

## Wollongong Local Planning Panel Assessment Report | 5 December 2018

<b>WLPP No.</b>	Item 2
<b>DA No.</b>	DA-2018/819
<b>Proposal</b>	Landscaping works, retaining wall and fencing
<b>Property</b>	7 Spray Street, Thirroul
<b>Applicant</b>	Matthew Benson
<b>Responsible Team</b>	Development Assessment and Certification – Building Certification (CB)

### ASSESSMENT REPORT AND RECOMMENDATION

#### Executive Summary

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#### Reason for consideration by Wollongong Local Planning Panel - Advice

The proposal has been referred to the Wollongong Local Planning Panel (WLPP) for advice pursuant to part 3 of the draft Wollongong City Council Submissions Policy as the application is determined to be of significant community interest by four (4) or more Councillors.

#### Proposal

The development application seeks approval for landscaping works, a retaining wall and fencing.

#### Permissibility

The subject site is zoned R2 Low Density Residential pursuant to Wollongong Local Environmental Plan (WLEP) 2009. The development is considered to be ancillary to a dwelling house which is permissible with consent in the zone.

#### Exhibition

Details of the proposal were publicly exhibited in accordance with Appendix 1 of the Wollongong Development Control Plan (WDCP) 2009.

A number of submissions were received; however, six (6) unique submissions were collated. Following the receipt of revised plans the proposal was renotified and three (3) additional unique submissions were received. The issues identified are discussed at section 1.5 of this report.

#### Main Issues

The main issues are:

- The proposed works will result in unacceptable flooding impacts
- The proposed works will result in unacceptable impacts upon drainage.
- Variations to the WDCP 2009 including retaining wall height, fencing height & part of retaining wall located within drainage easement

#### RECOMMENDATION

That approval be granted to DA-2018/819, subject to the draft conditions provided at Attachment 5.

## 1 APPLICATION OVERVIEW

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### 1.1 PLANNING CONTROLS

#### State Environmental Planning Policies:

- State Environmental Planning Policy No. 55 – Remediation of Land (SEPP No. 55)
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004
- State Environmental Planning Policy (Coastal Management) 2018

#### Local Environmental Planning Policies:

- Wollongong Local Environmental Plan 2009

#### Development Control Plans:

- Wollongong Development Control Plan 2009

#### Other Policies:

- Wollongong Development Contributions Plan

### 1.2 PROPOSAL

The development application request was lodged on 6 July 2018 and proposes landscaping works, a retaining wall and fencing. It is noted that approval was recently granted for a dwelling at the subject property: DA-2017/345. This dwelling is currently under construction and the proposed works are considered to be ancillary to the dwelling.

Revised architectural drawings are provided at Attachment 1. A copy of the revised Vegetation Restoration Plan is provided Attachment 2. Copies of two (2) revised engineering reports are provided as Attachment 3.

#### **Proposed Works**

##### Landscaping

- A variety of trees, shrubs, grasses and groundcovers arranged in three distinct planting zones depending on the level of flood affectation
- Hard landscaping elements including, paving, stepping stones, sandstone logs and sandstone boulders
- Weed removal on and near the watercourse

##### Retaining Wall

- Western boundary retaining wall constructed of steel posts and concrete sleepers
- Maximum retaining wall height of 830mm and wall length of approximately 18.326 metres

##### Fencing

- Side boundary timber fencing with a maximum height of 1.8 metres
- Front timber panel and sandstone pillar fencing with a maximum height of 1.2 metres

### 1.3 BACKGROUND

Application	Description	Application Type	Decision	Decision Date
PC-2017/1780	Residential – Dwelling house	Private Certifier – Construction Certificate	Completed	Dec 11 2017
DA-2017/345	Residential – Dwelling house	Integrated Development Application	Approved	Aug 7 2017
DA-2017/38	Residential – creek bank stabilisation works and construction of rock retaining walls	Integrated Development Application	Withdrawn	Mar 8 2017
DA-2016/1785	Residential - creek bank stabilisation works and construction of rock retaining walls	Development Application	Rejected	Jan 4 2017
DA-2016/1041	Residential - demolition of existing dwelling	Development Application	Approved	Aug 10 2016
BC-1998/807	Dwelling	Building Certificate Application	Not recorded	Not recorded

DA-2016/1785 for creek bank stabilisation works and construction of rock retaining walls was rejected due to a lack of sufficient information.

Unlike the current application, withdrawn application DA-2017/38 presented an engineering solution that sought to modify the location and form of the existing watercourse.

#### Customer service actions

There are no outstanding customer service requests of relevance to the development.

### 1.4 SITE DESCRIPTION

The site is located at 7 Spray Street, Thirroul and the title reference is Lot 1 DP 313546.

The site is a rectangular shaped block with direct street frontage. Land slopes gently from Spray Street to a watercourse, traversing the rear of the property. This watercourse flows into two culverts at 11 Spray Street and eventually into the ocean. The site contains a two (2) storey dwelling under construction and a back yard overtaken by weeds. A failing western boundary sheet metal retaining wall separates filled land at Number 5 Spray Street from the subject property. Likewise, the associated western boundary timber paling fence is failing.

The street scene in the immediate vicinity is characterised by low density residential development, predominantly of double storey construction, though noted within the streetscape are four (4) units at 11 Spray Street and a single storey heritage house of Local Significance at Number 10 Cliff Parade. The site is in close proximity to the coastal foreshore area which includes Thirroul Beach Reserve and Thirroul beach.



**Figure 1: Aerial photograph**

Property constraints

- Flood affected
- Foreshore Area LEP 2009
- Coastal hazard - current and future – ocean inundation extent
- Acid sulfate soils – Class 4 and Class 5
- 6.096m wide drainage easement

Council records identify the land as being located within the Coastal zone. The site is mapped as being located within the Coastal Use Area and the Coastal Environment Area Map.

**1.5 SUBMISSIONS**

The application was exhibited in accordance with WDCP 2009 Appendix 1: Public Notification and Advertising. The first notification dated 20 July 2018 received numerous submissions however there were six (6) collated as unique submissions. As a result of revised plans, a second notification dated 28 September 2018 was sent to submitters and three (3) unique submissions were received. The issues identified are discussed below.

<p><u>1. Plans</u></p> <ul style="list-style-type: none"> <li>- Plans are not clear and do not clearly indicate the proposal and are inconsistent.</li> </ul>	<p>Revised plans to clarify proposed works were requested, submitted and re-notified.</p>
<p><u>2. Policy Departures</u></p> <ul style="list-style-type: none"> <li>- The proposal departs from the Biodiversity Conservation Act &amp; Fisheries Management Act 1994</li> <li>- The proposal departs from</li> </ul>	<p>The proposed development was reviewed by Council’s Environment Officer who provided a satisfactory referral. With respect to key fish habitat the following comments relate: <i>“It is noted that dwellings already exist nearby in</i></p>

<p>Clauses 7.4, 7.6 and 7.7 of the WLEP 2009.</p> <ul style="list-style-type: none"> <li>- The proposal is not compliant with Chapters B1, E6, E13, E14 &amp; E23 of the DCP. Variation requests for Chapter B1 not suitably justified.</li> <li>- No Controlled Activity Approval for development</li> </ul>	<p><i>mapped Key Fish Habitat. Provided erosion and sediment controls are correctly installed and maintained during construction and all conditions of any controlled activity approval are complied with, impacts on Key Fish Habitat are expected to be minimal."</i></p> <p>It is considered that the proposal complies with the provisions of the WLEP 2009. Please refer to Section 2.1.4 for more detailed discussion.</p> <p>Overall, the proposal complies with most DCP provisions. Please refer to Section 2.31 for further discussion.</p> <p>The proposal does seek four variations to Council's policy and they are further discussed in Section 2.31 of this report (Chapter B1 &amp; E14).</p> <p>The proposal was reviewed by the Natural Resource Access Regulator who provided General terms of Approval for the development. Please refer to Attachment 5.</p>
<p><u>3. Previous Approvals at 7 Spray St, Thirroul</u></p> <ul style="list-style-type: none"> <li>- Previous like proposal for retaining wall refused</li> <li>- Proposal to ensure consistency with DA-2017/345 (Residential - Dwelling House) at the subject property. Conditions 9, 11, 15, 29, 32, 40 &amp; 47 of DA-2017/345 were highlighted</li> </ul>	<p>DA-2016/1785 for creek bank stabilisation works and construction of rock retaining walls was rejected due to a lack of sufficient information.</p> <p>Unlike the current application, withdrawn application DA-2017/38 presented an engineering solution that sought to modify the location and form of the existing watercourse.</p> <p>It is noted that DA-2017/345 does not include the western boundary retaining wall or landscaping works in the back yard. Submitter highlighted conditions from DA-2017/345 include:</p> <p>Condition 9 - Stormwater disposal. Condition recommended for compatibility between stormwater disposal system and landscaping works.</p> <p>Condition 11 relates to dwelling sub-floor structure within the floodplain only.</p> <p>Condition 15 - Overland flowpaths condition is consistent with the current proposal</p> <p>Condition 29 - Fencing condition is consistent with proposed fencing condition</p> <p>Condition 32 - No adverse runoff impacts on adjoining properties. Recommended condition duplicated for current application.</p> <p>Condition 40 Standard excavation/ filling/ retaining wall structure condition. Not applicable as no filling is proposed.</p> <p>Condition 47 Flood affectation certification. Recommended flooding conditions compliment this condition.</p>

<p><u>4. Flooding</u></p> <ul style="list-style-type: none"> <li>- inadequate analysis of flooding</li> <li>- proposal will increase flooding risk to surrounding properties</li> <li>- unacceptable financial impact on neighbouring properties from increased flooding risk</li> <li>- Proposed landscape features including the retaining wall, fencing, stone seating, sandstone logs, a deck and vegetation will increase flood risk</li> <li>- Proposed earthworks will increase flood risk</li> </ul>	<p>Council's Flood Engineer has reviewed submitted information and provided a satisfactory referral, subject to recommended conditions of consent. Such conditions are designed to ensure no increased flood risk for the locality.</p> <p>Financial impacts experienced by neighbours are generally not considerations in development application assessments. Notwithstanding, recommended conditions minimise flood risk and therefore associated financial impacts.</p> <p>The proposed retaining wall will not change existing levels along the joint property boundary between No. 5 &amp; 7 Spray Street. This is a replacement retaining wall.</p> <p>Subject to conditions of consent, proposed fencing within the floodplain will not obstruct the free flow of floodwaters, nor damage surrounding land in the event of a flood. Elsewhere, proposed fencing not located in the flood plain (such as the front fence) is not constrained by flooding and will be conditioned accordingly.</p> <p>Revised plans have removed the sandstone seating and deck</p> <p>Conditions are recommended to ensure that proposed features including sandstone logs, vegetation and earthworks will not increase flood risk in the locality</p>
<p><u>5. Earthworks &amp; Drainage</u></p> <ul style="list-style-type: none"> <li>- Proposed landscape features &amp; earthworks will have a detrimental impact on existing drainage patterns</li> <li>- proposed earthworks are excessive</li> </ul>	<p>Proposed works will not alter the location and existing levels of the watercourse bed.</p> <p>The revised proposal was reviewed by Council's Flood Engineer and Environment Officer who provided satisfactory referrals, subject to recommended conditions of consent to minimise drainage impacts.</p> <p>The proposal was referred to the Natural Resources Access Regulator who provided a satisfactory referral and General Terms of Approval to minimise drainage impacts.</p> <p>Proposed earthworks are considered to be minor and largely restricted to minor re-shaping of the northern bank (&lt;30m<sup>3</sup> excess excavation material). No filling is proposed.</p>
<p><u>6. Sea Level Rise</u></p> <ul style="list-style-type: none"> <li>- Proposal will contribute to sea level rise</li> </ul>	<p>Please refer to Section 2.1.3 of this report for further discussion.</p> <p>Council's Flood Engineer has reviewed the proposal in relation to Chapter E13 and has found the application to be conditionally satisfactory in relation to ocean inundation.</p>
<p><u>7. View Loss</u></p> <ul style="list-style-type: none"> <li>- Western boundary screen planting and fencing will result in view loss for western neighbour</li> </ul>	<p>Council officers have undertaken a view loss analysis based on view sharing principles which is included in section 2.31 of the report.</p>

<p>8. <u>Unsatisfactory referral</u></p> <p>- Council's Landscape Architect provided an unsatisfactory referral in relation to this application</p>	<p>Revised plans submitted for this application were reviewed by Council's Landscape Architect who provided a satisfactory referral, subject to recommended conditions of consent.</p>
<p>9. <u>Proposed works are unnecessary</u></p>	<p>The necessity of a proposal is generally not a consideration in DA assessment.</p> <p>The proposed works are requested to replace a structurally failing side boundary retaining wall and fencing, and to complete vegetation restoration works for a watercourse invaded by weeds.</p> <p>General landscaping of the site compliments the new approved dwelling currently under construction.</p>
<p>10. <u>Unrelated Matters pertaining to the subject site</u></p> <p>- For example, approval of the current dwelling under construction</p>	<p>It is beyond the purpose and scope of this report to incorporate unrelated matters into the assessment of this current application.</p>

## 1.6 CONSULTATION

### 1.6.1 INTERNAL CONSULTATION

Council's Flood, Landscape, Heritage, Environment & Coastal Officers have reviewed the application and provided satisfactory referrals.

These include recommended conditions which are included as part of Attachment 5.

### 1.6.2 EXTERNAL CONSULTATION

The proposal was referred to the Natural Resources Access Regulator who provided a satisfactory referral and General Terms of Approval. The General Terms of Approval are included as part of Attachment 6.

## 2 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 – 4.15 EVALUATION

### 2.1 SECTION 4.15(1)(A)(1) ANY ENVIRONMENTAL PLANNING INSTRUMENT

#### 2.1.1 STATE ENVIRONMENTAL PLANNING POLICY NO. 55 – REMEDIATION OF LAND

##### **7 Contamination and remediation to be considered in determining development application**

- (1) *A consent authority must not consent to the carrying out of any development on land unless:*
- (a) *it has considered whether the land is contaminated, and*
  - (b) *if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*
  - (c) *if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.*
- (2) *Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.*

- (3) *The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.*
- (4) *The land concerned is:*
- (a) *land that is within an investigation area,*
  - (b) *land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,*
  - (c) *to the extent to which it is proposed to carry out development on it for residential, educational, recreational or child care purposes, or for the purposes of a hospital—land:*
    - (i) *in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and*
    - (ii) *On which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).*

A desktop audit of previous land uses does not indicate any historic use that would contribute to the contamination of the site. There are minor earthworks proposed and the proposal does not comprise a change of use. No concerns are raised in regard to contamination as relates to the intended use of the land and the requirements of clause 7.

#### 2.1.2 STATE ENVIRONMENTAL PLANNING POLICY (BUILDING SUSTAINABILITY INDEX: BASIX) 2004

The provisions of BASIX, do not apply to the proposal.

#### 2.1.3 STATE ENVIRONMENTAL PLANNING POLICY (COASTAL MANAGEMENT) 2018

##### 3. Aims of Policy

*The aim of this Policy is to promote an integrated and coordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area, by:*

- (a) *managing development in the coastal zone and protecting the environmental assets of the coast, and*
- (b) *establishing a framework for land use planning to guide decision-making in the coastal zone, and*
- (c) *mapping the 4 coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the Coastal Management Act 2016.*

##### Division 1 Coastal wetlands and littoral rainforests area

10 Development on certain land within coastal wetlands and littoral rainforests area

11 Development on land in proximity to coastal wetlands or littoral rainforest

##### Division 2 Coastal vulnerability area

12 Development on land within the coastal vulnerability area

##### Division 3 Coastal environment area

13 Development on land within the coastal environment area

##### Division 4 Coastal use area

14 Development on land within the coastal use area

## Division 5 General

15 Development in coastal zone generally—development does not to increase risk of coastal hazards

Development consent must not be granted to development on land within the coastal zone unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land.

16 Development in coastal zone generally—coastal management programs to be considered

Development consent must not be granted to development on land within the coastal zone unless the consent authority has taken into consideration the relevant provisions of any certified coastal management program that applies to the land.

18 Hierarchy of development controls if overlapping

If a single parcel of land is identified by this Policy as being within more than one coastal management area and the development controls of those coastal management areas are inconsistent, the development controls of the highest of the following coastal management areas (set out highest to lowest) prevail to the extent of the inconsistency:

- (a) the coastal wetlands and littoral rainforests area,
- (b) the coastal vulnerability area,
- (c) the coastal environment area,
- (d) the coastal use area.

A review of the SEPP's mapping extents identifies the subject site as being located within coastal environment area and coastal use area.

Division 3 clause 13 applies to coastal environment areas. Consent must not be granted unless the consent authority has considered matters set out in subclause 1 and 2. These matters include impacts on vegetation, marine life and water quality, vegetation, Aboriginal heritage and community access. The development is designed, sited and will be managed to avoid the adverse impacts referred to in subclause 1. All matters detailed in subclause 1 and 2 are considered satisfactory.

Division 4 clause 14 applies to coastal use areas. Consent must not be granted unless the consent authority has considered matters set out in subclause 1 and 2. These matters include impacts on safe public access, overshadowing, wind funnelling, loss of views from public places to foreshores, visual amenity, Aboriginal heritage and cultural and built environment heritage. The development is designed, sited and will be managed to avoid the adverse impacts referred to in subclause 1. All matters detailed in clause 1 and 2 are considered satisfactory.

Division 5 includes general provisions for development in the coastal zone. Clause 16 applies to development in the coastal zone generally and states that development consent must not be granted to development on land within the coastal zone (other than land to which clause 13 applies) unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land. As detailed elsewhere within this report, the proposal is not expected to increase the risk of coastal hazards on the subject land or any other land.

### **NSW Coastal Management Act 2016 and Wollongong Coastal Zone Management Plan**

On 30 October 2017, Council endorsed the final draft of the Wollongong Coastal Zone Management Plan (CZMP) for resubmission to the NSW Minister for Environment for certification. The draft Plan was certified on 20 December 2017.

At the Council meeting of 19 February 2018, Council resolved that the certified final draft be adopted. Council's Notice was published in the NSW Gazette No 25 of 9 March 2018 and a

community briefing on the implications arising from Council adopting and gazetting the plan have been undertaken.

The NSW Coastal Management Act 2016 came into force on 3 April 2018. Under the Act any existing certified CZMP's continue in force until 2020. The Wollongong CZMP has been prepared to direct the management of risks from coastal hazards along the Wollongong LGA coastline.

A review of Council's associated CZMP coastal hazard mapping extents identifies that the subject site is partially impacted by coastal inundation at the 2010/ 2015/ 2100 timeline in the vicinity of the landscape works. The risk described for residences at this location is medium for inundation in 2010, high for inundation in 2050 and extreme for inundation in 2100 (pg 119 Wollongong CZMP: Management Study)

Coastal inundation (during high tides combined with storms and sea level rise) can occur as both wave overtopping of beaches and dunes or inundation of land behind the open coastline via coastal creeks, estuaries or stormwater systems connecting to the ocean.



**Figure 2: 2010 Ocean inundation extent map from Dekho**



**Figure 3: 2050 Ocean inundation extent map from Dekho**



**Figure 4: 2100 Ocean inundation extent map from Dekho**

Council's Flood Engineer has reviewed the proposal in relation to Chapter E13 and has found the application to be conditionally satisfactory in relation to ocean inundation.

It is noted that this proposal is for landscaping works, retaining wall and fencing only. Habitable rooms in the approved dwelling (DA-2018/345) are all located outside the ocean inundation mapped areas.

Additionally, the Immediate Inundation Risk Level and the Treatment Options Thirroul Beach Map shows no adverse ocean inundation impact upon the subject site with the overtopping risk treated by erosion option (pg 120 Wollongong CZMP: Management Study).

## 2.1.4 WOLLONGONG LOCAL ENVIRONMENTAL PLAN 2009

### Part 1 Preliminary

#### Clause 1.4 Definitions

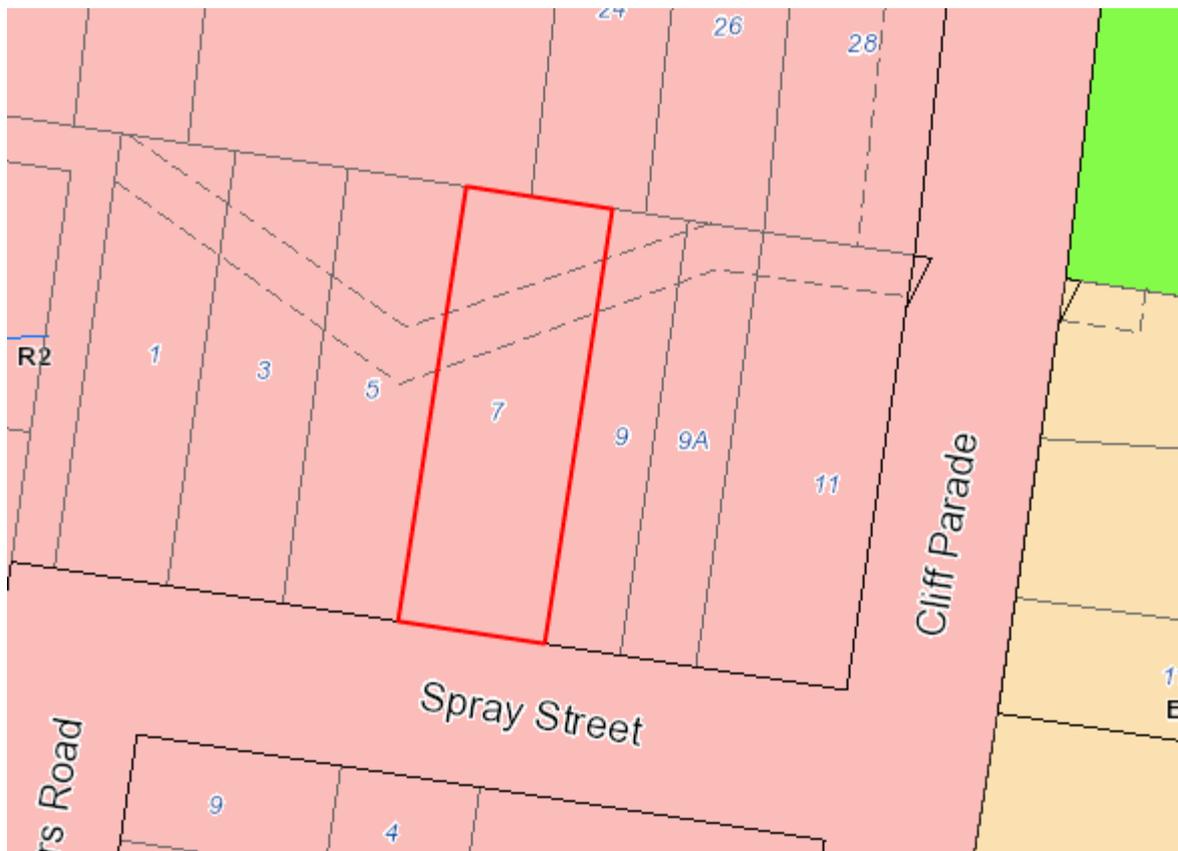
**Dwelling house** means a building containing only one dwelling.

**Note.** Dwelling houses are a type of residential accommodation—see the definition of that term in this Dictionary.

### Part 2 Permitted or prohibited development

#### Clause 2.2 – zoning of land to which Plan applies

The zoning map on the following page identifies the land as being zoned R2 Low Density Residential.



**Figure 5: WLEP 2009 zoning map**

#### Clause 2.3 – Zone objectives and land use table

The objectives of the zone are as follows:

- *To provide for the housing needs of the community within a low density residential environment.*
- *To enable other land uses that provide facilities or services to meet the day to day needs of residents.*

It is considered that the proposed landscaping works, retaining wall and fencing are ancillary to the use of the dwelling house under construction and are generally satisfactory with regards to the above objectives for Zone R2 Low Density Residential.

The land use table permits the following uses in the zone.

## **ZONE R2 Low Density Residential permitted uses:**

Attached dwellings; Bed and breakfast accommodation; Boarding houses; Boat launching ramps; Child care centres; Community facilities; Dual occupancies; **Dwelling houses**; Environmental facilities; Exhibition homes; Exhibition villages; Group homes; Health consulting rooms; Hospitals; Hostels; Information and education facilities; Jetties; Multi dwelling housing; Neighbourhood shops; Places of public worship; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Residential flat buildings; Roads; Semi-detached dwellings; Seniors housing; Shop top housing; Signage; Veterinary hospitals

The proposal is categorised as ancillary to the use of a dwelling house as defined above and is permissible in the zone with development consent.

### **Part 4 Principal development standards**

#### Clause 4.3 Height of buildings

The maximum height of the proposed western boundary fence/ retaining wall combination is 2.63 metres which does not exceed the maximum building height of 9m permitted for the site.

#### Clause 4.4 Floor space ratio

The proposal does not increase the gross floor area of the subject property.

### **Part 5 Miscellaneous provisions**

#### Clause 5.10 Heritage conservation

The subject property is located opposite to a house at 10 Cliff Parade, Thirroul (corner of Spray Street) which is a heritage item of local significance – Item No. 6154.

The proposed development was referred to Council's Heritage Officer who provided a satisfactory referral. No conditions of consent were recommended. It is considered that the proposed development will not impact adversely upon the subject heritage item.

### **Part 7 Local provisions – general**

#### Clause 7.1 Public utility infrastructure

The subject site is already serviced by public utilities.

#### Clause 7.3 Flood planning area

The land is identified as being flood affected. The application was supported with a vegetation restoration plan and engineering reports (Please refer to Attachments 2 & 3). Council's Flood Engineer has assessed the application in this regard and has not raised objections, subject to appropriate conditions of consent.



Figure 6: Map showing extent of flood affected land at 7 Spray Street, Thirroul in orange and red shaded areas

Clause 7.4 Riparian Lands

The site is affected by riparian lands as shown on the map below:



Figure 7: WLEP 2009 Riparian Lands

The objective of the clause is to ensure that development does not adversely impact upon riparian lands.

Landscaping works seek to rehabilitate riparian vegetation on and near the watercourse by removing weeds and replacing them with appropriate native species as documented in the submitted landscape plan and vegetation restoration plan.

The proposal was considered by Council's Flood, Environment and Landscape Officers who provided satisfactory referrals, subject to recommended conditions of consent. The Environment Officer offered the following:

*"Clause 7.4 Riparian Lands of Wollongong LEP 2009*

*Riparian Land has been mapped as occurring on the subject lot. Provided erosion and sediment control measures are correctly installed and maintained during construction, and all conditions of any controlled activity approval are complied with, adverse impacts on mapped Riparian Land are not expected."*

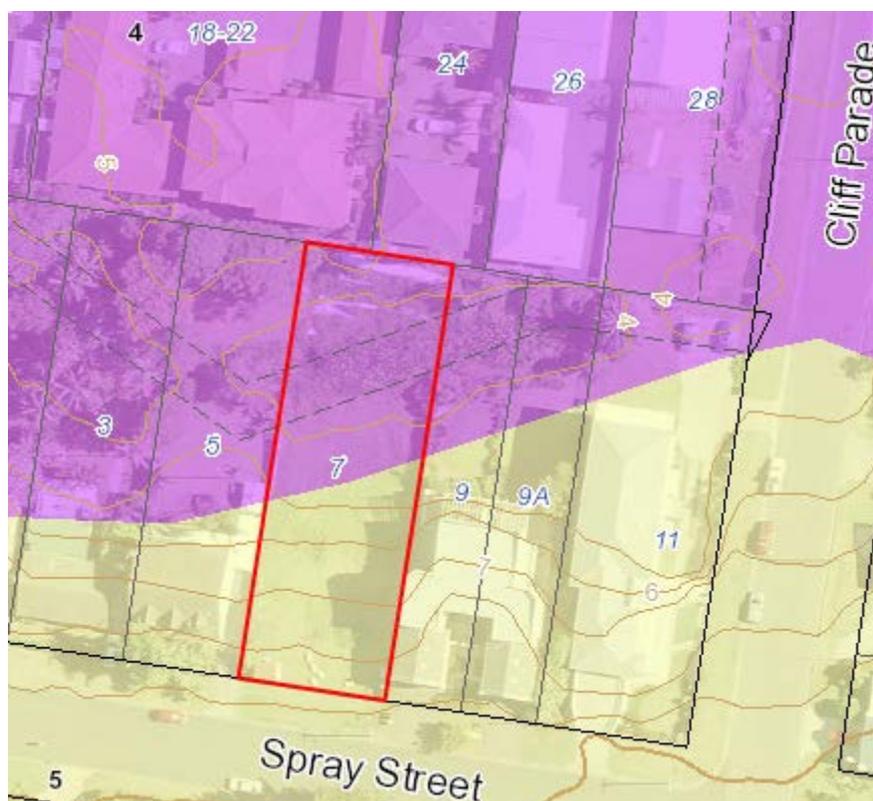
The proposal was also considered by the Natural Resources Access Regulator who provided a satisfactory referral and General Terms of Approval. Please refer to Attachment 6.

#### Clause 7.5 Acid Sulphate Soils

The objective of the clause is to ensure that development does not disturb, expose or drain acid sulphate soils and cause environmental damage.

The subject site is identified as being affected by Class 4 & 5 acid sulphate soils. An acid sulphate soils management plan is not required as the potential disturbance of acid sulphate soils can be addressed with conditions of consent.

The proposal was reviewed by the Environment Officer who recommended the standard condition for the management of acid sulphate soils.



**Figure 8: WLEP 2009 Acid Sulphate Soils**

### Clause 7.6 Earthworks

Minor earthworks are required to facilitate the proposed development. The western boundary retaining wall will not change existing ground levels at this location and no filling of the land is proposed. Existing watercourse bed levels will remain. Minor re-shaping of the northern bank (<30m<sup>3</sup> excess excavation material) forms part of the landscaping works. Please refer to approved plans in Attachment 1. The proposal was reviewed by Council's Flood Engineer and found to be satisfactory, subject to recommended conditions of consent.

As the works occur within a watercourse, the proposal was referred to the Natural Resources Access Regulator who provided a satisfactory referral and General Terms of Approval.

It is considered that the earthworks will have a minimal detrimental impact on environmental functions and processes, neighbouring uses and features of the surrounding land.

### Clause 7.7 Foreshore Building Line



**Figure 9: WLEP 2009 Foreshore Building Line**

The proposed western boundary retaining wall and fence will be partially located within the foreshore building line and they replace an existing, failing sheet metal retaining wall and timber paling fence. Clause 2(a), Clause 7.7 of the LEP states:

*“(2) Development consent must not be granted under subclause (2) unless the consent authority is satisfied that:*

*(a) the extension, alteration or rebuilding of an existing building wholly or partly in the foreshore area,”*

Both the fence and retaining wall fall within the definition of a ‘building’ as defined in the Wollongong LEP 2009 and the Environmental Planning and Assessment Act 1979, which provides the following definition:

*“**Building** includes part of a building, and also includes any structure or part of a structure (including any temporary structure or part of a temporary structure), but does not include a manufactured home, moveable dwelling or associated structure within the meaning of the Local Government Act 1993.”*

The flood impacts pertaining to the features of the site have been assessed by Council's Stormwater Engineer and found to be satisfactory.

The development is considered to contribute to achieving the objectives for the zone in which the land is located (see Clause 2.3 above).

The appearance of the proposed development from adjacent foreshore areas is considered to be compatible with the surrounding area.

The application was reviewed by Council's Environment Officer who provided a satisfactory referral. It is not anticipated that the proposed development will cause environmental harm such as pollution or siltation, or adversely affect marine habitats.

The development will not cause congestion of, or generate conflicts between, people using open space areas or waterways areas or the waterway. Public access to the foreshore is not affected by the proposal.

It is considered that the landscaping works, retaining wall and fencing will improve the aesthetic appearance of the foreshore by replacing weeds with native species and removing existing, dilapidated structures.

## **2.2 SECTION 4.15(1)(A)(II) ANY PROPOSED INSTRUMENT**

None applicable.

## **2.3 SECTION 4.15(1)(A)(III) ANY DEVELOPMENT CONTROL PLAN**

### **2.3.1 WOLLONGONG DEVELOPMENT CONTROL PLAN 2009**

#### **CHAPTER A1 – INTRODUCTION**

##### **8 Variations to development controls in the DCP**

The proposed development seeks variations to Section 4.0 General Residential Controls of Chapter B1 Residential Development including cl. 4.9.2.10b & cl. 4.17.3.9b Combined fence and retaining wall height on a sloping block and cl.4.17.3.1a Maximum retaining wall height of 600mm within 900mm of a side boundary.

The proposed development seeks a variation cl. 11.4 Conditions for Building over Common Stormwater Lines and Stormwater Easements of Chapter E14 Stormwater Management.

A variation statement, prepared in accordance with clause 8, has been submitted and is presented in Attachment 4. An assessment of the variation requests is included below in Chapter B1 Residential Development and Chapter E14 Stormwater Management.

#### **CHAPTER A2 – ECOLOGICALLY SUSTAINABLE DEVELOPMENT**

Development controls to improve the sustainability of development throughout Wollongong are integrated into the relevant chapters of this DCP.

Generally speaking, the proposal is considered to be consistent with the principles of Ecologically Sustainable Development.

## CHAPTER B1 – RESIDENTIAL DEVELOPMENT

The assessment table below relates to the assessment of this development application:

### 4.0 General Residential Controls

<i>Controls/objectives</i>	<i>Comment</i>	<i>Compliance</i>
<u>4.1 Maximum Number of Storeys</u>	The maximum height of the proposed western boundary fence/retaining wall combination is 2.63 metres.	Satisfactory
<u>4.2 Front Setbacks</u>	The proposal does not include dwelling or outbuilding construction.	Not applicable
<u>4.3 Side and Rear Setbacks</u>	The proposal does not include dwelling or outbuilding construction.	Not applicable
<u>4.4 Site coverage</u>	Lot Size: 1138.178m <sup>2</sup> The development will not reduce or change the existing site coverage of 27%.	Satisfactory
<u>4.5 Landscaped Area</u>	Lot Size: 1138.178m <sup>2</sup> Proposed Landscaping: 682.85m <sup>2</sup> The minimum required landscaped area for the subject property is 305.271m <sup>2</sup> . More than 50% per cent of the landscaped area is located behind the front building line, landscaped areas are integrated with the drainage design and a number of trees are included with the proposal.	Satisfactory

4.6 Private Open Space

The previously approved rear verandah (DA-2017/345) provides sufficient, suitable private open space for residents, which is not diminished by this development.

Satisfactory

4.7 Solar Access

Proposed landscaped areas are characterised by a variety of grasses, groundcovers, shrubs and trees located primarily in the front and rear yard of the subject property - a long rectangular block with a general north/south orientation.

Satisfactory

Given the proposed design at this location, it is considered that there is adequate solar access for adjoining residences in accordance with the policy.

4.8 Building Character and Form

The proposal is considered generally compliant with its natural and built context.

Satisfactory

The proposed fence within the front building line is sufficiently transparent in terms of design and height to maintain a visual connection between the dwelling and the street

<u>4.9 Fences</u>	<p>The proposal includes replacement fencing along the western side boundary with 1.8m high timber paling fencing proposed outside the drainage easement (below 4.78m AHD) and a 1.6m high flood compatible fence within the easement.</p> <p>Council's Flood Engineer has reviewed the proposal and recommended that all fencing within the flood plain shall not obstruct the free flow of flood waters. This area is more extensive than the easement (See Figure 6)</p> <p>Replacement side boundary fencing on land that is not flood affected and behind the front building line, complies with the provisions of this clause. A standard maximum height of 1.8 m is recommended in this regard.</p> <p>There is also a new front fence forward of the front building line with an open style design and maximum height of 1.2 metres.</p> <p>The maximum combined height of the western side fence and retaining wall is 2.63 metres which is non-compliant with the provisions of 10(b).</p>	See variation comments below
<u>4.10 Car parking and Access</u>	Existing approved access and parking (DA-2017/345) for the property is unchanged by this development.	N/A
<u>4.11 Storage Facilities</u>	The proposal does not include a dwelling or outbuilding.	N/A
<u>4.12 Site Facilities</u>	It is considered that the proposal is capable of providing adequate site facilities for the property.	Satisfactory
<u>4.13 Fire Brigade Servicing</u>	Existing - no proposed changes.	Existing

<u>4.14 Services</u>	Existing services are available to the site.	Existing
<u>4.15 Development near the coastline</u>	<p>The property is located about 100m from the commencement of sand or a rock platform. Accordingly, the site while in a coastal area, is not considered to be within close proximity to the coastal foreshore area.</p> <p>It is considered that the proposal does not adversely impact on the requirements of this clause.</p>	Satisfactory
<u>4.16 View sharing</u>	<p>Submission were received in relation to view loss associated with the proposed fencing and landscaping works.</p> <p>An assessment of view loss against the view sharing principles is provided below.</p>	Satisfactory. Detailed view impact analysis below.
<u>4.17. Retaining walls</u>	<p>The proposal is for a western boundary retaining wall with a maximum height of 830mm. This feature is non-compliant with Control 1(a).</p> <p>This retaining wall includes a 1.8m high fence with a combined maximum height of 2.63m which is non-compliant with the provisions of Control 9(b).</p> <p>Conditions are recommended for retaining wall design and construction.</p>	See Variation Statements below
<u>4.18 Swimming pools and spas</u>	Not applicable to this modification	N/A
<u>4.19 Development near railway corridors and major roads</u>	Not applicable to this modification	N/A
<u>4.20 Additional controls for semi-detached dwellings-alterations and additions</u>	Not applicable to this modification	N/A

<u>4.21 Additional controls for Dual Occupancies minimum site width</u>	Not applicable to this modification	N/A
<u>4.22 Additional controls for Dual Occupancies –building character and form</u>	Not applicable to this modification	N/A
<u>4.23 Additional Controls for Dual Occupancy’s – Deep Soil Zones</u>	Not applicable to this modification	N/A

**Variation Requests - 4.9 Fences & 4.17 Retaining Walls**

1. A variation is sought with respect to the combined side fence and retaining wall height on a sloping block.

Clauses to 4.9.2.10b & cl. 4.17.3.9b 4.1.2.1.3 both limit the combined side fence and retaining wall height on a sloping block to a maximum height of 2.2 metres above existing ground level.

The applicant seeks consent to replace an existing western side boundary retaining wall and fence that are structurally failing and to maintain existing ground levels. The combined retaining wall/fence height will range from 1.9 to 2.63 metres, with the subject property located on the low side. The non-compliant section will be approximately 13.7 metres in length.

It is asserted that the level difference is a result of fill placed in the rear yard of the western neighbour at No. 5 Spray Street.

It is noted that the majority of the side boundary fencing is located within flood affected land. In this regard, Council’s Flood engineer has recommended the installation of suitable fencing that will not obstruct the free flow of flood waters. Such fencing is characteristically open in style, thus reducing the visual dominance of a high retaining wall/fence combination.

Restricted to a maximum height of 1.5 metres, western side boundary fencing on the flood affected property would result in a 6 metre non-compliant section of fence/ retaining wall with a combined maximum height of 2.33m. Such a design is only marginally non-compliant with the above stated controls whilst providing secure fencing that moderates the visual impact of a high fence/ retaining wall combination.

The amended fence design is considered to suitably address the objectives relating to this control.

A Variation justification statement in accordance with Clause 8 Chapter A1 of WDCP 2009 has been submitted. A copy is provided at Attachment 4. Subject to recommended conditions of consent, the variations are supported in this instance.

2. A variation is sought with respect to maximum retaining wall height

Clause cl.4.17.3.1a limits the maximum retaining wall height to 600mm within 900mm of a side boundary.

The applicant seeks consent to replace an existing western side boundary retaining wall that is structurally failing and to maintain existing ground levels. Retaining wall heights range from

100mm to 830mm. It is asserted that the level difference is a result of fill placed in the rear yard of the western neighbour at No. 5 Spray Street.

Retaining wall materials, consisting of steel posts and concrete sleepers, will be structurally sound, maximise the use of available space and shall be maintenance friendly.

Conditions are recommended for retaining wall design and construction.

The design is considered to suitably address the objectives relating to this control.

A Variation justification statement in accordance with Clause 8 Chapter A1 of WDCP 2009 has been submitted. A copy is provided at Attachment 4. The variation is supported in this instance.

### **View Loss Analysis**

In the Land & Environment Court, the case of Tenacity Consulting versus Warringah (2004) NSWLEC 140 Roseth SC made the following planning principles when assessing the extent of view loss and whether it is considered a reasonable outcome.

The following four step process is recognised:-

**Step One– Assessment of the view to be affected.** *Water views are valued more highly than land views. Iconic views (eg of the Opera House, the Harbour Bridge or North Head) are valued more highly than views without icons. Whole views are valued more highly than partial views eg a water view in which the interface between land and water is visible is more valuable than one in which it is obscured..*

The objection is received from No. 5 Spray Street (neighbouring dwelling to the west) regarding water view loss from the rear yard posed by the proposed western boundary fencing and landscaping.

The view corridor is not considered significant as per the Step One principle as the rear yard is located some 130m eastward from the ocean, is obscured by existing development and vegetation and is across side property boundaries. Five properties separate the western neighbour from the ocean.



**Figure 10: East view from rear yard of Number 5 Spray St, Thirroul (near eastern boundary fence and metal garden shed)**

**Step Two – To consider from what part of the property the views are obtained.** *For example the protection of views across side boundaries is more difficult than the protection of views from front and rear boundaries. In addition, whether the view is enjoyed from standing or sitting position may also be relevant. Sitting views are more difficult to protect than standing views. The expectation to retain side views and sitting views is often unrealistic.*

The best yard water views are obtained near the eastern side boundary of Number 5 Spray Street in the vicinity of the metal garden shed. Please refer to Figure 10 above. With no seating in the rear yard, it is assumed that the view referred to is obtained from a standing position.

**Step 3 – To assess the extent of the impact.** *This should be done from the whole of the property not just for the view that is affected. The impact on views from living areas is more significant than from bedrooms and service areas (though views from kitchens are highly valued because people spend so much time in them). The impact may be assessed quantitatively, but in many cases this can be meaningless. For example, it is unhelpful to say that the view loss is 20% if it includes one of the sails of the Opera House. It is usually more useful to assess the view loss qualitatively as negligible, minor, moderate, severe or devastating.*

It is anticipated that view loss from the dwelling of No. 5 Spray Street from the proposed works will be negligible, with visibility to the east restricted to the front garden at No. 7, the eastern side fence and views to the back yard of No. 7 from the north-eastern corner of the dwelling (first floor).

View loss from replacement boundary fencing is considered negligible as the majority of No. 7 is flood affected, necessitating the use of open style fencing in the rear yard to permit the free flow of

floodwaters. A recommended maximum fence height of 1.5m would maintain side boundary water views from a standing position in the rear yard of Number 5.

Proposed landscaping in the back yard of No. 7 includes a mix of lawn, groundcovers, shrubs and trees that is domestic in scale and generally consistent with other rear yards in the neighbourhood. Overall, the water view loss experienced from the proposed landscaping is considered to be negligible.

The objector expressed particular concern regarding view loss from the proposed western boundary *Syzygium australe* screen planting - about 7.5 metres in length and, without pruning, about 4 metres high.



**Figure 11: East view from the rear yard of No. 5 Spray Street in the vicinity of the proposed *Syzygium australe* screen planting (located behind fence)**

Eastern rear yard water view loss from No. 5 in the vicinity of the *Syzygium* screen planting is considered to be minor as the existing view is largely obscured by fencing, buildings and vegetation. Please refer to Figure 11 above.

A recommended condition to limit screen planting height at this location to a maximum of 2.5 metres will mitigate view loss from such planting.

**Step 4 – To assess reasonableness of proposal that is causing the impact.** *A development that complies with all planning controls would be considered more reasonable than one that breaches them. Where an impact on views arising as a result of non-compliance with one or more planning controls, even a moderate impact may be considered unreasonable. With a complying proposal, the question should be asked whether a more skilful design could provide the applicant with the same development potential and amenity and reduce the impact on the views of the neighbours. If the answer to that question is no, then the view impact of a complying development would probably be considered acceptable and the view sharing reasonable.*

The development achieves the planning controls for height, site coverage and landscaped area. Overall, the proposed retaining wall, fencing and landscaping works are considered reasonable. The failing side boundary retaining wall and fence will be replaced without changing existing levels and new fencing at this location will permit the free flow of floodwaters. Landscaping works will restore a back yard traversed by a watercourse that is overgrown with weeds.

It is noted that the rear yard of No. 5 is located in a relatively higher position in comparison to the yard at No. 7. By replacing the existing timber paling fence with open style fencing, views to the east from the back yard of No. 5 will be dominated by the back yard of No. 7, affording little privacy for either residents. A recommended condition for lower screen plants between the boundary of No. 5 & 7 will achieve a lower maximum height to balance privacy and view loss concerns.

#### **CHAPTER D1 – CHARACTER STATEMENTS**

##### Thirroul

Chapter D1 indicates that Thirroul’s residential development will remain primarily a low density residential suburb. The proposed development is a permissible use in the R2 zone is considered low density and reasonably satisfies controls. The proposal is not considered to be inconsistent with the existing and desired future character for the locality.

#### **CHAPTER E6: LANDSCAPING**

This development application for landscaping works, a retaining wall and fencing was accompanied with a detailed landscape plan and vegetation restoration plan (VRP). The VRP includes maintenance and monitoring of the subject works. Please refer to Attachment 2.

Proposed landscaping seeks to primarily restore riparian vegetation on or near the watercourse.

The proposal was referred to Council’s Environment Officer and Landscape Architect who provided satisfactory referrals, subject to recommended conditions of consent.

#### **CHAPTER E7: WASTE MANAGEMENT**

The submitted Site Waste Minimisation and Management Plan satisfies the objectives of this DCP Chapter. The amount of excess excavated material is estimated at less than 30m<sup>3</sup>. Standard condition recommended for site waste management.

#### **CHAPTER E11: HERITAGE CONSERVATION**

The subject property is located opposite to a house at 10 Cliff Parade, Thirroul (corner of Spray Street) which is a heritage item of local significance – Item No. 6154.

The proposed development was referred to Council’s Heritage Officer who provided a satisfactory referral. No conditions of consent were recommended. It is considered that the proposed development will not impact adversely upon the subject heritage item.

#### **CHAPTER E13: FLOODPLAIN MANAGEMENT**

The land is identified as being flood affected. Council’s Flood Engineer has assessed the application in this regard and has not raised objections, subject to appropriate conditions of consent.

#### **CHAPTER E14: STORMWATER MANAGEMENT**

##### **Variation - Section 11.4 Conditions for Building over Common Stormwater Lines and Stormwater Easements**

The proposed retaining wall design entails a 5 metre encroachment into the existing drainage easement located at the rear of the subject property. Council’s Stormwater Engineers support the encroachment in this instance for the following reasons:

- The previous landform modifications on the adjoining lot to the west creates the change in level between the development lot and the adjoining lot
- There is no existing stormwater infrastructure within the easement

- Undertaking battering or additional fill would not be supported given the flooding constraints for the site
- The proposed retaining wall is of concrete sleeper construction with localised piers, and removal of such a structure should future works be proposed would not be prohibitive

Conditions have been applied to the development to ensure no adverse impacts on adjoining properties.

#### **CHAPTER E19 EARTHWORKS (LAND RESHAPING WORKS)**

Minor earthworks are required to facilitate the proposed development. The western boundary retaining wall will not change existing ground levels at this location and no filling of the land is proposed. Existing watercourse bed levels will remain. Minor re-shaping of the northern bank (<30m<sup>3</sup> excess excavation material) forms part of the landscaping works. The proposal was reviewed by Council's Flood Engineer and found to be satisfactory, subject to recommended conditions of consent.

As the works occur within a watercourse, the proposal was referred to the Natural Resources Access Regulator who provided a satisfactory referral and General Terms of Approval.

#### **CHAPTER E21 DEMOLITION AND ASBESTOS MANAGEMENT**

Minimal demolition is required to facilitate this development. It is considered that the proposed demolition satisfies the objectives of this chapter of the DCP. Standard demolition condition recommended.

#### **CHAPTER E22 SOIL EROSION AND SEDIMENT CONTROL**

Councils' Flood Engineer, Environment Officer and the Natural Resources Access Regulator reviewed the proposal and recommended conditions to ensure adequate erosion and sediment control measures.

#### **CHAPTER E23 RIPARIAN AND MANAGEMENT**

Councils' Flood Engineer, Environment Officer and the Natural Resources Access Regulator reviewed the proposal and recommended conditions to ensure adequate riparian management provisions.

#### **2.3.2 WOLLONGONG SECTION 94A DEVELOPMENT CONTRIBUTIONS PLAN**

The development is exempt from the policy as the cost of construction is \$100,000 or less.

#### **2.4 SECTION 4.15(1)(A)(IIIA) ANY PLANNING AGREEMENT THAT HAS BEEN ENTERED INTO UNDER SECTION 7.4, OR ANY DRAFT PLANNING AGREEMENT THAT A DEVELOPER HAS OFFERED TO ENTER INTO UNDER SECTION 7.4**

There are no planning agreements entered into or any draft agreement offered to enter into under S7.4 which affect the development.

#### **2.5 SECTION 4.15(A)(IV) THE REGULATIONS (TO THE EXTENT THAT THEY PRESCRIBE MATTERS FOR THE PURPOSES OF THIS PARAGRAPH)**

##### 92 What additional matters must a consent authority take into consideration in determining a development application?

The Government Coastal Policy only applies to the offshore component of the coastal zone, extending three nautical miles seaward from the open coast high water mark.

##### 93 Fire safety and other considerations

No proposed change of building use.

94 Consent authority may require buildings to be upgraded

Not applicable.

**2.6 SECTION 4.15(A)(V) ANY COASTAL ZONE MANAGEMENT PLAN (WITHIN THE MEANING OF THE COASTAL PROTECTION ACT)**

Please refer to Section 2.1.3.

**2.7 SECTION 4.15(1)(B) THE LIKELY IMPACTS OF DEVELOPMENT**

Context and Setting:

The proposal has been assessed with regard to the amenity impacts from the development, the zoning and existing and future character of the area, and is considered to be compatible with the local area. The development is comparable to other developments in the locality.

Access, Transport and Traffic:

There will be minimal adverse impact on the access, transport or traffic for the surrounding area as a result of the proposed development.

Public Domain:

There will be minimal adverse impact on the public domain as a result of the proposed development.

Utilities:

The proposal is not envisaged to place an unreasonable demand on utilities supply. Existing utilities are able to service the development.

Heritage:

Heritage items are not expected to be adversely impacted by the proposal. No Aboriginal objects are known to exist upon the site.

Other land resources:

The proposal is considered to contribute to orderly development of the site and is not envisaged to impact upon any valuable land resources.

Water:

The site is presently serviced by Sydney Water, which can be readily extended to meet the requirements of the proposed development.

Soils:

There will be minimal adverse impacts on the soils of the subject site or surrounding area as a result of the proposed development.

Air and Microclimate:

The proposal is not expected to have negative impact on air or microclimate.

Flora and Fauna:

The proposal is not expected to have negative impact on flora or fauna.

Waste:

A condition will be attached to any consent granted that an appropriate receptacle be in place for any waste generated during the construction. Existing waste collection arrangements.

Energy:

The proposal is not envisaged to have unreasonable energy consumption.

Noise and vibration:

A condition will be attached to any consent granted that nuisance be minimised during any construction, demolition, or works.

Technological hazards:

There are no technological hazards affecting the site that would prevent the proposal.

Safety, Security and Crime Prevention:

This application does not promote greater opportunities for criminal or antisocial behaviour.

Social Impact:

Adverse social impacts are not expected.

Economic Impact:

The proposal is not expected to create negative economic impact.

Cumulative Impacts:

The proposal is not expected to have negative cumulative impacts.

**2.8 SECTION 4.15(1)(C) THE SUITABILITY OF THE SITE FOR DEVELOPMENT**

Does the proposal fit in the locality?

It is considered that the proposed development is generally in keeping with the planning policies that apply to the area. Subject to recommended conditions of consent, approval of the development is not expected to result in significant adverse impacts on the environment or development in the locality.

Are the site attributes conducive to development?

There are no site constraints that would prevent the proposal.

**2.9 SECTION 4.15(1)(D) ANY SUBMISSIONS MADE IN ACCORDANCE WITH THIS ACT OR THE REGULATIONS**

Nine(9) unique submissions have been received and are discussed above in section 1.5.

**2.10 SECTION 4.15(1)(E) THE PUBLIC INTEREST**

The application is not expected to result in unreasonable impacts on the environment or the amenity of the locality. It is considered appropriate with consideration to the zoning and the character of the area and approval is therefore considered consistent with the public interest.

### **3 CONCLUSION**

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The application has been assessed having regard to Section 4.55 and Heads of Consideration under Section 4.15(1) of the Environmental Planning and Assessment Act 1979, the provisions of Wollongong Local Environmental Plan 2009 and all relevant Council DCPs, Codes and Policies and found to be generally satisfactory.

### **4 RECOMMENDATION**

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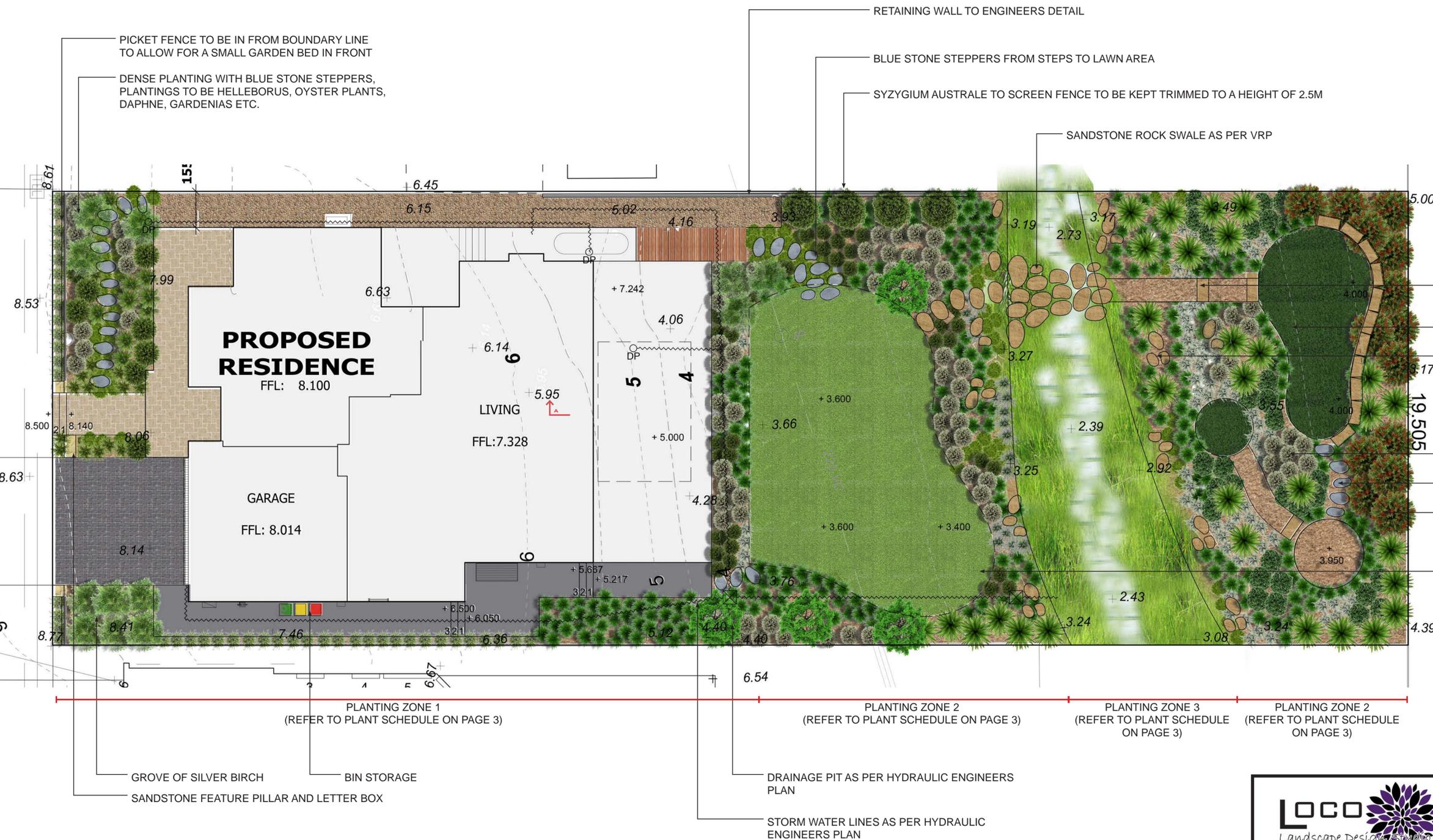
It is recommended DA-2018/819 be approved subject to draft conditions provided at Attachment 5.

### **5 ATTACHMENTS**

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- 1 Plans
- 2 Vegetation Restoration Plan
- 3 Two (2) Engineering Reports
- 4 Variation Justification Statements- WDCP 2009
- 5 Draft Conditions of Consent
- 6 NRAR General Terms of Approval

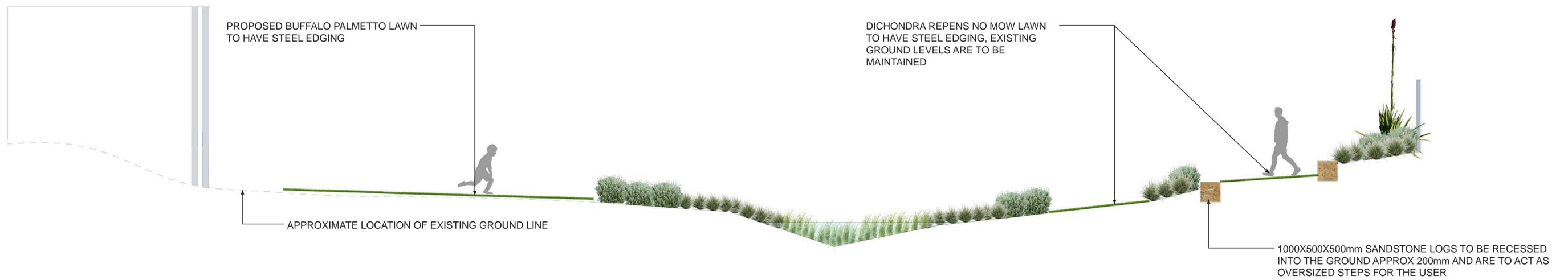
LEGEND	
+ 2.73	EXISTING LEVELS
+ 3.74	PROPOSED LEVELS
(Dashed line)	CONTOURS
(Dark grey pattern)	'HERITAGE' QUARTZ COBBLES
(Brown pattern)	MULCHED PATHWAYS
(Light brown pattern)	TRAVERTINE PAVING LAID IN A FRENCH PATTERN
(Light grey pattern)	PROPOSED CONCRETE PATHS LIGHT GREY IN COLOUR
(Blue stones)	BLUESTONE STEPPING STONES
(Wood logs)	SANDSTONE LOGS
(Large stones)	2-3 MAN SANDSTONE BOULDERS
(Dashed line)	CORTEN STEEL EDGING
(Large stones)	ROCK SWALE AS PER VRP
(Green lawn)	BUFFALO PALMETTO LAWN
(Dark green lawn)	DICHONDRA REPENS 'NO MOW LAWN'
(Group of plants)	MASS PLANTING BEDS
(Wetland plants)	CREEK WETLAND PLANTINGS



- MULCHED PATH WITH SANDSTONE LOG STEPS WHICH ARE TO BE RECESSED INTO THE GROUND APPROX. 200mm
- 'NO MOW' DICHONDRA REPENS WITH STEEL EDGING
- 2-3 MAN SANDSTONE BOULDERS TO BE PLACED AT RANDOM IN GROUPS OF 1-3 MAX ALONG THE CREEK EDGE AND BANK TO ASSIST IN STABILISATION
- DENSE NATIVE PLANTINGS OF DORYANTHES, LOMANDRA, BANKSIA, WESTRINGIA ETC.
- BLUE STONE STEPPERS
- GROVES OF SYZYGIUM AUSTRALE FOR SCREENING
- BUFFALO PALMETTO TURF AREA TO BE EDGED IN STEEL EDGING

LANDSCAPE CONCEPT PLAN  
SCALE: 1:200

	<b>PROJECT:</b> 7 SPRAY ST THIRROUL	<b>DATE:</b> 18.09.2018
	<b>CLIENT:</b> MR AND MRS PERRINS	<b>SCALE:</b> 1:200@A1, 1:400@A3
<b>DRAWING:</b> CONCEPT DESIGN	<b>DRAWN BY:</b> J.BATURYNSKY	<b>DRAW NO:</b> 1/3
PH: 0450810284 EMAIL: JBATURYNSKY@HOTMAIL.COM ABN: 71186151941	<b>REVISION:</b> B	

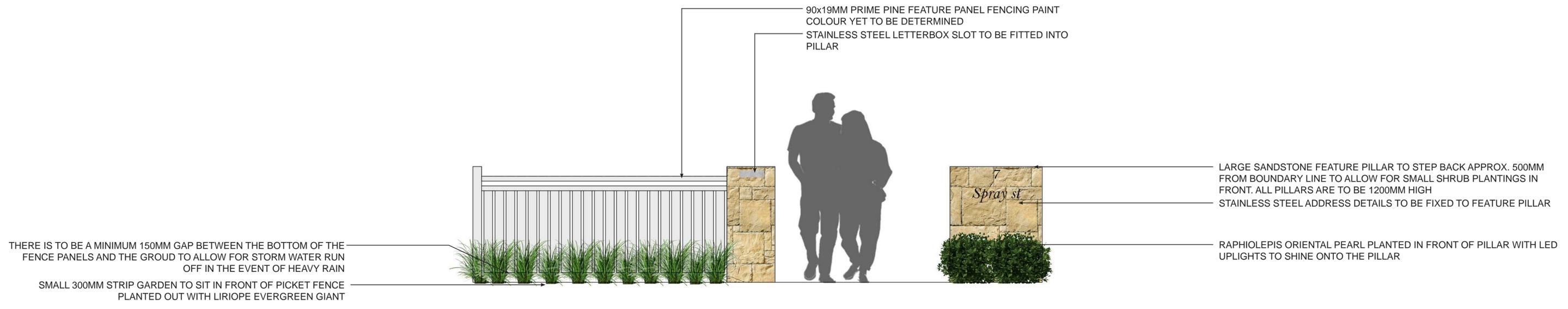


SECTION AA  
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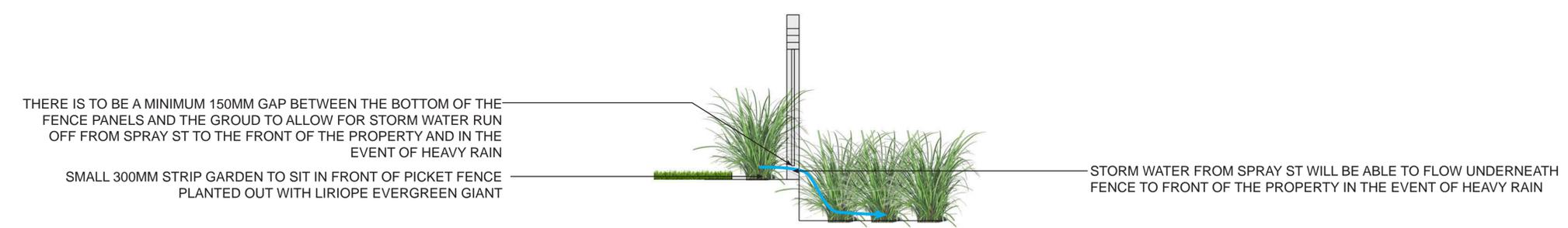


CREEK BED TYPICAL SECTION  
SCALE: 1:50@A1 1:100@A3

 <p>PH: 0450810284 EMAIL: JBATURYNSKY@HOTMAIL.COM ABN: 71186151941</p>	<b>PROJECT:</b> 7 SPRAY ST THIRROUL	<b>DATE:</b> 18.09.2018
	<b>CLIENT:</b> MR AND MRS PERRINS	<b>SCALE:</b> As SHOWN
	<b>DRAWING:</b> SECTION ELEVATIONS	<b>DRAWN BY:</b> J.BATURYNSKY
		<b>DRAW NO:</b> 2/3 <b>REVISION:</b> B



FRONT FENCE DETAIL  
 SCALE: 1:20



FRONT FENCE DETAIL 2  
 SCALE: 1:20

**INDICATIVE PLANTS LIST ZONE 1 : FRONT YARD AND SOUTHERN SIDE OF BACKYARD**

BOTANIC NAME	COMMON NAME	HEIGHT AND WIDTH
<b>TREES</b>		
Acer palmatum 'Sango Kaku'	Coral Bark Maple	5m x 5m
Betula Pendula	Silver Birch	8m x 4m
Lagerstroemia indica 'Natchez'	Crepe Myrtle	4m x 3m
Magnolia 'Teddy Bear'	Magnolia	4m x 3m
<b>SHRUBS</b>		
Agave attenuata	Agave	1 x 1m
Daphne odora 'Star White'	Daphne	1.5 x 1.5
Echium candicans	Pride of Madeira	2m x 2m
Euphorbia 'Silver Swan'	Silver Euphorbia	.7m x .7m
Gardenia augusta 'Florida'	Gardenia	1m x 1m
Kalanchoe bracteata	Silver Spoons	.7m x .5m
Pittosporum 'Miss Muffet'	Miss Muffet	.7m x .7m
Raphiolepis Indica 'Snow Maiden'	Indian Hawthorn	1.5m x 1m
Raphiolepis Oriental Pearl		1m x 1m
Teucrium fruiticans	Germander	1.5m x 1.5m
Zamia furfuracea	Cardboard Plant	1m x 1m

<b>GRASSES AND GROUNDCOVERS</b>		
Acanthus mollis	Oyster Plant	1m x 1m
Clivia miniata	Clivea	1m x 1m
Helleborus orientalis	Lenten Rose	.5m x .5m
Viola hederacea	Native Violet	.5m x .5m
Liriope 'Evergreen Giant'	Liriope	.7m x .7m

**INDICATIVE PLANTS LIST ZONE 2: FLOOD PLAIN ZONE**

BOTANIC NAME	COMMON NAME	HEIGHT AND WIDTH
<b>TREES</b>		
Alphitonia excelsa	Red Ash	7m x 4m
Callistemon salignus	Willow Bottle Brush	7m x 3m
Syzygium australe	Lilly Pilly	4m x 3m
<b>SHRUBS</b>		
Rapanea variabilis	Muttonwood	4m x 3m
Correa alba	White Correa	1m x 1m
Doryanthes excelsa	Gynea Lilly	2m x 2m
Westringia fruticosa	Westringia	1.5m x 1.5m

<b>GRASSES AND GROUNDCOVERS</b>		
Carpobrotus glaucescens	Pig Face	.3m x 1m
Dianella Caerula 'Cassa Blue'	Dianella	1m x 1m
Juncus usitatus	Common Rush	1m x 1m
Lomandra 'Tanika'	Mat rush	1m x 1m
Viola hederacea	Native Violet	.5m x .5m

**INDICATIVE PLANTS LIST ZONE 3: CREEK WETLAND PLANTINGS**

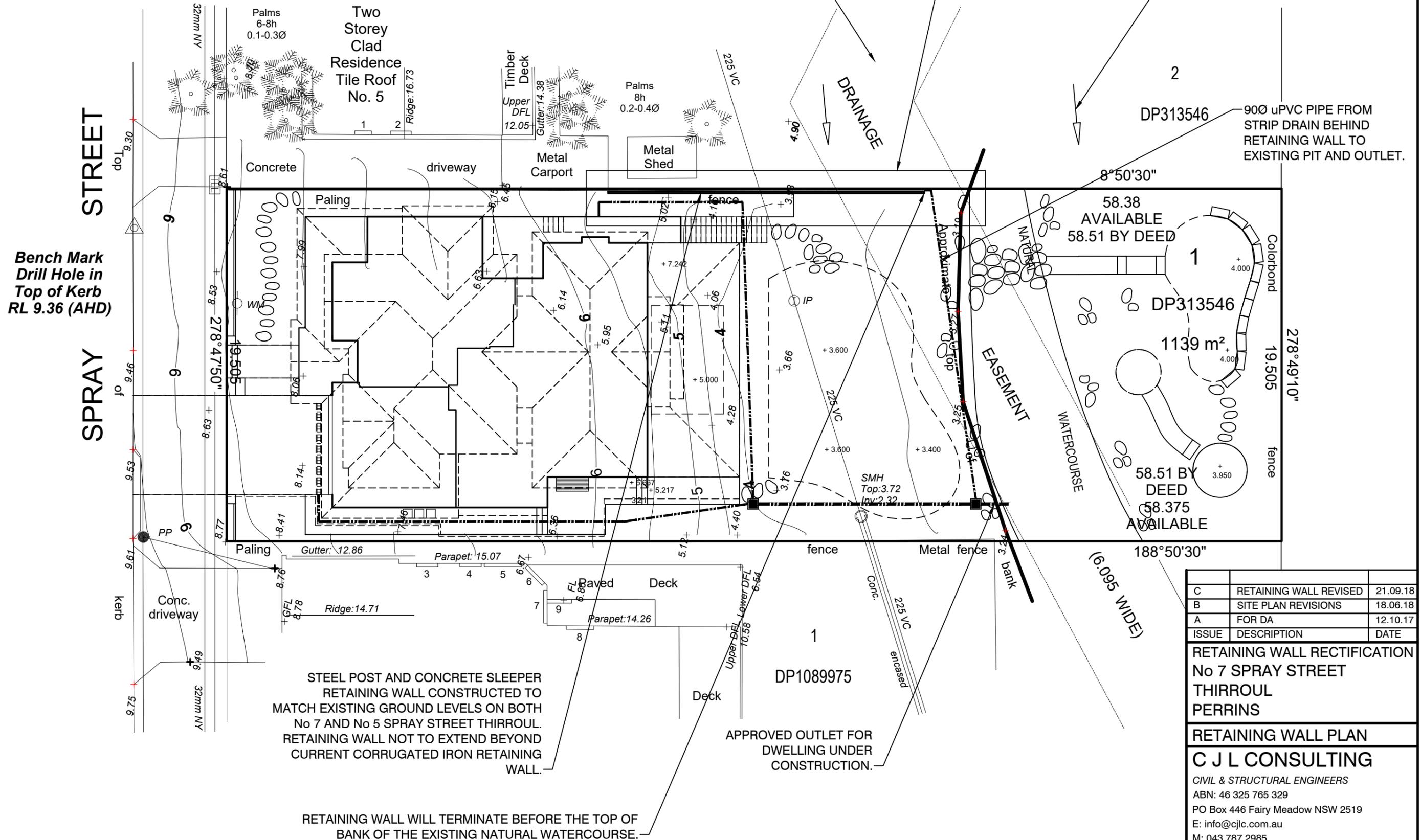
BOTANIC NAME	COMMON NAME	HEIGHT AND WIDTH
<b>GRASSES AND GROUNDCOVERS</b>		
Baloskian Tetraphyllum	Feather Top	1m x 1m
Carex apressa	Tall Sedge	.8m x 1m
Ficinia nodosa	Knobby Club Rush	1m x 1m
Juncus usitatus	Common Rush	1m x 1m
Lomandra longifolia	Mat rush	1m x 1m

<p>PH: 0450810284          EMAIL: JBATURYNSKY@HOTMAIL.COM          ABN: 71186151941</p>	<b>PROJECT:</b> 7 SPRAY ST THIRROUL	<b>DATE:</b> 18.09.2018
	<b>CLIENT:</b> MR AND MRS PERRINS	<b>SCALE:</b> N/A
	<b>DRAWING:</b> FENCE DETAIL & PLANT SCHEDULES	<b>DRAWN BY:</b> J.BATURYNSKY
	<b>DRAW NO:</b> 3/3	<b>REVISION:</b> B

BASED ON AVAILABLE INFORMATION THERE DOES NOT APPEAR TO BE ANY STORMWATER DRAINAGE PIPES LOCATED WITHIN EASEMENT.

REFER TO SHEETS R2, R3 AND R4 FOR DETAILED SURVEY AND RETAINING WALL DETAILS

DIRECTION OF FLOODWATER FLOWS.



**RETAINING WALL PLAN**

SCALE 1:200

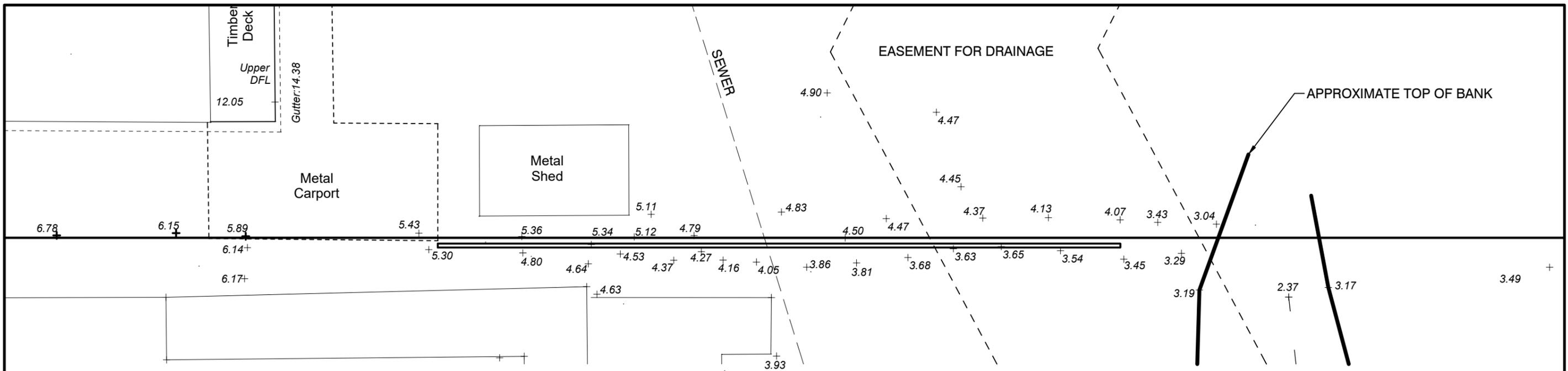
C	RETAINING WALL REVISED	21.09.18
B	SITE PLAN REVISIONS	18.06.18
A	FOR DA	12.10.17
ISSUE	DESCRIPTION	DATE

**RETAINING WALL RECTIFICATION**  
**No 7 SPRAY STREET**  
**THIRROUL**  
**PERRINS**

**RETAINING WALL PLAN**

**C J L CONSULTING**  
 CIVIL & STRUCTURAL ENGINEERS  
 ABN: 46 325 765 329  
 PO Box 446 Fairy Meadow NSW 2519  
 E: info@cjl.com.au  
 M: 043 787 2985

DESIGN: C. LINDSAY MIEAust CPENG NER	SCALE: 1:200
DRAWN: C. J. L.	SET: 1 of 4
DWG: 17/779	SHEET: R1 REV: C



STEEL POST AND CONCRETE SLEEPER  
RETAINING WALL STEPPED DOWN SLOPE.

FILL AGAINST BOTTOM SLEEPER  
TO MAINTAIN EXISTING GROUND LEVELS.

PROVIDE LANDSCAPING TO STABILISE  
BATTER AT END OF WALL.

	0.00	2.10	3.90	5.00	6.50	8.80	10.5	11.8	14.0	15.8	17.5	19.0
HEIGHT m	0.10	0.56	0.70	0.61	0.52	0.83	0.77	0.79	0.73	0.59	0.60	0.14
TOP OF WALL m AHD	5.40	5.36	5.34	5.14	4.79	4.79	4.58	4.47	4.37	4.13	4.05	
GROUND LEVEL No 5 m AHD	5.43	5.36	5.34	5.12	4.79	4.83	4.50	4.47	4.37	4.13	4.07	3.43
GROUND LEVEL No 7 m AHD	5.30	4.80	4.64	4.53	4.27	3.96	3.81	3.68	3.64	3.54	3.45	3.29
CHAINAGE m	0.00	2.10	3.90	5.00	6.50	8.80	10.5	11.8	14.0	15.8	17.5	19.0

ISSUE	DESCRIPTION	DATE
B	RETAINING WALL REVISED	21.09.18
A	FOR DA	12.10.17

**RETAINING WALL RECTIFICATION**  
**No 7 SPRAY STREET**  
**THIRROUL**  
**PERRINS**

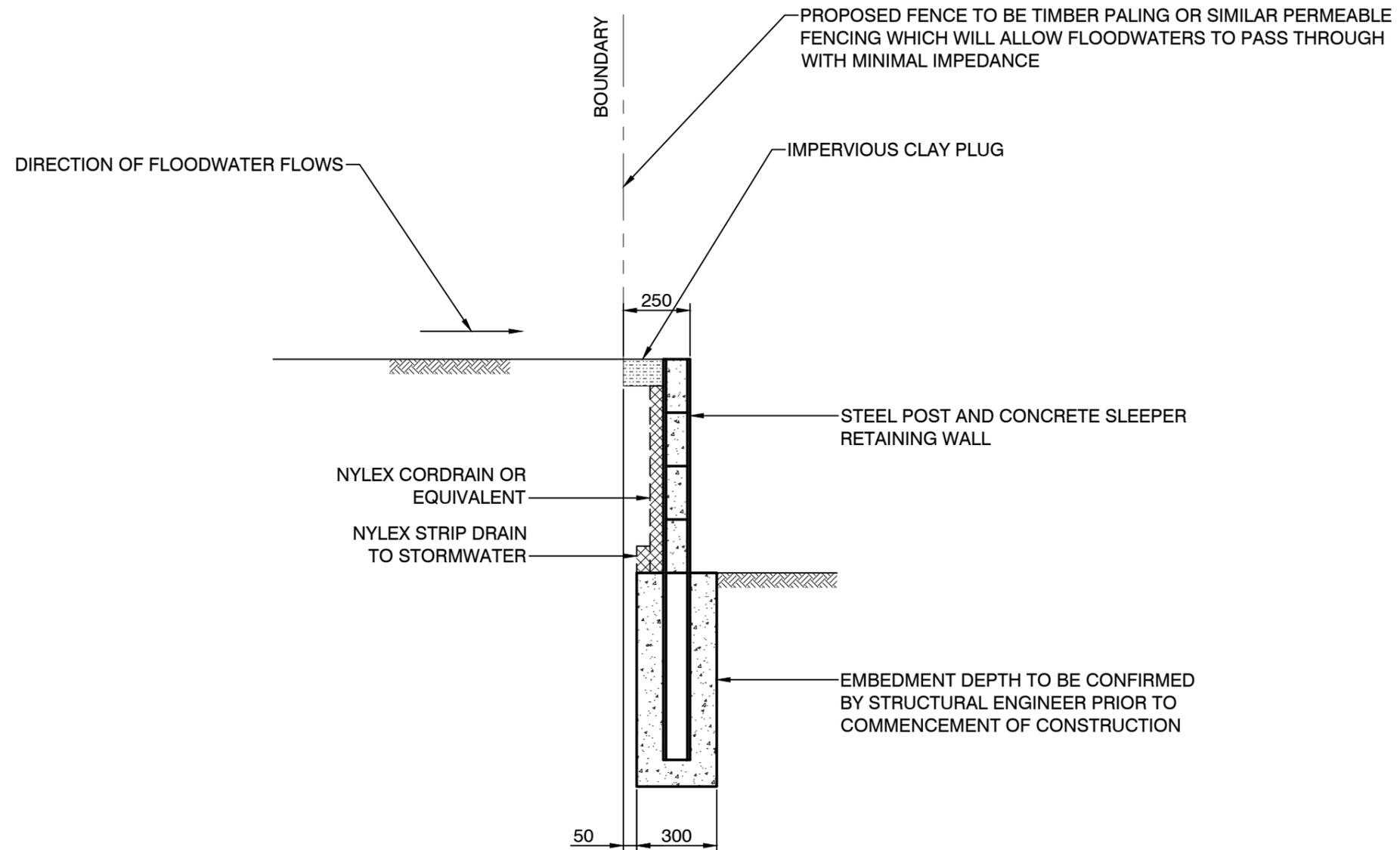
**RETAINING WALL PROPOSED**

**C J L CONSULTING**  
CIVIL & STRUCTURAL ENGINEERS  
ABN: 46 325 765 329  
PO Box 446 Fairy Meadow NSW 2519  
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M: 043 787 2985

DESIGN: C. LINDSAY <small>MIEAust CPENG NER</small>	SCALE: 1:100
DRAWN: C. J. L.	SET: 3 of 4
DWG: 17/779 SHEET: R3 REV: B	

**RETAINING WALL PROPOSED**  
SCALE 1:100





**RETAINING WALL DETAIL**  
SCALE 1:20

ISSUE	DESCRIPTION	DATE
A	RETAINING WALL REVISED	21.09.18

**RETAINING WALL RECTIFICATION**  
**No 7 SPRAY STREET**  
**THIRROUL**  
**PERRINS**

**STRUCTURAL DESIGN**

**C J L CONSULTING**

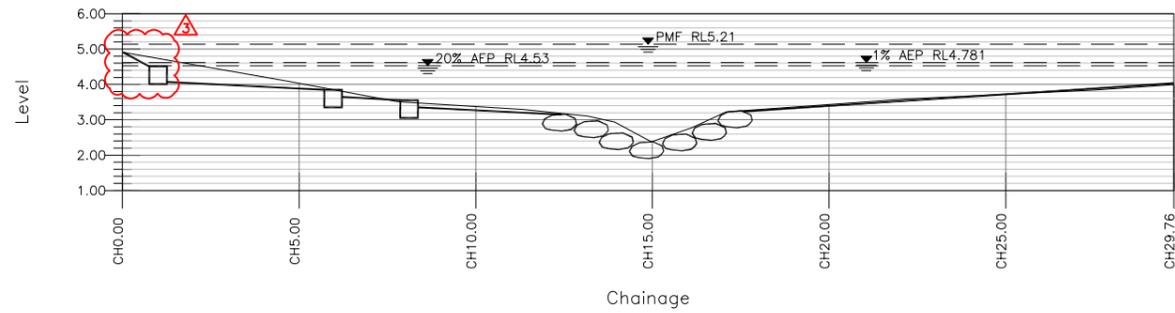
*CIVIL & STRUCTURAL ENGINEERS*  
ABN: 46 325 765 329  
PO Box 446 Fairy Meadow NSW 2519  
E: info@cjl.com.au  
M: 043 787 2985

DESIGN: C. LINDSAY  
MIEAust CP Eng NER SCALE: 1:20

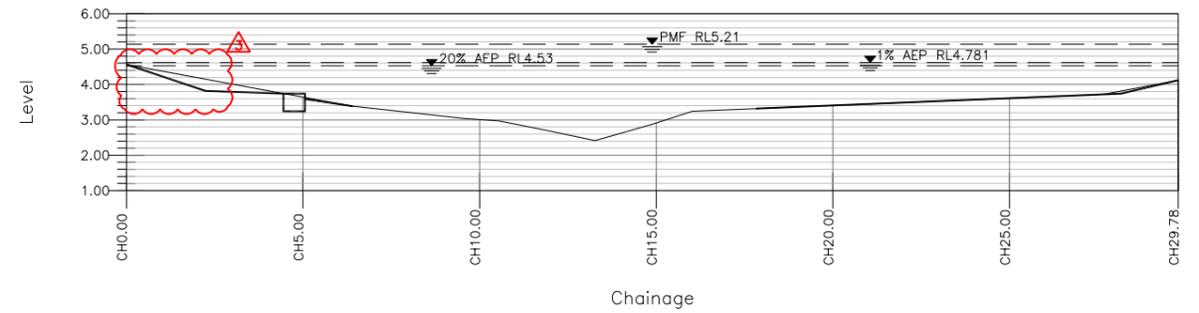
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DWG: 17/779 SHEET: R4 REV: A

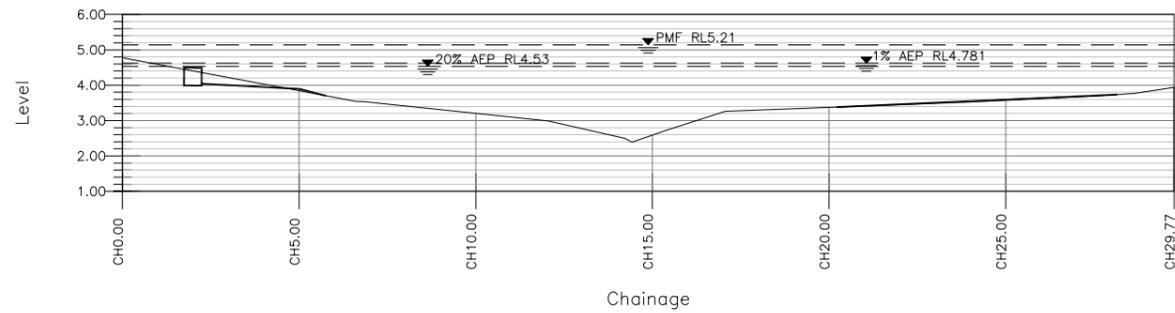




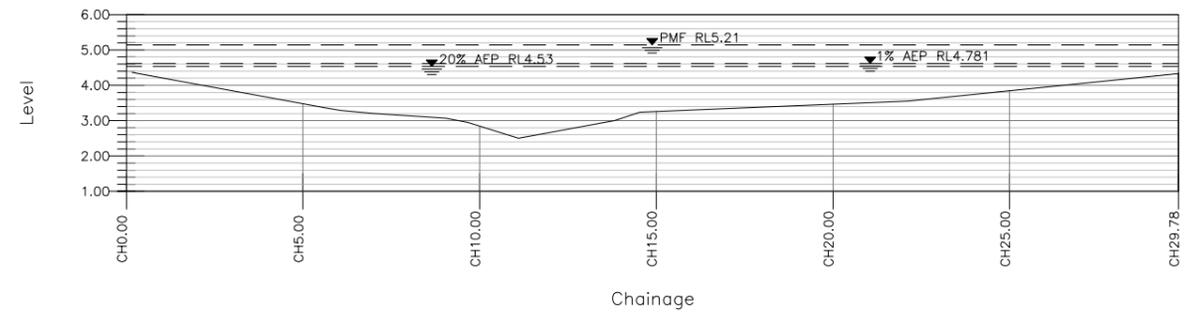
**A**  
SECTION  
SCALE 1:200



**C**  
SECTION  
SCALE 1:200



**B**  
SECTION  
SCALE 1:200



**D**  
SECTION  
SCALE 1:200

**KEY**

- EXISTING GROUND PROFILE
- PROPOSED GROUND PROFILE

**CHANGE IN CROSS SECTIONAL AREA (m<sup>2</sup>)**

SECTION	20% AEP (FLOOD LEVEL RL 4.53m AHD)		1% AEP (FLOOD LEVEL RL 4.78m AHD)		PMF (FLOOD LEVEL RL 5.21m AHD)	
	PRE	POST	PRE	POST	PRE	POST
A	27.51	30.13	30.02	32.76	45.25	48.15
B	31.02	31.20	33.60	33.74	49.01	49.19
C	32.42	33.20	35.10	35.88	49.39	51.35
D		30.91		33.39		48.83

ISSUE	DESCRIPTION	DATE
3	RE-ISSUED FOR DEVELOPMENT APPLICATION	18/09/18
2	RE-ISSUED FOR DEVELOPMENT APPLICATION	10/04/18
1	FOR DEVELOPMENT APPLICATION	05/03/18

FOR DEVELOPMENT APPLICATION  
NOT FOR CONSTRUCTION

FOOTPRINT (NSW) PTY. LTD. AUTHORISE THE USE OF THIS DRAWING ONLY FOR THE PURPOSE DEMONSTRATED BY THE STATUS STAMP SHOWN ABOVE.

SCALES	ORIGINAL
1:200	A3
CLIENT:	K, PERRINS

SURVEYOR:	D.SMITH
DATUM:	AHD
AZIMUTH:	LOCAL
DRAWN:	AB
DESIGNED:	AB
DESIGNED DATE:	MAR '18
CHECKED:	AB

**footprint**  
sustainable engineering  
a. 15 meehan drive  
kiama downs nsw 2533  
p. 02 4237 6770  
f. 02 4237 8962

**7 SPRAY STREET, THIRROUL**  
PROPOSED LANDSCAPING WORKS  
FLOOD IMPACT ASSESSMENT  
CROSS SECTIONS

DRAWING NO.	1758-C02
ISSUE.	3
SHEET	2 OF 2



# Vegetation Restoration Plan

**SITE:** 7 Spray St, Thirroul  
Lot 1 DP 313546

**CLIENT:** Mr K. Perrins & Mrs R. Perrins

**DATE:** December 2017

**PREPARED BY:** Emmett Weatherford and Jay Windsor

**Revisions:** 31<sup>st</sup> January 2018  
8<sup>th</sup> February 2018  
31<sup>st</sup> October 2018

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## SECTION 1 INTRODUCTION

### 1.1 BACKGROUND INFORMATION

In August 2017, Southern Habitat (NSW) Pty Ltd was contacted by Mr Ken Perrins and Mrs Rebecca Perrins to develop a Vegetation Restoration Plan (VRP) for Lot 1 DP 313546, 7 Spray St, Thirroul, NSW, following unauthorised clearing at this location. The purpose of this VRP is to address the implementation of works to restore the integrity of the site prior to unauthorised clearing and to guide any future land management.

This report conforms to the requirements of the Wollongong City Council guidelines for the preparation of Vegetation Restoration Plan for Unauthorised Works.

Revisions were made to this document on 8<sup>th</sup> February 2018 in acknowledgement of recommendations made by Wollongong City Council's Environmental Scientist on 5<sup>th</sup> February: the area of the VRZ in Figure 1 was expanded to account for the width of the stream, and six species (*Banksia integrifolia* var. "Roller Coaster," *Grevillea banksii* var. "Robyn Gordon," *Westringia fruticosa* var. "Zena," *Myoporum parvifolium*, *Corymbia citriodora*, *Waterhousea floribunda*) were removed from the planting list (Table 3) as being inappropriate cultivars and or not locally native and replaced with more suitable alternatives (*Clerodendrum tomentosum*, *Rapanea variabilis*, *Westringia fruticosa*, *Oplismenus imbecillis*, *Callistemon salignus*, *Alphitonia excelsa*).

A final revision was made 31<sup>st</sup> October 2018, for the purpose of incorporating the most up to date revision of landscape documentation, as prepared by Loco Landscape Design, dated 18<sup>th</sup> September 2018 revision 5. This VRP document fully endorses this work.

### 1.2 REPORT PURPOSE AND OBJECTIVE

A VRP provides a clear framework for restoring the degraded natural attributes of a site consequential of unauthorised clearing or development. This is an ongoing process, requiring a greater emphasis on ecology and natural systems rather than the short-term reliance on traditional engineering and landscape solutions.

Specifically, this VRP aims to:

- Provide a description of the site including topography, geology, soil type and drainage;
- Provide an assessment of the current flora of the site (both native and weed species);

- Provide an assessment of site habitat values and restoration potential;
- Provide recommendations for the management of native and weed species on the site;
- Provide a comprehensive works methodology to enable restoration activities to take place, thereby creating a sustainable environmental state that will contribute to the overall health of the site;
- Provide a framework for the maintenance of the site during and following restoration activities.

### 1.3 LEGISLATIVE FRAMEWORK

The recommended site restoration works are to be undertaken in accordance with legislature relating specifically to the protection of threatened species and endangered ecological communities, the control of declared noxious weeds and protection of riparian zones and waterways. The relevant legislature is outlined below.

#### 1.3.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act is the principal federal legislation which makes provisions for the protection and conservation of Australia's environment and biodiversity.

#### 1.3.2 Biodiversity Conservation Act 2016 (BC Act)

The BC Act, which is the principal NSW state legislation, is designed to “conserve biological diversity and promote ecologically sustainable development, prevent the extinction and promote the recovery of threatened species and ecological communities, protect habitat for threatened species and ecological communities, [and] ensure that the impact of any action affecting threatened species and ecological communities is properly assessed.” (NSW OEH, 2017)

#### 1.3.3 Biosecurity Act 2015

The primary object of this Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

#### 1.3.4 Soil Conservation Act 1938 (SC Act)

The SC Act makes provisions for the protection and conservation of soils, including the prevention and remediation of soil erosion. Restoration activities in the subject area must be undertaken in such

a way as to minimise soil erosion and remediate existing areas of embankment degradation.

1.3.5 Water Management Act 2000 (WM Act)

The WM Act regulates activities ‘carried out in, on or under waterfront land’ (WaterNSW 2017). This Act applies to restoration activities undertaken on the subject. The Act requires this VRP to make provisions for a stable riparian zone, including riparian embankments, which enhances and emulates the vegetation communities typical of the site and surrounding area.

1.3.6 Local Land Services Act 2013 (LLS Act)

The newly amended LLS Act provides a regulatory framework for native vegetation and land management activities in NSW, and aims to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistently with the principles of ecologically sustainable development.

## 1.4 DEFINITIONS

For the purposes of this report:

**Council:** Wollongong City Council;

**Ecological Restoration:** the practice of repairing or reinstating the structure and function of a site's plant community, with the level of intervention determined by the site's resilience. Where the resilience is high, regeneration procedures are required, where the resilience is depleted, a reconstruction approach may be required;

**Introduced Species:** includes both deliberate plantings of 'native' and 'non-native' as well as self-sown species. A 'native' can be introduced to the site if it does not naturally occur in the surrounding natural landscape;

**Local Provenance:** plants propagated from collections from locations as close geographically and in terms of habitat as practicable to the location where the propagated plants are to be planted;

**Recruitment:** the supply of a species' propagules to the site. This includes seed production and fecundity; seed input and storage, either by soil-stored or canopy-stored seed banks; seed viability; seedling establishment and mortality;

**Regeneration:** the management of weeds on existing bushland to facilitate the natural response of indigenous plant species. It primarily involves hand weeding and chemical control;

**Rehabilitation:** a non-specific term encompassing revegetation and regeneration;

**Riparian Vegetation:** vegetation on land that adjoins, directly influences, or is influenced by a body of water. Normally riparian vegetation is a component of a greater riparian corridor of varying widths, depending on the classification of waterway/s;

**Subject site:** also referred to as study area or subject area, and refers to the nominated riparian corridor on the proposed site;

**VRP:** refers to this Vegetation Restoration Plan

## SECTION 2 SITE ASSESSMENT

### 2.1 SITE DESCRIPTION

The subject site is located approximately 12km north-northeast of Wollongong CBD, at Lot 1 DP 313546, 7 Spray Street, Thirroul, NSW (34°19'09"S 150°55'31"E) and covers the Vegetated Riparian Zone (VRZ) and the area affected by unauthorised vegetation clearing. The VRZ covers an area of approximately 417m<sup>2</sup> (WCC, 2017). Refer to Figure 1 – Site Map for a visual presentation of the site.



**Figure 1:** Site Map – Location of subject site (red) showing unnamed watercourse (blue) and VRZ (yellow).

### 2.2 TOPOGRAPHY, GEOLOGY, SOIL AND HYDROLOGY

After examination of the Soils Landscape Map for Wollongong - Port Hacking, the site was found to be

located within the Gwynneville (gw) soil landscape (Hazelton, Bannerman & Tillie, 1990). This landscape is characterised by shallow Brown Podzolic Soils and Xanthozems on upper slopes, Lithosols on simple slopes and shallow Brown Earth on mid and lower slopes. This landscape can be found in the foot-slopes of the Illawarra Escarpment and isolated rises of the Wollongong Plain. Typically they involve broad to moderately rounded ridges and gently to steeply inclined slopes, with a local relief of 10 – 70m and slopes of 3 – 25%. This landscape is extensively cleared tall open-forest and open-forest. The limitations of this soil landscape include extreme erosion hazard, steep slopes, mass movement hazard, local flooding and reactive subsoils and impermeable, low wet bearing strength clay subsoils (Hazelton, Bannerman & Tillie, 1990).

The site has an overall gentle slope downwards to the north, with a ~1m downward step at the approximate mid-point of the property, and a slight rise from the channel to the northern edge of the site (WCC, 2017). An unnamed open watercourse crosses the property, entering approximately three-quarters of the way towards the northern end of the property and flowing west-east. Within the site the watercourse is approximately 5m wide and 600-900mm deep, with a narrow floodplain defined by the aforementioned rise to the north and step to the south. Downstream, 20m after exiting the property, the watercourse is piped under Cliff Parade and discharged onto Thirroul Beach (Tenhave, 2016).

## 2.3 VEGETATION SURVEY

### 2.3.1 Survey Methodologies

The vegetation survey was undertaken on the 8th of December 2017 by Emmett Weatherford, a qualified Southern Habitat (NSW) Pty Ltd bush regenerator. The vegetation audit comprised a full floristic survey of the riparian treatment zone, with all observable native and alien (i.e. weed) species identified and recorded. The audit involved a complete, comprehensive and systematic walk-through of the site. Species nomenclature followed Fairley & Moore (2010), Richardson & Shepherd (2011), PlantNET (2017) and Fuller (2011).

The abundance of each identified species was also recorded, following a modified Braun Blanquet percentage foliage cover abundance index (Poore, 1955; Mason and French 2007; Gooden et al. 2009a, b):

- (1): <5% cover and one or a few individuals;
- (2): <5% cover and uncommon;
- (3): <5% cover and common;
- (4): <5% cover and very abundant;
- (5): 5 - 20% cover;

(6): 21 – 50% cover;

(7): 51-75% cover;

(8): 76 – 100% cover.

The Braun Blanquet scale of species abundance provides an indication of the relative abundance of species at a particular site. This can subsequently be used as baseline reference data during future vegetation monitoring and reporting programs in order to gauge site responses to the recommended restoration activities contained within this VRP. That is, the Braun Blanquet scale will allow future assessments to determine whether weed control measures have been successful at reducing weed diversity and abundance, and whether ecological restoration activities have been successful at increasing the diversity and abundance of native plant species. In addition, the scale will provide a tool to determine whether any restoration or development activities are having a detrimental impact on the site's native vegetation community.

---

### 2.3.2 Survey Results

Plant species from a total of 26 families were recorded at the site, with the vegetation assemblage comprising 9 native and 47 alien or weed species (refer **Appendices A and B**). According to Map 8b the Native Vegetation of the Illawarra Escarpment and Coastal Plain Study (NPWS, 2002), the entirety of the subject site occurs within “cleared land,” with no remnants of native vegetation communities found nearby. The subject site contained a poor representation of native species, with the dominant native species being *Typha orientalis*, with minor amounts of aquatics and groundcover. The native vegetation is almost completely overwhelmed by a large variety of exotic species (refer Photo 1).



**Photo 1 - Looking southeast from the northwest corner (December 2017).**

The narrow floodplain to the south of the channel is covered mostly by a mix of five grass species, predominantly *Eragrostis pilosa*, *Stenotaphrum secundatum*, and *Paspalum dilatatum*, (refer Photo 2 and Photo 3) with an increasing proportion of herbs and other groundcovers (*Rumex crispus*, *Modiola caroliniana*, *Sonchus oleraceus*, *Trifolium dubium*), vines (*Ipomoea cairica*, *Ipomoea indica*), and shrubs (*Solanum americanum*) approaching the channel. Native groundcovers *Geranium homaneum* and *Commelina cyanea* are present, but severely out-competed by exotic species. Native aquatics and semi-aquatics *Cyperus eragrostis*, *Persicaria decipiens*, *Persicaria strigosa*, *Alocasia brisbanensis*, and *Alternanthera denticulata* can be found in small numbers adjacent to the channel. The shrub *Phyllanthus gunni* is also represented in very low numbers, in a juvenile state. Some of the exotic species, such as *Canna indica*, *Alstroemeria psittacina*, *Convolvulus sabatius*, *Solanum lycopersicum*, and *Tropaeolum majus* appear to be garden escapes from neighbouring properties.



**Photo 2 – View from the southern boundary of the subject site looking north towards the VRZ (December 2017).**



**Photo 3 – View from the southeast corner of the VRZ looking northwest (December 2017).**

The channel itself is choked with *Colocasia esculenta*, with some native *Typha orientalis* also present (refer to Photo 1, Photo 3, and Photo 4). There is a small amount of *Myriophyllum aquaticum* encroaching from upstream.



**Photo 4 – Looking southwest from the northeastern corner of the VRZ (December 2017).**

North of the channel, no native species are evident, having been completely overwhelmed by exotic species after unauthorised clearing by the landowner; strips of geotech fabric have been laid down across this area, presumably in an attempt to suppress the re-emergence of previously cleared *Lantana camara* (refer Photo 5 and Photo 6). This area contains a broad mix of groundcovers and annual and perennial herbs, vines, and juvenile shrubs. The dominant species is *Sonchus oleraceus*, along with high numbers of *Bidens pilosa*, *Solanum americanum*, *Solanum lycopersicum*, *Chenopodium album*, *Ageratina adenophora*, *Verbena bonariensis*, *Acetosa sagittata*, *Tradescantia fluminensis*, and *Tropaeolum majus*. It should be noted that *Lantana camara*, *Anredera cordifolia*, and *Lonicera japonica* were also all present, though in small quantities, mostly encroaching from the edges of the property.



**Photo 5 – View from the northeast corner of the VRZ, facing west (December 2017).**



**Photo 6 – View from the northeast corner of the VRZ, facing east (December 2017).**

No canopy plants are present anywhere on the subject site, though *Banksia serrata* have been planted on the neighbouring property to the east, adjacent to the site boundary (See Photo 6).

## 2.4 WEED ECOLOGY

‘A plant is only a weed where it interferes with a human’s use of the land for particular purposes, with their well-being, or with the quality of their environment’ (Auld & Medd 1987). We believe this definition should be viewed with a greater emphasis on the latter part of the above statement – that is, the influence with which weeds affect the quality of the environment. Weeds can be further categorised into ‘groupings’ which describe their potential to impact the environment. A weed can be classified as a:

- **Noxious weed** – harmful to agriculture, human health and community;
- **Weeds of National Significance** – prioritised based on invasiveness, potential for spread and environmental, social and economic impacts;
- **Environmental weed** – an escapee from a garden or nursery that has invaded a natural ecosystem;
- **Keystone Weed** – an introduced plant that poses a serious and immediate threat to the native plant community in which it occurs. A keystone (or primary target weed) can be either a noxious weed or environmental weed – either way; it must be given priority in any weed management program.

How weeds threaten the existence of native species on the subject site forms the foundation of the restoration approach presented in this report.

#### 2.4.1 Legislative Framework

The Biosecurity Act (2015) wholly repealed the Noxious Weeds Act (1993) effective from the 1st of July 2017. This Act includes several tools that can be used to manage weeds. The following offers a broad categorisation:

Outcome Category	Biosecurity Toolset
Weeds excluded from entering state.	Prohibited Matter: Declaration and management of significant weeds not present in NSW, or part of NSW.
Weeds to be eradicated.	Control Order: Management of weeds that are the targets of approved eradication programs. Although a Control Order is for a five year period, this can be renewed for longer term

	eradication programs.
Weeds to be effectively managed to reduce spread on a regional basis.	Biosecurity Zone: Weeds subject to ongoing 'strategic' regional management.
All weeds.	<p>General Biosecurity Duty: Requires any person dealing with biosecurity matter or a carrier of biosecurity matter and who knows or ought to know of the biosecurity risks associated with that activity to take measures to <u>prevent, minimise or eliminate</u> the risk as far as is reasonably practicable. Specific measures to reduce the risk will be detailed in regional weeds plans for priority weeds.</p> <p>Note: the General Biosecurity Duty exists for all weeds that present a biosecurity risk.</p>
Other Biosecurity tools.	<p>Mandatory Measures Regulation: May require persons to take specific actions with respect to weeds or carriers of weeds.</p> <p>Emergency Order: To respond to a current or imminent biosecurity risk that may have a significant impact.</p> <p>Biosecurity Direction: An enforceable instruction to a person or class of persons to take action to:</p> <ul style="list-style-type: none"> <li>• prevent, eliminate, minimise a biosecurity risk,</li> <li>• prevent, manage or control a biosecurity impact,</li> <li>• enforce any instrument under this Act.</li> </ul> <p>Biosecurity Undertaking: An authorised officer may accept in writing an undertaking given by a person that sets out the measures a person has agreed to implement to remedy a contravention, a likely contravention, or suspected contravention of the Act.</p>

#### 2.4.2 Identified Priority Weeds

Two priority weeds were identified from the vegetation audit for NSW and the South East region:

Botanical Name	Common Name	Duty
<i>Anredera cordifolia</i>	Madeira Vine	<b>Mandatory Measure:</b> Must not be imported into the State or sold.
<i>Lantana camara</i>	Lantana	<p><b>Mandatory Measure:</b> Must not be imported into the State or sold.</p> <p><b>Regional Recommended Measure</b></p> <p><b>Exclusion zone:</b> whole region excluding the core infestation area of Eurobodalla, Kiama, Shellharbour, Wollongong and the Shoalhaven local government area north of the Lantana Containment Line at 35°11'42 S</p> <p><b>Whole region:</b> Land managers should mitigate the risk of new weeds being introduced to their land.</p> <p><b>Exclusion zone:</b> The plant should be eradicated from the land and the land kept free of the plant.</p>

The control of these species and all other weeds identified and listed shall be addressed within the Section 3 of this document.

#### 2.4.3 Identified Weeds of national significance

Two Weeds of National Significance were identified from the vegetation audit: *Anredera cordifolia* and *Lantana camara*. The control of these species and all other weeds identified and listed shall be addressed within the Section 3 of this document.

## 2.6 LANDSCAPE DEGRADATION AND IMPACTS

In general terms, landscape degradation can mean a reduction in environmental quality and is caused by any disturbance or force that causes any changes in habitat or community structure and composition, such as a natural event or human activities. Applying this to the subject site, we can interpret landscape degradation to mean one or more of the following:

- The loss/reduction of floristic diversity (native plant species);
- The loss/reduction of fauna using the site;
- The increase in weed species diversity and distribution;
- The wholesale modification to soil profiles and subsequent micro-organisms.

At present, we consider the most significant factor contributing to the landscape degradation of the site to be:

- The high abundance and diversity of weeds within the subject site
- The potential for increased weed diversity and distribution. The disturbance created by unauthorised clearing activities has significantly reduced the biomass of the site, increasing soil disturbance and light availability, and reduced bank stability. Such factors create an environment favourable for weed infestation.

Native fauna utilising vegetation as habitat, prior to and post clearing, will also benefit from vegetation management of the site, as increased food and shelter availability will prevent displaced and fragmented populations threatening long-term survival.

Erosion is a concern for the site as steep slopes, mass movement hazard, local flooding and reactive subsoils and impermeable, low wet bearing strength clay subsoils (Hazelton, Bannerman & Tillie, 1990) as mentioned previously. While the slopes on this site are relatively gentle, there is still a risk of bank erosion and collapse into the channel due to vegetation loss, and a risk of flooding in high rainfall events (Tenhave, 2016). Mitigation of erosion will be required to prevent land degradation of the site and is outlined in the action plan.

## 2.7 HABITAT VALUES

‘Habitat’ describes those components of the environment that native flora and fauna require for different parts of their life cycle. Native fauna need areas for feeding, roosting, migration, nesting and the rearing of offspring. Different habitat components may be required for each of these life cycle stages, and can be provided by biotic components (e.g. trees) and abiotic components (e.g. rocks and boulders) of the environment. Resident native plant species may require certain habitats to support

recruitment, seedling establishment and successful reproduction.

Identifying and assessing the habitat values of the site is an important step towards designing an effective restoration works programme. In assessing the habitat values of the subject site, we posed a series of questions, viz:

**Question 1:** Is the patch of vegetation connected to surrounding contiguous vegetation?

**Observation 1:** The site is located on cleared land in a low density residential setting. Upstream and downstream from the site are residential gardens and recreational parks, with no remnants of native vegetation communities found nearby.

**Question 2:** Does the site contain weed species and, if so, does their occupation affect native species regeneration across the site?

**Observation 2:** Yes, weed species diversity is significantly higher than that of natives throughout the subject site. The extensive presence of exotic species is effectively inhibiting the occupation of native species and excluding the establishment of any new vegetation. If given the opportunity to increase their occupancy, these species and all others in Appendix B will further reduce native species regeneration.

**Question 3:** Is there evidence of animal grazing?

**Observation 3:** We did not observe any animals grazing on site at time of inspection, or any evidence of vegetation damaged by grazing. The urban surroundings of the site act as an effective barrier against deer and rabbit incursion into the area, however proximity to recreational parks and beaches suggests rabbits may live nearby.

**Question 4:** Is there evidence of human disturbance?

**Observation 4:** The site is located within a low density urban setting with residential gardens on both sides of the property, recreational parks 0.4km upstream, and beach park 0.1km downstream. The site has been disturbed by unauthorised clearing and use of machinery. Several large sandstone landscaping blocks have been placed on the site, and strips of geotech fabric have been pegged across the back of the site (see Photo 5 and Photo 6).

**Question 5:** Is there a high diversity of groundcover species?

**Observation 5:** No. Native species of groundcover are significantly inhibited by weed species, leaving low diversity and abundance of natives in the groundcover.

**Question 6:** Did the site contain leaf litter, fallen timber and organic material?

**Observation 6:** No. The lack of trees on the site means there is no source available for leaf litter or timber. Any organic material on the site is provided by exotic ground species.

**Question 7:** Are the native trees on the site healthy or showing signs of dieback?

**Observation 7:** There are no tree species on the subject site.

**Question 8:** Was there evidence of native tree or shrub species regenerating?

**Observation 8:** Yes, but very little. A few juvenile specimens of the native shrub *Phyllanthus gunnii* were found to be growing in the south-eastern side of the VRZ.

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### 2.6.1 Summary of Habitat Values

In summary, the habitat value of the subject site was strengthened by the: (1) lack of herbivory or vegetation damage; (2) the presence of native trees and shrubs naturally regenerating.

The habitat value of the subject site was weakened by the: (1) high diversity and abundance of weed species; (2) low diversity and abundance of native species; (3) potential encroachment of further weed species from outside the site; (4) the high level of anthropogenic pressures; (5) the discontinuous nature of the site with surrounding vegetation.

Based on the accumulation of our observations, we consider the habitat value of the subject site to be very low across the subject site.

## 2.8 RESTORATION POTENTIAL

As earlier defined, ecological restoration is the practice of repairing or reinstating the structure and function of the natural plant community at a particular site, with the level of intervention determined by the site's resilience. Where the resilience is high, regeneration procedures are required. However, where the resilience is depleted, a reconstructive approach may be required to rehabilitate the site.

The key to the above term is 'resilience', or the measure of recoverability of the natural plant community. That is, if the site contains a high resilience there is a good chance that natural restoration will occur with minimal intervention. Conversely, if the site contains low resilience, greater intervention is required to deliver restoration outcomes.

The subject site contains a low native diversity, with limited structural variation. Native specimens observed were noted to be small and discontinuous, with no native species found on the north side of the channel.

Natural recruitment was observed, in the form of a few seedlings of *Phyllanthus gunnii*, but no other recruitment of trees or shrubs was observed, though there is the potential for recruitment from *Banksia serrata* planted adjacent to the subject site on the neighbouring property.

We consider, therefore, that the subject site contains very low resilience. Action is required to mitigate the threats to the site outlined in section 2.6 to restore the site and maintain the environmental values at this location described in section 2.7. Any restoration (revegetation) activities will be designed in line with the landscape design concept prepared for the site by Loco Landscape Design Studios (Baturynsky, 2017) while also attempting to complement and assist the natural native regeneration.

## 2.9 VANDALISM AND PUBLIC SAFETY

The location of the site on and adjacent to privately owned land indicates little to no risk of vandalism or public safety.

## SECTION 3 RESTORATION PLAN OF ACTION

### 3.1 OBJECTIVES

Vegetation restoration is often required by Council proceeding unauthorised clearing or development works which have degraded the natural environment. The purpose of this VRP is to identify key areas of the site that require management actions to improve and further the integrity of the natural landscape of the site. This includes the restoration of flora, fauna habitat and vegetation communities. Site specific objectives will focus on mitigating the impacts outlined in section 2.7 and maintaining the values defined in section 2.8. The priority tasks are outlined as follows:

- Site preparation and induction of team members;
- Protection of existing vegetation;
- Soil erosion control program;
- Primary and secondary weed control;
- Recommended species for revegetation;
- Densities and spatial arrangement;
- Installation of revegetation tubestock;
- Plant protection;
- Implementation of maintenance program.

It also works alongside the landscape design concept prepared for the site (Baturynsky, 2018), and acknowledges that the landowner intends to develop and live on the subject site of which the VRZ is a part. In this way we aim to recreate a natural vegetated riparian zone and integrate it with the landscaping desired by the landowner. Please refer Appendix D for Landscape Documentation.

The approved Vegetation Restoration Plan will be implemented by a suitably qualified contractor (subject to WCC approval) with the following minimum qualification and or experience:

- Qualifications in Conservation and Land Management/Natural Areas Restoration (Certificate III);
- Equivalent study and/or demonstrated experience in ecological restoration (minimum 2 years).

### 3.2 SITE PREPARATION & INDUCTION

Before any on-site vegetation restoration works commence, the following shall be implemented:

1. A documented Project Safety Plan (PSP), including Safe Work Method Statements, Risk Assessment and Hazard Identification, Emergency Evacuation Plan and Materials Handling Plan. A copy of the PSP is to be available on-site during work hours;
2. The induction of all team members (whom shall be qualified to a minimum standard of Certificate II in Bush Regeneration);
3. Notification sent to WCC as to the commencement of VRP works;
4. The establishment of the various restoration boundaries with reference to the VRP and relevant documentation;
5. The identification of all species throughout the subject site (weed and native) with reference to the VRP.

All VRP works to be implemented by suitably qualified ecological restoration contractor (subject to WCC approval) whom shall hold the following minimum qualifications and/or experience:

- Qualifications in Conservation and Land Management/Natural Areas Restoration (Certificate III);
- Equivalent study and/or demonstrated experience in ecological restoration (minimum 2 years).

### 3.3 PROTECTION OF EXISTING VEGETATION

Due to the low resilience and natural recruitment of the study site, as discussed previously, the protection of existing vegetation will play an integral role in the VRP. During the implementation of Weed Control outlined below in Section 3.5, care will be taken to isolate around existing native species in order to preserve the plants, protect their ongoing health, and promote natural regeneration.

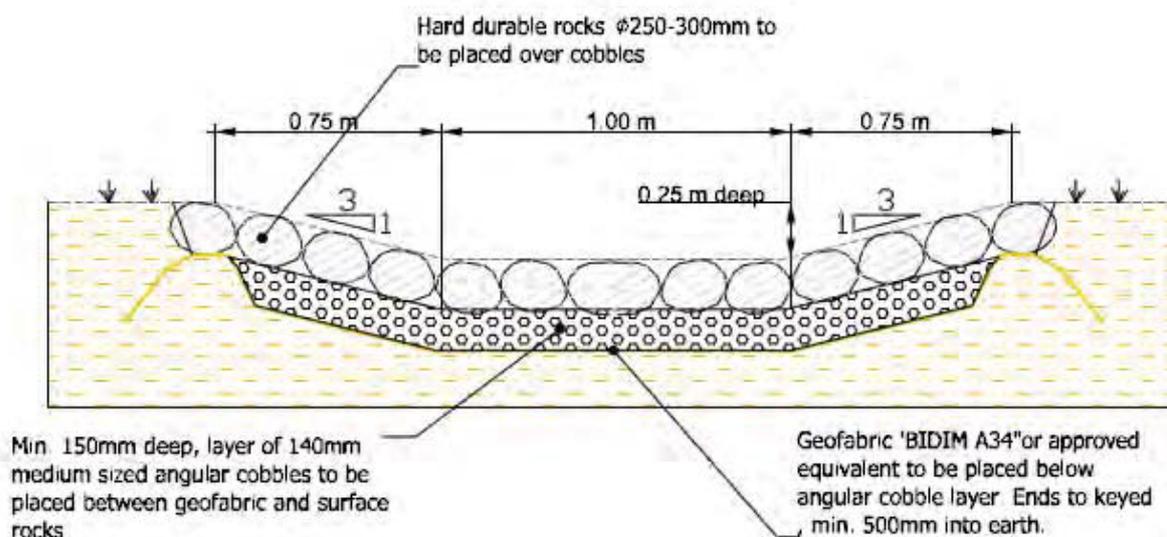
### 3.4 SOIL PROTECTION

As described on section 2.2, the site is located on Gwynneville soil landscape. Such a landscape is characteristic of extreme erosion hazard, mass movement hazard, local flooding and reactive subsoils and impermeable, low wet bearing strength clay subsoils. The protection of the soil across the site will

involve planting of aquatic species with fine root networks within and adjacent to the channel for superior bed and bank stability and natural water filtration, and planting of structurally diverse native plants on the banks and floodplain.

Soil protection within the disturbed section at the western end of the channel (see Appendix D) will also integrate, in conjunction with plantings, some engineering measures. These will take the form of sandstone boulders across the channel and jute matting along the bank. The sandstone boulders will be installed across the channel with spacing such that the watercourse can flow easily between them, and sized so that the tops of the boulders are flush with the surface of the water. This design is suitable for preventing bed erosion in small creeks, similar to the rock swale design shown in Figure 2 (Applied Ecology Pty Ltd, 2012), and has been successfully applied by Southern Habitat in similar situations, as in Figure 3. Biodegradable jute matting will be installed along the bank parallel to the direction of the watercourse, at a width of 1.8m on either side of the channel. The aquatic sedges and rushes (see Sections 3.6 – 3.9) will be planted into the soil underneath through slits in the jute matting. This will help to stabilise the bank soil until the establishment of the plants (Applied Ecology Pty Ltd, 2012).

Protection and maintenance of present native vegetation will also play an integral role in the protection of soil and mitigation of erosion. Vegetation cover decreases soil exposure, in turn minimising effects of weathering. Root systems of vegetation will also assist in stabilising and strengthening slopes in areas where erosion is apparent. Where native cover is minimal, native revegetation will take place to improve slope stability; where exotic species dominate, weed control measures will focus on actions that reduce soil disturbance, such as cut-and-paint and, where possible, herbicide spray application.



**Figure 2:** Cross-section of a typical rock swale as an erosion protection measure (from Applied Ecology Pty Ltd, 2012).



**Figure 3:** An example of boulders across the channel of a small watercourse as a method of bed erosion protection (Southern Habitat, Newcombe Street, Maianbar, 2015). In the example pictured here, a long stretch of the channel has been engineered, whereas for the purposes of this VRP, only one row of boulders across the channel is needed.

### 3.5 WEED CONTROL (PRIMARY AND SECONDARY)

#### 3.5.1 Primary Weed Control

Discussed previously, weed abundances, diversities, and densities are extremely high across the site. Species of greatest concern include *Lantana camara*, *Anredera cordifolia*, *Ipomoea cairica*, *Ipomoea indica*, *Colocasia esculenta*, *Sonchus oleraceus*, *Bidens pilosa*, *Acetosa sagittata*, *Solanum americanum*, and *Ageratina adenophora*.

In addition to targeting these alien species, weed control will also target the native aquatic plant *Typha orientalis*, as it is seen to have inferior value in bed stabilisation and natural water filtration; by removing and replacing it with other native aquatic plants that have a finer root system (such as *Baumea ribuginosa* and *Ficinia innundatus*), these values can be improved.

The control of weeds within and immediately adjacent to the channel will be carried out at a gradual rate to prevent excessive disturbance, in turn decreasing the potential for further infestation.

#### 3.5.2 Secondary Weed Control

Proceeding the completion of primary weed control and prior to revegetation works, a program of weed control will be implemented to ensure propagules are suppressed throughout the site. This will assist in mitigating any further spread of weed species as well as providing the best conditions for the establishment of native plantings. The methodology for the treatment of emergent secondary weeds shall be in accordance with best practice with reference given to Table 1.

**Table 1 – Proposed Techniques for Weed Control Activities**

Botanical Name	Common Name	Control Methodology
<i>Acetosa sagittata</i>	Turkey Rhubarb	Dig out tubers and remove prior to seeding, remove all weed propagule from site. Where infestation is dense, low impact back-pack with 'Weed Master Duo' at 2% dilution rate and indicator dye to product label.
<i>Ageratina adenophora</i>	Crofton Weed	Hand pull prior to seeding and remove weed propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance - spot spray with 'Weed Master Duo' at 0.5% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label.
<i>Allium ampeloprasum</i>	Wild Leek	Hand pull prior to seeding; where infestation is densely covering ground surface and hand removal will generate undue soil disturbance, spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Alstroemeria psittacina</i>	Parrot Lily	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Anredera cordifolia</i>	Madeira Vine	Where infestation is small, manually remove or scrape and paint stems, all material to be removed from site. For dense infestation, rake away from watercourse at a distance where contamination is avoided. Low impact back-pack spray piles with Fluroxypyr at 30ml in 10L of water and indicator dye to product label.
<i>Austrostipa aristiglumis</i>	Plains Grass	Slashing at a maximum height of 100mm to prevent seeding and dispersal of propagules; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Bidens pilosa</i>	Cobblers Pegs	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and

Botanical Name	Common Name	Control Methodology
		indicator dye to product label.
<i>Brassica tournefortii</i>	Mediterranean Turnip	Hand pull prior to seeding and remove propagule from site. Where dense infestation occurs, low impact back-pack with Glyphosate at 1% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label.
<i>Canna indica</i>	Canna Lily	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Cardamine hirsuta</i>	Tous-les-mois Arrowroot	Hand pull prior to seeding; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Chenopodium album</i>	Fat Hen	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Colocasia esculenta</i>	Taro	Cut above water surface and paint with undiluted bi-active Glyphosate.
<i>Convolvulus sabatius</i>	Blue Rock Bindweed	Hand pull or scrape and paint base of specimen with undiluted Glyphosate, removal of all material from site. Where dense infestation occurs, low impact back-pack with Glyphosate at 1% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label.
<i>Cyclospermum leptophyllum</i>	Slender Celery	Hand pull prior to seeding; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Eragrostis curvula</i>	African Lovegrass	Slashing at a maximum height of 100mm to prevent seeding and dispersal of propagules; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.

Botanical Name	Common Name	Control Methodology
<i>Eragrostis pilosa</i>	Soft Lovegrass	Slashing at a maximum height of 100mm to prevent seeding and dispersal of propagules; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Fumaria muralis</i> subsp. <i>muralis</i>	Wall Fumitory	Hand pull prior to seeding; emergent regrowth apply spot spray with 'Weed Master Duo' at 1% dilution and indicator dye to product label.
<i>Galinsoga parviflora</i>	Potato Weed	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Hydrocotyle bonariensis</i>	Largeleaf Pennywort	Spot spray with bi-active Glyphosate at 2% dilution rate and indicator dye to product label.
<i>Hypochaeris radicata</i>	Flatweed	Hand pull prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Ipomoea cairica</i>	Coastal Morning Glory	Hand pull or scrape and paint base of specimen with undiluted Glyphosate, removal of all material from site. Where dense infestation occurs, low impact back-pack with Glyphosate at 1% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label.
<i>Ipomoea indica</i>	Morning Glory	Hand pull or scrape and paint base of specimen with undiluted Glyphosate, removal of all material from site. Where dense infestation occurs, low impact back-pack with Glyphosate at 1% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label.
<i>Lantana camara</i>	Lantana	Where dense infestation occurs, low impact back-pack with 'Weed Master Duo' at 0.9% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label; vegetative material to be cut-up and retained on site as mulch.

Botanical Name	Common Name	Control Methodology
		Where target is lightly infesting area – cut and paint crowns and reduce biomass on site, retained as mulch on site.  Any ascendant crowns to be skirted, bases cut and painted with undiluted ‘Weed Master Duo’. Material left in-situ to die and feather out.
<i>Lonicera japonica</i>	Japanese Honeysuckle	Hand pull or scrape and paint base of specimen with undiluted Glyphosate, removal of all material from site. Where dense infestation occurs, low impact back-pack with Glyphosate at 1% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label.
<i>Modiola caroliniana</i>	Red-flowered Mallow	Hand pull prior to seeding; emergent regrowth apply spot spray with ‘Weed Master Duo’ at 1% dilution and indicator dye to product label.
<i>Myriophyllum aquaticum</i>	Parrots Feather	Scoop from water with pool-cleaner and remove all material from site.
<i>Nothoscordum gracile</i>	Onion Weed	Hand pull prior to seeding; where infestation is densely covering ground surface and hand removal will generate undue soil disturbance, spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Oenothera lindheimeri</i>	Clockweed	Hand pull prior to seeding; where infestation is densely covering ground surface and hand removal will generate undue soil disturbance, spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Onopordum acanthium</i>	Scotch Thistle	Cut and paint base of specimen with undiluted ‘Weed Master Duo’, removal of weed propagule from site. Where populations are dense, isolate if adjacent to native species then spot spray with ‘Weed Master Duo’ at 0.9% dilution rate, 45ml/15L of Synetrol surfactant and indicator dye to product label.
<i>Oxalis debilis</i> var. <i>corymbosa</i>	-	Hand pull prior to seeding; where infestation is densely covering ground surface and hand removal will generate undue soil disturbance, spot spray with Glyphosate at 1% dilution and indicator dye to product label.

Botanical Name	Common Name	Control Methodology
<i>Oxalis sp</i>	-	Hand pull prior to seeding; where infestation is densely covering ground surface and hand removal will generate undue soil disturbance, spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Paspalum dilatatum</i>	Paspalum	Slashing at a maximum height of 100mm to prevent seeding and dispersal of propagules; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Plantago lanceolata</i>	Plantain	Hand pull prior to seeding; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Rumex crispus</i>	Curled Dock	Hand pull prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Sida rhombifolia</i>	Paddy's Lucerne	Hand pull prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance – cut at base and paint with undiluted Glyphosate or spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Solanum americanum</i>	Glossy Nightshade	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Solanum lycopersicum</i>	Tomato	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Solanum nigrum</i>	Black-berry Nightshade	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.

Botanical Name	Common Name	Control Methodology
<i>Solanum torvum</i>	Devil's Fig	Hand pull or cut and paint with undiluted Glyphosate prior to seeding and remove propagule from site; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Sonchus oleraceus</i>	Common Sowthistle	Hand pull prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance, spot spray with Glyphosate at 1% dilution rate and indicator dye to product label.
<i>Stachys arvensis</i>	Stagger Weed	Hand pull prior to seeding; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Stenotaphrum secundatum</i>	Buffalo Grass	Slashing at a maximum height of 100mm to prevent seeding and dispersal of propagules; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Tradescantia fluminensis</i>	Wandering Jew	Where infestation is small, manually remove all material from site. For dense infestation, rake away from watercourse at a distance where contamination is avoided. Low impact back-pack spray piles with 'Starane™ Advanced' at 90ml in 10L of water and indicator dye to product label.
<i>Trifolium dubium</i>	Yellow Suckling Clover	Hand pull prior to seeding; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.
<i>Tropaeolum majus</i>	Nasturtium	Where infestation is small, manually remove all material from site. For dense infestation, low impact back-pack spray piles with Glyphosate at 1% dilution and indicator dye to product label.
<i>Typha orientalis</i>	Broadleaf Cumbungi	Spray with bi-active Glyphosate at 200mL/15L dilution and indicator dye to product label.
<i>Verbena bonariensis</i>	Purpletop	Hand pull prior to seeding and remove propagule from site. Where target is densely covering ground surface and physical removal will cause soil disturbance – cut at base and paint with undiluted Glyphosate or spot spray with Glyphosate at 1% dilution rate

Botanical Name	Common Name	Control Methodology
<i>Vicia sativa</i> subsp. <i>nigra</i>	Narrow-leaved Vetch	and indicator dye to product label.  Hand pull prior to seeding and remove propagule from site; emergent regrowth apply spot spray with Glyphosate at 1% dilution and indicator dye to product label.

### 3.6 PLANT MATERIAL AND PROVENANCE

Plant material to be utilised for re-vegetation purposes for this site will be sourced from a reputable supplier and include stock propagated from a local provenance. Supplies will preferably be purchased from Wollongong Botanic Gardens nursery to ensure endemic, healthy, genetically appropriate specimens.

### 3.7 RECOMMENDED PLANT SPECIES FOR RE-VEGETATION

Although weed control and natural regeneration will form a part of this VRP, due to its very low resilience native revegetation works will be required in order to assist in slope stabilisation as well as encouraging native recruitment, increase habitat and food supplies for native fauna and deter weed invasion. These revegetation works will be undertaken in line with the existing landscape design concept (Baturynsky, 2017) by integrating many of the plants suggested therein (see Table 2).

Within the channel, plantings will encompass wetland sedges and rushes. Beyond the channel, there will be a range of groundcovers, shrubs and small trees in order to recreate a structurally diverse habitat and encourage natural regeneration (see Table 3).

**Table 2– Recommended Plant Species within channel**

Species type	Species	Common Name	QTY
<b>Sedges/Rushes</b>			
	<i>Baloskion tetraphyllum</i> *	Feather Top	30
	<i>Baumea rubiginosa</i>	Soft Twig Rush	30
	<i>Carex appressa</i> *	Tall Sedge	30
	<i>Eleocharis gracilis</i>	Slender Spike-rush	30
	<i>Ficinia inundata</i>	-	30
	<i>Ficinia nodosa</i> *	Knobby Club Rush	30
	<i>Gahnia clarkei</i>	Tall Saw-sedge	30
	<i>Juncus usitatus</i> *	Common Rush	30
	<i>Ledpidosperma forsythia</i>	Rapier Sedge	30
	<i>Lomandra longifolia</i> *	Spiky-headed Mat-rush	30
		<b>Sub-total</b>	<b>300</b>
*Denotes plants from the landscape concept design (Baturynsky, 2017)			

**Table 3– Recommended Plant Species on the floodplain**

Species type	Species	Common Name	QTY
<b>Grass/Groundcover</b>			
	<i>Carpobrotus glaucescens*</i>	Pig Face	100
	<i>Dianella caerulea*</i>	Blue Flax-lily	75
	<i>Dichondra repens*</i>	Kidney Weed	300
	<i>Juncus usitatus*</i>	Common Rush	150
	<i>Lomandra longifolia*</i>	Spiky-headed Mat-rush	75
	<i>Oplismenus imbecillis</i>	Creeping Beard Grass	100
	<i>Viola hederacea*</i>	Native Violet	250
		<b>Sub-total</b>	<b>1050</b>
<b>Shrub</b>			
	<i>Clerodendrum tomentosum</i>	Downy Chance	9
	<i>Correa alba*</i>	White Correa	9
	<i>Doryanthes excelsa*</i>	Gynea Lily	9
	<i>Rapanea variabilis</i>	Muttonwood	9
	<i>Westringia fruticosa</i>	Coastal Rosemary	9
		<b>Sub-total</b>	<b>45</b>
<b>Tree</b>			
	<i>Alphitonia excelsa</i>	Red Ash	7
	<i>Callistemon salignus</i>	Willow Bottlebrush	7
	<i>Syzygium australe*</i>	Lilly Pilly	7
		<b>Sub-total</b>	<b>21</b>
*Denotes plants from the landscape concept design (Baturynsky, 2017)			

### 3.8 DENSITIES AND SPATIAL ARRANGEMENT

Once primary and secondary weed control is completed, natural native recruitment is expected to be low to very low for this study site. As such, plant densities during revegetation work will be relatively high in order to achieve the desired outcome (see Table 4).

**Table 4 – Average Planting Densities within Riparian Corridor**

Plant Type	Densities within composition
Aquatic herbs and sedges	0.72 units/m <sup>2</sup>
Herbaceous groundcover	2.52 units/m <sup>2</sup>
Shrub	0.11 units/m <sup>2</sup>
Tree	0.05 units/m <sup>2</sup>
<b>Combined Planting Densities</b>	<b>3.40 units/m<sup>2</sup></b>

### 3.9 INSTALLATION PROCEDURE

Installation of the recommended species shall conform to the following guidelines:

- Planting of the subject area is to be undertaken by experienced bush regenerators with strict adherence to the approved VRP;
- Plants to be moist in pots prior to planting;
- Planting holes to be dug to depth of 200mm and diameter of 100mm;
- Plant establishment additives (e.g. 'Terraform') to be incorporated into soil prior to planting;
- After planting, the soil is to be gently firmed down, allowing for a slight depression around each plant for water collection;
- Plants are to be watered generously after installation;
- Plant guards and stakes installed to tree and shrub units (if required);
- Plants to receive additional watering until deemed to be successfully established.

### 3.10 PLANT PROTECTION

Although plant predation was not directly observed, there is a risk that rabbits may reside nearby; as such it is recommended that low-cost, bio-degradable tree guards constructed from cardboard barriers and bamboo poles are installed around shrubs and trees at the time of planting. These will provide effective protection against the risk of herbivory.

### 3.11 MAINTENANCE

The VRP is to apply for a total of 2 years from the date of commencement, inclusive of establishment and maintenance phases. Maintenance shall be ongoing until WCC declares in writing, that the site has been returned to its natural state.

The maintenance period shall commence following completion of primary weed control and recommended revegetation.

Maintenance activities will focus on the prevention of secondary weed invasion, the protection and establishment of planting.

## SECTION 4 MAINTENANCE

### 4.1 GENERAL

The VRP is to apply for a total of 2 years from the date of commencement, inclusive of establishment and maintenance phases. The maintenance period shall commence following completion of all revegetation activities. Maintenance shall be ongoing until WCC declares in writing, that the site has been returned to its natural state.

Performance of the site will be assessed on a six-monthly basis and if targets have not been met the monitoring will continue in 6-monthly blocks until such time that the performance targets are achieved. Maintenance activities will focus on the prevention of secondary weed invasion, the protection and consolidation of establishing tubestock and erosion prevention of the site.

All VRP works to be implemented by suitably qualified ecological restoration contractor (subject to WCC approval) whom shall hold the following minimum qualifications and/or experience:

- Qualifications in Conservation and Land Management/Natural Areas Restoration (Certificate III);
- Equivalent study and/or demonstrated experience in ecological restoration (minimum 2 years).

The restoration contractor shall devise a schedule of maintenance based upon the performance of the site, weed presence and success of remediation. A minimum frequency of quarterly visitation to the site for the purposes of maintenance is to apply for the maintenance period.

### 4.2 WEED CONTROL

During the maintenance period, the Contractor is to control weed growth across the site regardless of the timing of nominated stages, and prevent any weeds from setting seed or dispersing propagules. Weed control is to occur at minimum quarterly intervals for the entire maintenance period. Throughout the maintenance period, it is anticipated the following weeds will require due diligence to ensure successful restoration outcomes for the site:

**Table 5 – Anticipated weeds of concern**

Botanical Name	Common Name
<i>Acetosa sagittata</i>	Turkey Rhubarb
<i>Ageratina adenophora</i>	Crofton Weed

<i>Anredera cordifolia</i>	Madeira Vine
<i>Bidens pilosa</i>	Cobblers Pegs
<i>Colocasia esculenta</i>	Taro
<i>Ipomoea cairica</i>	Coastal Morning Glory
<i>Ipomoea indica</i>	Morning Glory
<i>Lantana camara</i>	Lantana
<i>Lonicera japonica</i>	Japanese Honeysuckle
<i>Tradescantia fluminensis</i>	Wandering Jew
<i>Verbena bonariensis</i>	Purpletop

The above species are those that pose the greatest threat to the integrity and restoration potential of the site, even if they occur at low abundances (e.g. *Lantana camara*, *Anredera cordifolia*).

#### 4.3 WATERING

All plants installed as revegetation tubestock throughout the subject site shall be regularly watered to maintain a healthy growth rate. The Contractor is to be aware of the natural rainfall of the site and adjust the watering program accordingly.

#### 4.4 PEST AND DISEASE CONTROL

During the contract period, pests and disease are to be controlled via natural means (i.e. the use of organic sprays, manual removal and disposal of pests). No chemicals, other than glyphosate-based herbicides, are to be applied within the subject site.

#### 4.5 EROSION CONTROL

The Contractor is to remediate any erosion or soil disturbance that may occur during the maintenance period. Erosion and sediment control devices are to be inspected, maintained and reinstated if there is a likelihood of sediments on slopes becoming mobile. Sediment and erosion control shall be undertaken in accordance with industry best practice and in accordance with the approved Soil and Water Management Plan.

#### 4.6 FIRE MANAGEMENT

No works proposed as part of the revegetation are likely to cause a bushfire. Nor will the vegetation added

to the site increase the risk of fire to adjoining properties. Burning off within any riparian or roadside vegetation corridors is not permitted during revegetation works or the maintenance period.

#### 4.7 RUBBISH REMOVAL

During the maintenance period, the subject site is to be kept free of all rubbish. Particular attention should be paid after high rainfall events, when debris may accumulate within the channel and along the edges of the watercourse.

#### 4.8 PLANT REPLACEMENT

During the maintenance period, the Contractor is to monitor the success of establishing revegetation tubestock. In the event of plant species failure, the Contractor is to supply and install replacement planting consistent with the prescribed planting recommendations contained within this VRP. Provision is to be made at the time of collection and propagation of native seed stock to ensure adequate replacement plant material will be available and is consistent with the genetic integrity of the local provenance of the site.

#### 4.9 PROTECTIVE TREE GUARD MAINTENANCE

During the maintenance period, all protective tree guards shall be inspected regularly to ensure rabbits are prevented from damaging the plantings. Any tree guards that have been damaged, removed, or lost are to be replaced. At the end of the maintenance period, tree guards should be removed from those plants that have become established, in order to avoid constricting them.

#### 4.10 MANAGEMENT OF INTERNAL AND ADJACENT AREAS

Management of all areas within and surrounding the site offers the potential to complement the VRP. Threats include further weed invasion as neighbouring and upstream growth acts as a seed source if carried to the subject site. Managing all areas in relation to erosion will also create the best environment for vegetation success. As adjacent land is privately owned, management of these areas will not be considered.

## SECTION 5 MONITORING AND REPORTING PROGRAM

### 5.1 MONITORING

A monitoring program will provide an objective measurement of any changes to the site at a species, population and community level. Monitoring should provide both qualitative (visual) and quantitative (statistical) assessment of the site. Qualitative assessments can be in the form of photographs taken from permanent photo points, whilst quantitative assessments can be measured against the original description of the environment outlined in Section 2 of this report (i.e. comparing Braun Blanquet indices between monitoring events to see if the abundance of weed and native species has changed). Results should be regularly assessed and presented in report format (refer to Section 5.2).

Performance indicators have been established for this project to ensure that the recommended program of works and strategies are achieved. Both quantitative and qualitative assessment of the floristic value of the site should be assessed at the recommended intervals. In general, performance indicators for the subject are described in Table 6 below.

**Table 6 – Performance Criteria**

Task/Milestone	Performance Indicator	How Measured
<p><b>Note: All VRP works to be implemented by suitably qualified ecological restoration contractor. Whom shall hold the following minimum qualifications and/or experience:</b></p> <ul style="list-style-type: none"> <li>• Qualifications in Conservation and Land Management/Natural Areas Restoration (Certificate III);</li> <li>• Equivalent study and/or demonstrated experience in ecological restoration (minimum 2 years).</li> </ul>		
Site Induction	All tasks identified in Section 3.2 complied with.	Record of site inductions kept with job file; Notification sent to WCC as to the commencement of works on site.
Weed Control	95% eradication of all identified keystone weeds in subject area.	Using the weed species audit in this Report as baseline data, undertake a similar audit at the 1 month after completion of weed control throughout subject area to ensure Performance Indicator is met.
Successful installation of all revegetation tubestock throughout each stage of riparian corridor.	Recommended plant material installed at prescribed densities and composition.	Review of daily planting summaries. Random sampling of subject site.
Successful establishment of revegetation material. tree guards	95% survivorship across whole of site. Tree guards are in	6-monthly inspections to determine percentage loss. Random sampling of subject site. Quarterly inspection tree

		guards
Continued reduction and control of weeds throughout site.	Continual reduction and control of all invasive species to a maximum of 5% of weed cover. of native plantings	Using the weed species audit in this Report as baseline data, undertake a similar weed species audit at the 12 month interval to ensure that the number of weed species has reduced to a maximum of 5% of weed cover.
Monitoring and Reporting	Undertake monitoring at prescribed intervals, preparation and submission of reports to WCC.	Complete monitoring as per works schedule. Timely submission and receipt of reports to WCC.

## 5.2 REPORTING

A series of reports will be prepared during the recommended reporting period, with the aim to provide an objective assessment of the performance of the site against the Performance Criteria outlined in Table 5. As well as this quantitative comparison, the interim reports will also provide a review of the protection, enhancement and rehabilitation measures being undertaken as outlined in this VRP.

A report shall be prepared by the consultant every six (6) months during the recommended maintenance period. The reporting period shall be for the duration of the maintenance period that commences at the completion of revegetation on the subject site and any subsequent monitoring period that may be required. Once completed, reports shall be submitted to Client and WCC Regulation and Enforcement Division.

Contents of the six monthly interim reports shall include but not be limited to:

- Evaluation of performance criteria as per Table 6 – Performance Criteria
- Restoration activities undertaken during specific reporting period;
- Maintenance summary and log of date and time for each activity for the period;
- Photographic records taken from designated photo points showing progress of works
- Recommendations for forthcoming maintenance period to address any short fall in performance criteria.

A suggested pro-forma for these interim reports is provided in Appendix C.

## SECTION 6 PROJECT COSTS AND SEQUENCE OF WORKS

### 6.1 PROJECT COSTS

An estimate of costs associated with implementation of the riparian restoration and maintenance recommendations contained in this report has been provided in Table 7. Please note this costing does not include any landscape construction elements identified on the landscape design concept (Baturynsky, 2017).

**Table 7 – Estimated Costs**

Restoration Activity	Description	Cost
Site Preparation	Project Safety Plan (PSP), including Safe Work Method Statements, Risk Assessment and Hazard Identification, Emergency Evacuation Plan and Materials Handling Plan.	\$400.00
Primary Weed Control	Completion of primary weeding.	\$3,000.00
Plant Material Supply	The supply of all plant material nominated for installation.	\$2,000.00
Install Plant Material	Installation of all plants	\$2,000.00
Maintenance	Provision of the necessary labour and resource to ensure restoration outcomes are achieved throughout the subject site. Maintenance Costs have been calculated for the provision of a 24-month maintenance program commencing at completion of planting.	\$12,000.00
Monitoring/Reporting	Undertake 6-monthly interval monitoring and assessment. Preparation and lodgement of interim reports for a period of 24-months.	\$2,400.00
<b>Total Cost Estimate (excluding GST)</b>		<b>\$21,800.00</b>

## 6.2 SEQUENCE OF WORKS

Task No.	Section (VRP)	Task	Prerequisite Tasks	Timeframe	Performance Criteria	Anticipated Labour
1	3.2	Appointment of all Key Personnel,  Establishment of photo monitoring points (a minimum of 2 points).	-	Prior to works commencing on-site.	Minimum qualifications for all team members working on the site.  Notification sent to WCC of works program commencing.  Photo log of monitoring points completed and sent to WCC.	8 hrs
2	3.3 & 3.10	Protection of existing native vegetation.	1		No signs of herbicide harm to native species.	24 hrs
3	3.4	Soil protection/soil erosion control measures.	1	Ongoing throughout construction period	Visual assessment of soil surface to determine stability.  No signs of soil loss over site.	24 hrs
4	3.6 & 3.7	Discuss with preferred native plant supplier as to the availability of species as identified in Section	1	At completion of Task 1	Alignment of recommended species with VRP and consultation with Author of report for approval of any substitutions of species.	1.5 hrs

Task No.	Section (VRP)	Task	Prerequisite Tasks	Timeframe	Performance Criteria	Anticipated Labour
		3.7. Placement of order.			Copies of plant material supply to be attached to interim reporting.	
5	3.5	Primary Weed Control	4	2 days	90% eradication of all identified keystone weeds in subject area.	48 hrs
6	3.7, 3.8 & 3.9	Revegetation Works	5	2 days	Recommended plant material installed at prescribed densities and composition.  Practical completion and site ready for maintenance period to be enacted.	32 hrs
7	4	Maintenance Period commences	6	2 years	90% survivorship across whole of site. Continual reduction and control of all weed species to a maximum of 5% of weed cover.	16 hrs/qtr.
8	5.1 5.2	Monitoring & Reporting Period commences	7	2 years	Undertake monitoring at prescribed intervals, preparation and submission of reports to WCC (four reports in total).	6hrs/report

## SECTION 7 CONCLUSION

### 7.1 CONCLUSION

This VRP provides the guiding documentation for the site's rehabilitation in accordance with the legislative framework and guidelines from WCC. The VRP will provide the agreed basis for the restoration of the subject site.

The provision of a prescriptive Performance Criteria will allow the objective evaluation of the site's performance over the two year maintenance period and effective determination of whether successful environmental restoration has been achieved on the site.

If adopted, the recommendations made in within this report will dramatically improve the health of vegetation throughout, add value to the surrounding area and contribute to landscape outcomes across the whole of property, while simultaneously providing a path towards the landowners achieving their desired landscape designs.

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## APPENDIX A - NATIVE SPECIES SURVEY

(Undertaken on 8<sup>th</sup> December 2017)

Family Name	Botanical Name	Common Name	Cover	Abundance*
COMMELINACEAE	<i>Commelina cyanea</i>	Scurvy Weed	< 5%	2
CYPERACEAE	<i>Cyperus eragrostis</i>	Umbrella Sedge	< 5%	3
GERANIACEAE	<i>Geranium homeanum</i>	Native Geranium	< 5%	3
POLYGONACEAE	<i>Persicaria decipiens</i>	Slender Knotweed	< 5%	3
POLYGONACEAE	<i>Persicaria strigosa</i>	Spotted Knotweed	< 5%	1
PHYLLANTHACEAE	<i>Phyllanthus gunnii</i>	Scrubby Spurge	< 5%	1
TYPHACEAE	<i>Typha orientalis</i>	Broadleaf Cumbungi	5-20%	5
AMARANTHACEAE	<i>Alternanthera denticulata</i>	Lesser Joyweed	< 5%	1
ARACEAE	<i>Alocasia brisbanensis</i>	Spoon Lily	<5%	1
<b>Total Native Species Recorded</b>				<b>9</b>
*Values represent the abundance of each species based on the modified Braun Blanquet cover abundance index: 1, <5% cover and one or a few individuals; 2, <5% cover and uncommon; 3, <5% cover and common; 4, <5% cover and very abundant; 5, 5-20% cover; 6, 21-50% cover; 7, 51-75% cover; 8, 76-100% cover.				

## APPENDIX B - WEED SPECIES SURVEY

(Undertaken on 8<sup>th</sup> December 2017)

Family Name	Botanical Name	Common Name	Cover (%)	Abundance *
POLYGONACEAE	<i>Acetosa sagittata</i>	Turkey Rhubarb	5-20%	5
ASTERACEAE	<i>Ageratina adenophora</i>	Crofton Weed	<5%	3
ALLIACEAE	<i>Allium ampeloprasum</i>	Wild Leek	<5%	1
ALSTROEMERACEAE	<i>Alstroemeria psittacina</i>	Parrot Lily	<5%	2
BASELLACEAE	<i>Anredera cordifolia</i>	Madeira Vine	<5%	2
POACEAE	<i>Austrostipa aristiglumis</i>	Plains Grass	<5%	2
ASTERACEAE	<i>Bidens pilosa</i>	Cobblers Pegs	5-20%	5
BRASSICACEAE	<i>Brassica tournefortii</i>	Mediterranean Turnip	<5%	2
CANNACEAE	<i>Canna indica</i>	Canna Lily	<5%	1
BRASSICACEAE	<i>Cardamine hirsuta</i>	Tous-les-mois Arrowroot	<5%	2
CHENOPODIACEAE	<i>Chenopodium album</i>	Fat Hen	<5%	4
ARACEAE	<i>Colocasia esculenta</i>	Taro	5-20%	5
CONVOLVULACEAE	<i>Convolvulus sabatius</i>	Blue Rock Bindweed	<5%	2
APIACEAE	<i>Cyclospermum leptophyllum</i>	Slender Celery	<5%	2
POACEAE	<i>Eragrostis curvula</i>	African Lovegrass	<5%	3
POACEAE	<i>Eragrostis pilosa</i>	Soft Lovegrass	5-20%	5
PAPAVERACEAE	<i>Fumaria muralis</i> subsp. <i>muralis</i>	Wall Fumitory	<5%	2
ASTERACEAE	<i>Galinsoga parviflora</i>	Potato Weed	<5%	2
ARALIACEAE	<i>Hydrocotyle bonariensis</i>	Largeleaf Pennywort	<5%	2
ASTERACEAE	<i>Hypochaeris radicata</i>	Flatweed	<5%	2
CONVOLVULACEAE	<i>Ipomoea cairica</i>	Coastal Morning Glory	21-50%	6
CONVOLVULACEAE	<i>Ipomoea indica</i>	Morning Glory	5-20%	5
VERBENACEAE	<i>Lantana camara</i>	Lantana	<5%	1

CAPRIFOLIACEAE	<i>Lonicera japonica</i>	Japanese Honeysuckle	<5%	1
MALVACEAE	<i>Modiola caroliniana</i>	Red-flowered Mallow	<5%	4
HALORAGACEAE	<i>Myriophyllum aquaticum</i>	Parrots Feather	<5%	1
ALLIACEAE	<i>Nothoscordum gracile</i>	Onion Weed	<5%	2
ONAGRACEAE	<i>Oenothera lindheimeri</i>	Clockweed	<5%	1
ASTERACEAE	<i>Onopordum acanthium</i>	Scotch Thistle	<5%	1
OXALIDACEAE	<i>Oxalis debilis</i> var. <i>corymbosa</i>	-	<5%	1
OXALIDACEAE	<i>Oxalis</i> sp	-	<5%	2
POACEAE	<i>Paspalum dilatatum</i>	Paspalum	<5%	4
PLANTAGINACEAE	<i>Plantago lanceolata</i>	Plantain	<5%	2
POLYGONACEAE	<i>Rumex crispus</i>	Curled Dock	<5%	3
MALVACEAE	<i>Sida rhombifolia</i>	Paddy's Lucerne	<5%	1
SOLANACEAE	<i>Solanum americanum</i>	Glossy Nightshade	5-20%	5
SOLANACEAE	<i>Solanum lycopersicum</i>	Tomato	<5%	4
SOLANACEAE	<i>Solanum nigrum</i>	Black-berry Nightshade	<5%	3
SOLANACEAE	<i>Solanum torvum</i>	Devil's Fig	<5%	1
ASTERACEAE	<i>Sonchus oleraceus</i>	Common Sowthistle	5-20%	5
LAMIACEAE	<i>Stachys arvensis</i>	Stagger Weed	<5%	3
POACEAE	<i>Stenotaphrum secundatum</i>	Buffalo Grass	<5%	4
COMMELINACEAE	<i>Tradescantia fluminensis</i>	Wandering Jew	<5%	2
FABACEAE - FABOIDEAE	<i>Trifolium dubium</i>	Yellow Suckling Clover	<5%	4
TROPAEOLACEAE	<i>Tropaeolum majus</i>	Nasturtium	<5%	3
VERBENACEAE	<i>Verbena bonariensis</i>	Purpletop	<5%	4
FABACEAE - FABOIDEAE	<i>Vicia sativa</i> subsp. <i>nigra</i>	Narrow-leaved Vetch	<5%	2
<b>Total Weed Species Recorded</b>				<b>47</b>
Values represent the abundance of each species based on the modified Braun Blanquet cover abundance index: 1, <5% cover and one or a few individuals; 2, <5% cover and uncommon; 3, <5% cover and common; 4, <5% cover and very abundant; 5, 5-20% cover; 6, 21-50% cover; 7, 51-75% cover; 8, 76-100% cover.				

# Interim Works Summary

Period: xxxxxxxx to xxxxxxxx

Site Name: xxxxxxxxxx

Location: xxxxxxxxxx

REPORT DATE: xxxxxx

PREPARED BY: xxxxxx

REPORT PREPARED FOR: xxxxx

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## 1. Introduction

The following report offers an interim summary of restoration works conducted by Southern Habitat (NSW) Pty Ltd at *Site Name (Site Address)* during the six months from xxxx to xxxx, 20xx.

Specifically, the interim report aims to provide an up-to-date summary of the following:

- Changing condition of resident vegetation since the commencement of restoration works (including an updated native and weed plant species audit);
- Restoration work activities, including a brief overview of restoration techniques and weed treatments employed on site;
- A brief breakdown of the number of hours used for site restoration.

## 2. Performance Criteria

The Vegetation Restoration Plan (VRP) provides a brief set of performance criteria that must be addressed by the current restoration works and subsequent interim reports. These performance criteria represent both qualitative and quantitative measures to ensure the protection, enhancement and rehabilitation of site vegetation:

- *List specific Performance Criteria as outlined in Section 5 of VRP*

This interim restoration works summary will specifically address these performance criteria as detailed in the VRP.

## 3. Summary of Restoration Works

- *Detailed summary of works conducted within reporting period, as outlined in Section 3 of VRP*
- *Table of any vegetation units installed (refer Appendix)*

#### 4. Summary of Allocated Hours

Month	Hours	Activity
Total		

#### 5. Photo Diary

The following photographs represent qualitative before-and-after analyses of changing vegetation conditions as a result of restoration works conducted by Southern Habitat (NSW) Pty Ltd between xxxxx and xxxxx 20xx.

#### 6. Future Restoration Actions

- *Framework for next 6-month works period, including any actions to address shortfalls identified in this report*
- *Refer Appendix*

## APPENDIX: Summary of Installed Vegetation Units and 6-monthly audit

Details of 4 sample plots (10m x 10m) throughout subject site

Note that abundances of species are provided for both the initial and 6-monthly audits. Species highlighted in bold are those exhibiting changes in occurrence or abundance at the completion of 6 months restoration.

### *6 monthly audit      Sample Plot Results*

**Site:**

**Project:**

**Sample Plot No.:**

**Audit Undertaken by:**

**Date:**

<b>Botanical Name</b>	<b>Common Name</b>	<b>Installed No.</b>	<b>Audited No.</b>	<b>No. Loss</b>	<b>% loss</b>

*6 monthly audit*      *Summary of Sample Plot Results*

**Site:**

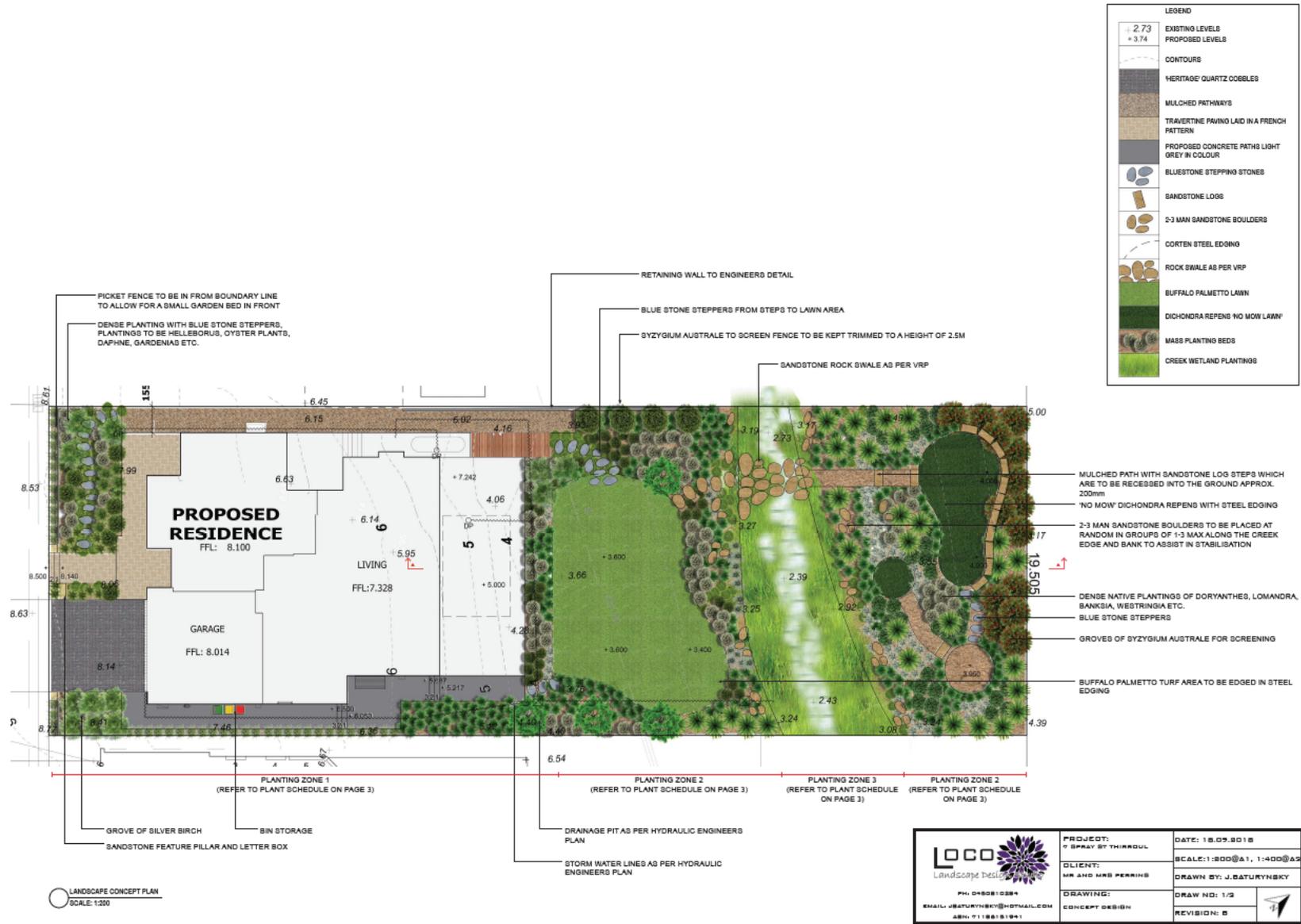
**Project:**

**Audit Undertaken by:**

**Date:**

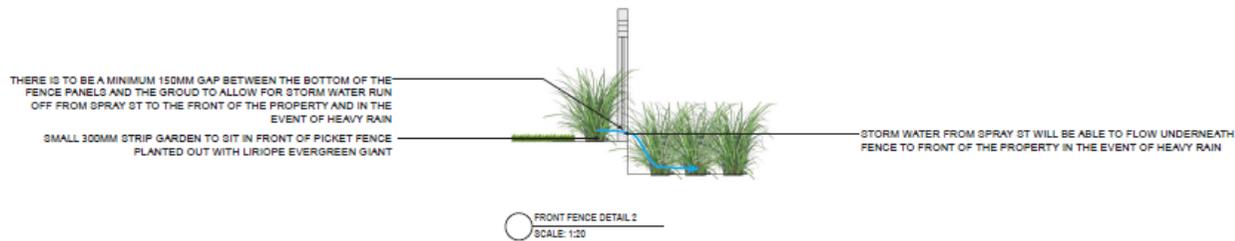
<b>Botanical Name</b>	<b>Common Name</b>	<b>Installed No.</b>	<b>Audited No.</b>	<b>Total No. Loss</b>	<b>% loss</b>	<b>No. recommended for infill planting</b>

Refer overleaf





 <p>PH: 045810384 EMAIL: JSATURYNBKY@HOTMAIL.COM ABN: 71 186181943</p>	PROJECT: 7 SPRAY BUSHWOOD	DATE: 18.09.2018
	CLIENT: MR AND MRS PERKINS	SCALE: AS SHOWN
	DRAWING: SECTION ELEVATIONS	DRAWN BY: J.SATURYNBKY
		DRAW NO: 0/2
		REVISION: 0



**INDICATIVE PLANTS LIST ZONE 1: FRONT YARD AND SOUTHERN SIDE OF BACKYARD**

BOTANIC NAME	COMMON NAME	HEIGHT AND WIDTH
<b>TREES</b>		
Acer palmatum 'Sango Kaku'	Coral Bark Maple	5m x 5m
Betula Pendula	Silver Birch	8m x 4m
Lagerstroemia indica 'Natchez'	Crepe Myrtle	4m x 3m
Magnolia 'Teddy Bear'	Magnolia	4m x 3m
<b>SHRUBS</b>		
Agave attenuata	Agave	1x1m
Daphne odora 'Star White'	Daphne	1.5x1.5
Echium candicans	Pride of Madeira	2m x 2m
Euphorbia 'Silver Swan'	Silver Euphorbia	.7m x .7m
Gardenia augusta 'Florida'	Gardenia	1m x 1m
Kalanchoe bracteata	Silver Spoons	.7m x .5m
Pittosporum 'Miss Muffet'	Miss Muffet	.7m x .7m
Raphiolepis Indica 'Snow Maiden'	Indian Hawthorn	1.5m x 1m
Raphiolepis Oriental Pearl		1m x 1m
Teucrium fruticans	Germander	1.5m x 1.5m
Zamia furfuracea	Cardboard Plant	1m x 1m
<b>GRASSES AND GROUNDCOVERS</b>		
Acanthus mollis	Oyster Plant	1m x 1m
Clivia miniata	Clivea	1m x 1m
Helleborus orientalis	Lenten Rose	.5m x .5m
Viola hederacea	Native Violet	.5m x .5m
Liriope 'Evergreen Giant'	Liriope	.7m x .7m

**INDICATIVE PLANTS LIST ZONE 2: FLOOD PLAIN ZONE**

BOTANIC NAME	COMMON NAME	HEIGHT AND WIDTH
<b>TREES</b>		
Alphitonia excelsa	Red Ash	7m x 4m
Callistemon salignus	Willow Bottle Brush	7m x 3m
Syzygium australe	Lilly Pilly	4m x 3m
<b>SHRUBS</b>		
Rapanea variabilis	Muttonwood	4m x 3m
Correa alba	White Correa	1m x 1m
Doryanthes excelsa	Gymea Lily	2m x 2m
Westringia fruticosa	Westringia	1.5m x 1.5m
<b>GRASSES AND GROUNDCOVERS</b>		
Carpobrotus glaucescens	Pig Face	.3m x 1m
Dianella Caerulea 'Cassa Blue'	Dianella	1m x 1m
Juncus usitatus	Common Rush	1m x 1m
Lomandra 'Tanika'	Mat rush	1m x 1m
Viola hederacea	Native Violet	.5m x .5m

**INDICATIVE PLANTS LIST ZONE 3: CREEK WETLAND PLANTINGS**

BOTANIC NAME	COMMON NAME	HEIGHT AND WIDTH
<b>GRASSES AND GROUNDCOVERS</b>		
Baloskian Tetraphyllum	Feather Top	1m x 1m
Carex apressa	Tall Sedge	.8m x 1m
Ficinia nodosa	Knobby Club Rush	1m x 1m
Juncus usitatus	Common Rush	1m x 1m
Lomandra longifolia	Mat rush	1m x 1m

	PROJECT: 7 SPRAY ST THIRROOL	DATE: 18.09.2018
	CLIENT: MR AND MRS FERRIS	SCALE: N/A
	DRAWING: FENCE DETAIL & PLANT SCHEDULES	DRAWN BY: J.SATURYNSKY
		DRAW NO: 2/2

## Attachment 3 - Retaining Wall and Front Fence Report

21 September 2018

Ref: 17 / 779 - 3

Mr K Perrins  
2 Robert Street  
Corrimal NSW 2518

Dear Sir,

**ENGINEERING INSPECTION REPORT RETAINING WALL  
RECTIFICATION AND PROPOSED FRONT FENCE  
No 7 SPRAY STREET THIRROUL**

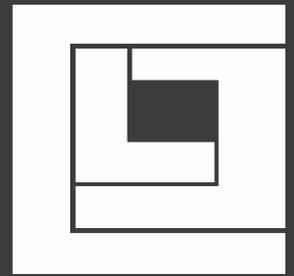
### 1. Introduction

This report presents the results of a structural engineering inspection on the existing retaining wall along the western boundary of No 7 Spray Street Thirroul. The purpose of the inspection was to inspect the existing retaining wall to determine the suitability for the existing retaining wall to remain and provide details to rectify the wall as required. This report also contains an assessment of the proposed front fence and impact, if any, on floodwater surface flows.

### 2. Site Inspection

An inspection of the existing retaining wall along the western boundary of No 7 Spray Street Thirroul was carried out on the 12<sup>th</sup> October 2017, the main features observed are noted below and some features are shown in photographs 1 to 6, attached.

- The ground level to the rear of No 5 Spray Street Thirroul varies from approximately 600mm – 900mm above the ground level on No 7 Spray Street Thirroul.
- This higher ground level on No 5 Spray Street Thirroul extends from the existing metal shed to the top of the watercourse.
- This ground is currently retained with corrugated iron sheets embedded into the ground extending from the existing metal shed to the top of the watercourse (refer photographs 1 and 2).
- Above the corrugated iron sheets is a timber paling fence in poor condition (refer photograph 1).
- The corrugated iron sheets terminate at the top of the bank of the existing natural watercourse which runs through the



**CJL**  
CONSULTING

CIVIL + STRUCTURAL  
**ENGINEERS**

PO BOX 446  
Fairy Meadow  
NSW 2519

E: [info@cjl.com.au](mailto:info@cjl.com.au)

M: 0437 872 985

ABN: 46 325 765 329

- rear of No 5 and No 7 Spray Street Thirroul (refer photograph 3).
- The corrugated iron sheets are in poor condition with areas of significant corrosion and movement visible (refer photographs 4, 5 and 6).

### **3. Assessment of Existing Retaining Wall**

The existing corrugated iron retaining wall is in very poor condition with areas of significant movement and corrosion. It is our opinion that the existing corrugated iron is no longer structurally adequate and should be replaced as a matter of urgency. It is highly unlikely that the existing corrugated iron retaining wall would be able to withstand the forces of floodwater that are likely to act on the wall. Failure of the wall would result in both the corrugated sheets and the paling fence above the wall becoming debris which would be washed into the existing natural watercourse potentially blocking the culvert under Cliff Parade.

Without any form of support it is also likely that significant erosion along the eastern side of the yard of No 5 Spray Street Thirroul would occur which could also potentially block the culvert under Cliff Parade.

Based on the above it is our opinion that to ensure the long-term stability of No 5 Spray Street Thirroul and reduce potential debris which could block the culvert under Cliff Parade the existing corrugated iron retaining wall and paling fence be removed and replaced with a suitable retaining wall and fence.

### **4. Proposed Rectification Works**

It is proposed to replace the existing corrugated iron retaining wall with a steel post and concrete sleeper retaining wall, refer to C J L Consulting drawing 17/779 sheets R1C, R2C, R3B and R4A dated 21<sup>st</sup> September 2018 for details. This retaining wall would match the existing ground levels on both No 5 and No7 Spray Street Thirroul and extend for the same length as the existing retaining wall. There would be no alteration to the conveyance of floodwaters as no changes in ground level are proposed. Please note that the floodwater flows from the west to the east from No 5 Spray Street onto No 7 Spray Street, i.e. from higher ground to lower ground.

The proposed retaining wall will cross the existing drainage easement but based on the available information there does not appear to be any pipes located within the easement. The proposed retaining wall will not extend into the existing natural watercourse. Please note that the existing retaining wall extends to within the easement and that no changes in ground level are proposed as part of the works. The proposed retaining wall type has been selected as it is one of the narrowest forms of retaining wall available. The existing timber paling fence is proposed to be replaced with either a timber paling fence or similar permeable fencing which will allow floodwaters to pass through the fence with minimal impedance. The intent is to provide a structure which is structurally sound and won't allow erosion or debris to occur during flood events.

## 5. Proposed Timber Picket Front Fence

It is proposed to construct a timber picket fence in from the front boundary line with a small landscaping bed to be planted in front of the wall. Please refer to plans by Loco Landscape Design Studio dated 2<sup>nd</sup> April 2018 for details.

The proposed timber picket fence is located beyond the extent of both the 1% AEP and PMF flood events. The front footpath grades towards the proposed fence and the proposed fence will need to have provision to allow any surface flows to enter the property unimpeded. The following is the determination of the anticipated surface flows that the fence will need to allow for.

The catchment area to the kerb on the northern side of Spray Street has been estimated to be 11,400m<sup>2</sup>. The catchment extends to the south from Spray Street approximately 167m towards Tasman Parade. The probabilistic rational method has been used to calculate the anticipated flows from both the 1% AEP and PMF events. The 1% AEP has been calculated to be 1.0m<sup>3</sup>/s with a rainfall intensity of 252mm/h and the PMF 2.0m<sup>3</sup>/s with a rainfall intensity of 660mm/h.

Spray Street falls from the east to the west to a low point on the curve of the intersection of Spray Street and The Breakers approximately 38m to the west of No 7 Spray Street. The capacity of Spray Street, excluding piped drainage, has been assessed using manning's equation to be 2.7m<sup>3</sup>/s which is greater than both the 1% AEP and PMF flows. Spray Street therefore has sufficient capacity to collect and convey surface flows from the south of Spray Street and convey the flows to the low point at the intersection of Spray Street and The Breakers.

The catchment area to the proposed picket fence in from the boundary line is therefore the area of land from the fence to the back of the northern kerb of Spray Street. This catchment area has been calculated to be 48m<sup>2</sup>. For this catchment the 1% AEP has been calculated to be 3.7l/s and the PMF 8.9l/s with respective flow depths of 3mm and 5mm. A standard timber fence with a clearance of 50mm from the underside of the pickets to the ground will provide adequate clearance to accommodate the likely surface flows. It is our opinion that given the anticipated flow depths the proposed landscaping will not cause any significant flow diversion and that there will be sufficient gaps between the plants to allow the passage of the anticipated flows.

Please do not hesitate to contact the undersigned if you wish to discuss any of the above.

Regards,  
C J L Consulting



Colin Lindsay  
BE (Hons 1) MIEAust CPEng NER

Attached: C J L Consulting DWG: 17/779 Sheets R1 - R4



Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5

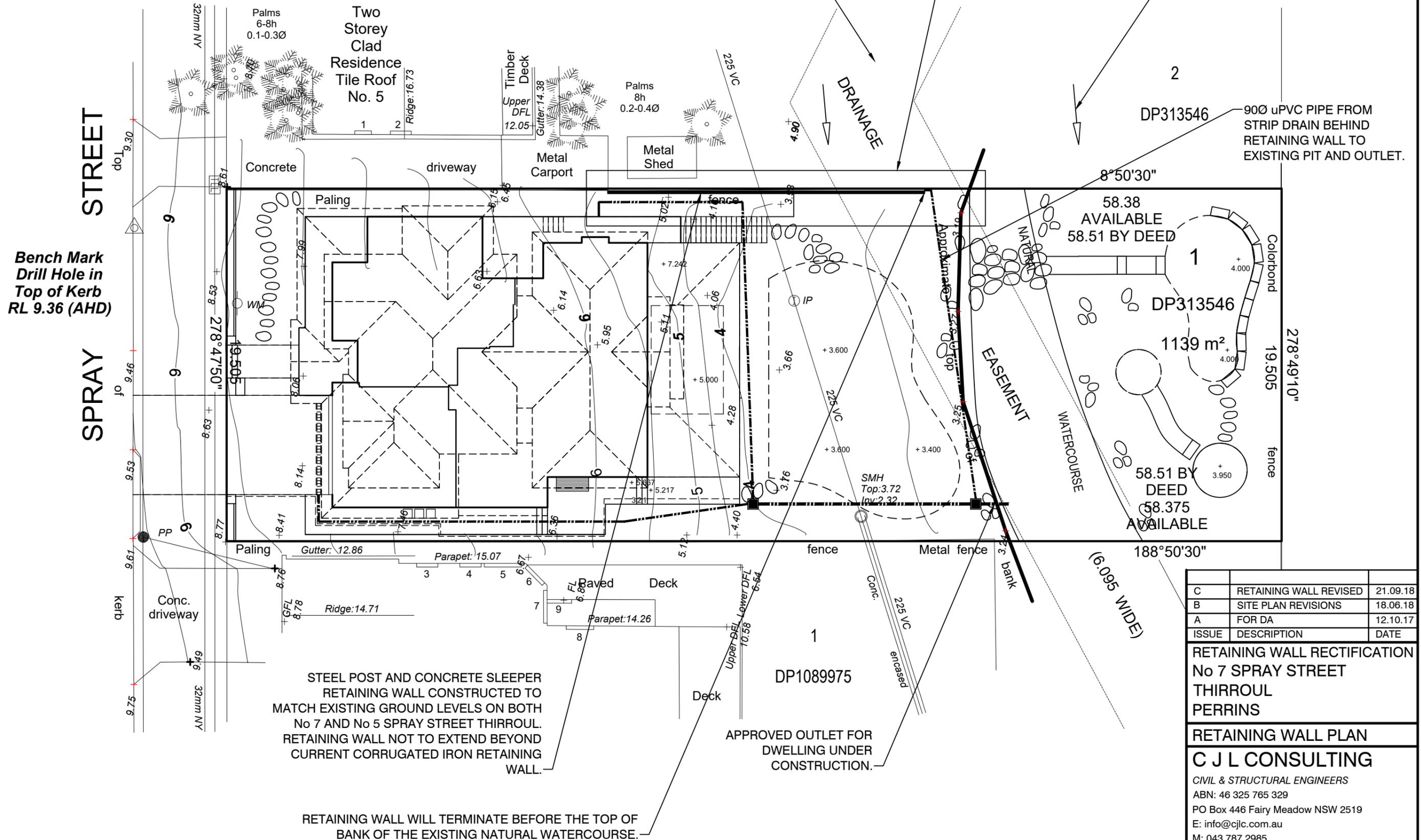


Photograph 6

BASED ON AVAILABLE INFORMATION THERE DOES NOT APPEAR TO BE ANY STORMWATER DRAINAGE PIPES LOCATED WITHIN EASEMENT.

REFER TO SHEETS R2, R3 AND R4 FOR DETAILED SURVEY AND RETAINING WALL DETAILS

DIRECTION OF FLOODWATER FLOWS.



Bench Mark Drill Hole in Top of Kerb RL 9.36 (AHD)

STEEL POST AND CONCRETE SLEEPER RETAINING WALL CONSTRUCTED TO MATCH EXISTING GROUND LEVELS ON BOTH No 7 AND No 5 SPRAY STREET THIRROUL. RETAINING WALL NOT TO EXTEND BEYOND CURRENT CORRUGATED IRON RETAINING WALL.

RETAINING WALL WILL TERMINATE BEFORE THE TOP OF BANK OF THE EXISTING NATURAL WATERCOURSE.

APPROVED OUTLET FOR DWELLING UNDER CONSTRUCTION.

900 uPVC PIPE FROM STRIP DRAIN BEHIND RETAINING WALL TO EXISTING PIT AND OUTLET.

**RETAINING WALL PLAN**

SCALE 1:200

C	RETAINING WALL REVISED	21.09.18
B	SITE PLAN REVISIONS	18.06.18
A	FOR DA	12.10.17
ISSUE	DESCRIPTION	DATE

**RETAINING WALL RECTIFICATION**  
**No 7 SPRAY STREET THIRROUL PERRINS**

**RETAINING WALL PLAN**

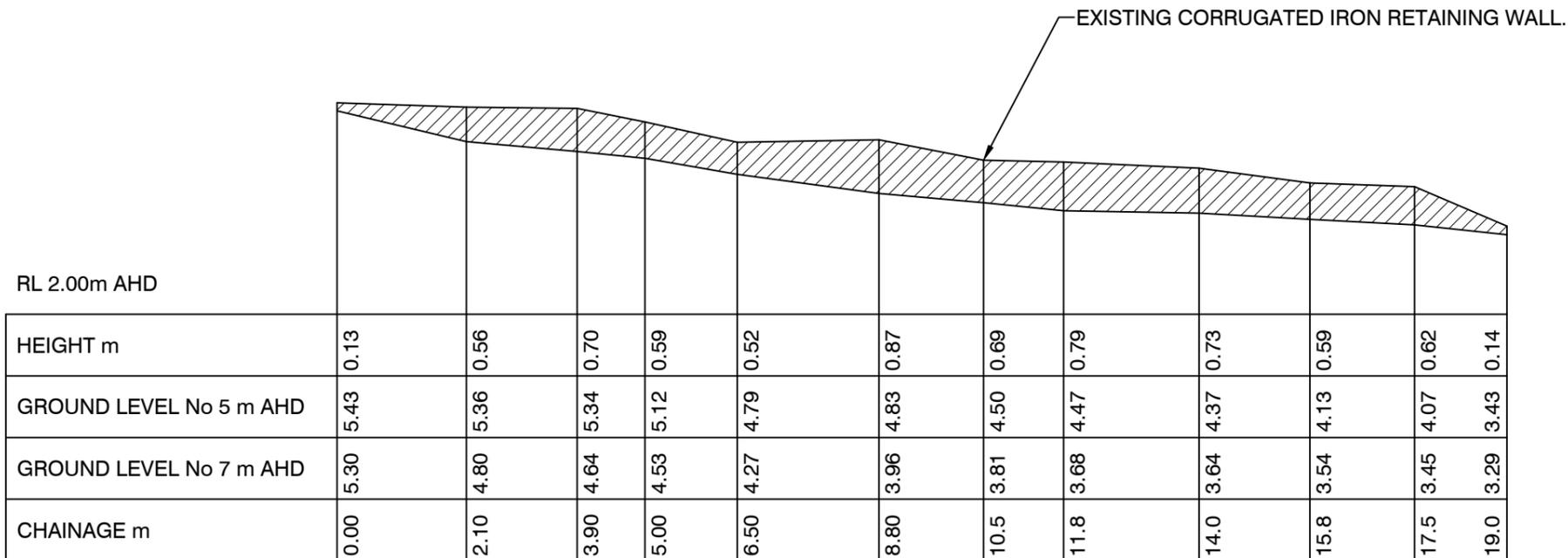
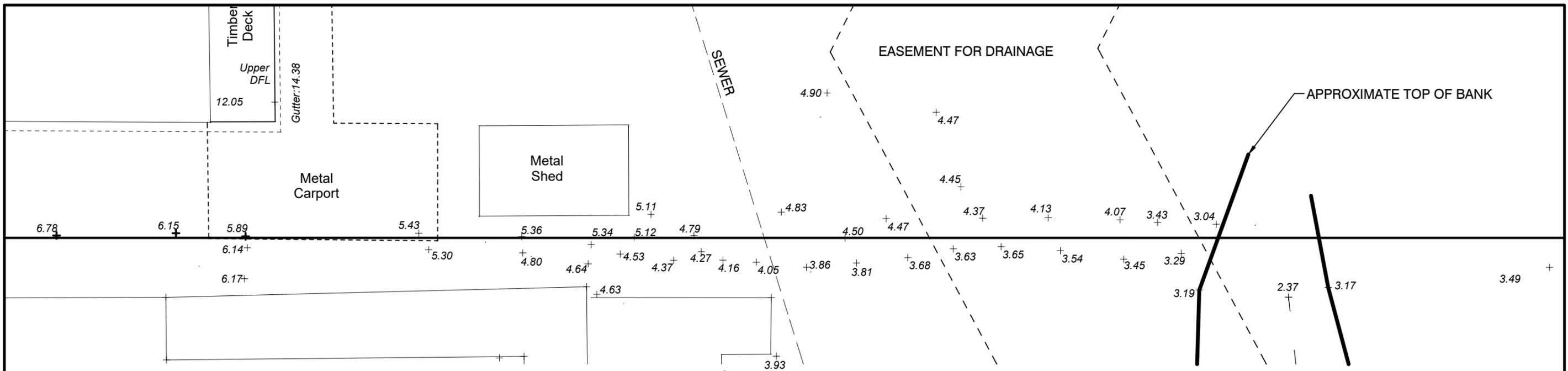
**C J L CONSULTING**  
 CIVIL & STRUCTURAL ENGINEERS  
 ABN: 46 325 765 329  
 PO Box 446 Fairy Meadow NSW 2519  
 E: info@cjl.com.au  
 M: 043 787 2985

DESIGN: C. LINDSAY  
MIEAust CPENG NER SCALE: 1:200

DRAWN: C. J. L. SET: 1 of 4

DWG: 17/779 SHEET: R1 REV: C





C	RETAINING WALL REVISED	21.09.18
B	SITE PLAN REVISIONS	18.06.18
A	FOR DA	12.10.17
ISSUE	DESCRIPTION	DATE

**RETAINING WALL RECTIFICATION**  
**No 7 SPRAY STREET**  
**THIRROUL**  
**PERRINS**

**RETAINING WALL EXISTING**

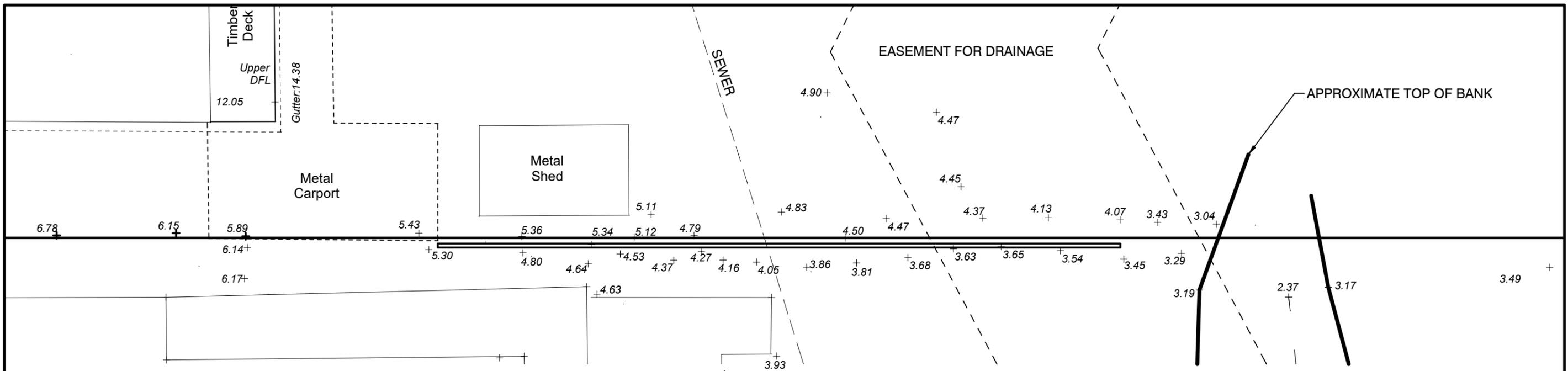
**C J L CONSULTING**  
 CIVIL & STRUCTURAL ENGINEERS  
 ABN: 46 325 765 329  
 PO Box 446 Fairy Meadow NSW 2519  
 E: info@cjl.com.au  
 M: 043 787 2985

DESIGN: C. LINDSAY MIEAust CP Eng NER	SCALE: 1:100
DRAWN: C. J. L.	SET: 2 of 4

DWG: 17/779 SHEET: R2 REV: C



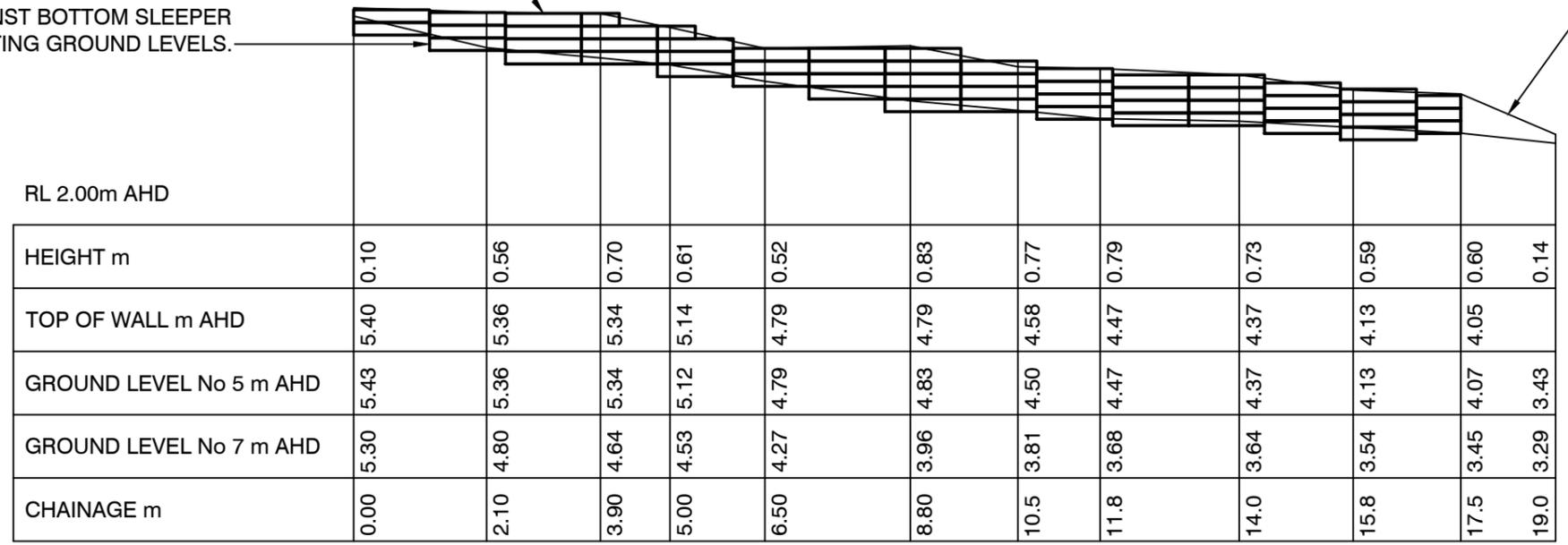
**RETAINING WALL EXISTING**  
 SCALE 1:100



STEEL POST AND CONCRETE SLEEPER  
RETAINING WALL STEPPED DOWN SLOPE.

FILL AGAINST BOTTOM SLEEPER  
TO MAINTAIN EXISTING GROUND LEVELS.

PROVIDE LANDSCAPING TO STABILISE  
BATTER AT END OF WALL.



	0.00	2.10	3.90	5.00	6.50	8.80	10.5	11.8	14.0	15.8	17.5	19.0
RL 2.00m AHD												
HEIGHT m	0.10	0.56	0.70	0.61	0.52	0.83	0.77	0.79	0.73	0.59	0.60	0.14
TOP OF WALL m AHD	5.40	5.36	5.34	5.14	4.79	4.79	4.58	4.47	4.37	4.13	4.05	
GROUND LEVEL No 5 m AHD	5.43	5.36	5.34	5.12	4.79	4.83	4.50	4.47	4.37	4.13	4.07	3.43
GROUND LEVEL No 7 m AHD	5.30	4.80	4.64	4.53	4.27	3.96	3.81	3.68	3.64	3.54	3.45	3.29
CHAINAGE m	0.00	2.10	3.90	5.00	6.50	8.80	10.5	11.8	14.0	15.8	17.5	19.0

ISSUE	DESCRIPTION	DATE
B	RETAINING WALL REVISED	21.09.18
A	FOR DA	12.10.17

**RETAINING WALL RECTIFICATION**  
**No 7 SPRAY STREET**  
**THIRROUL**  
**PERRINS**

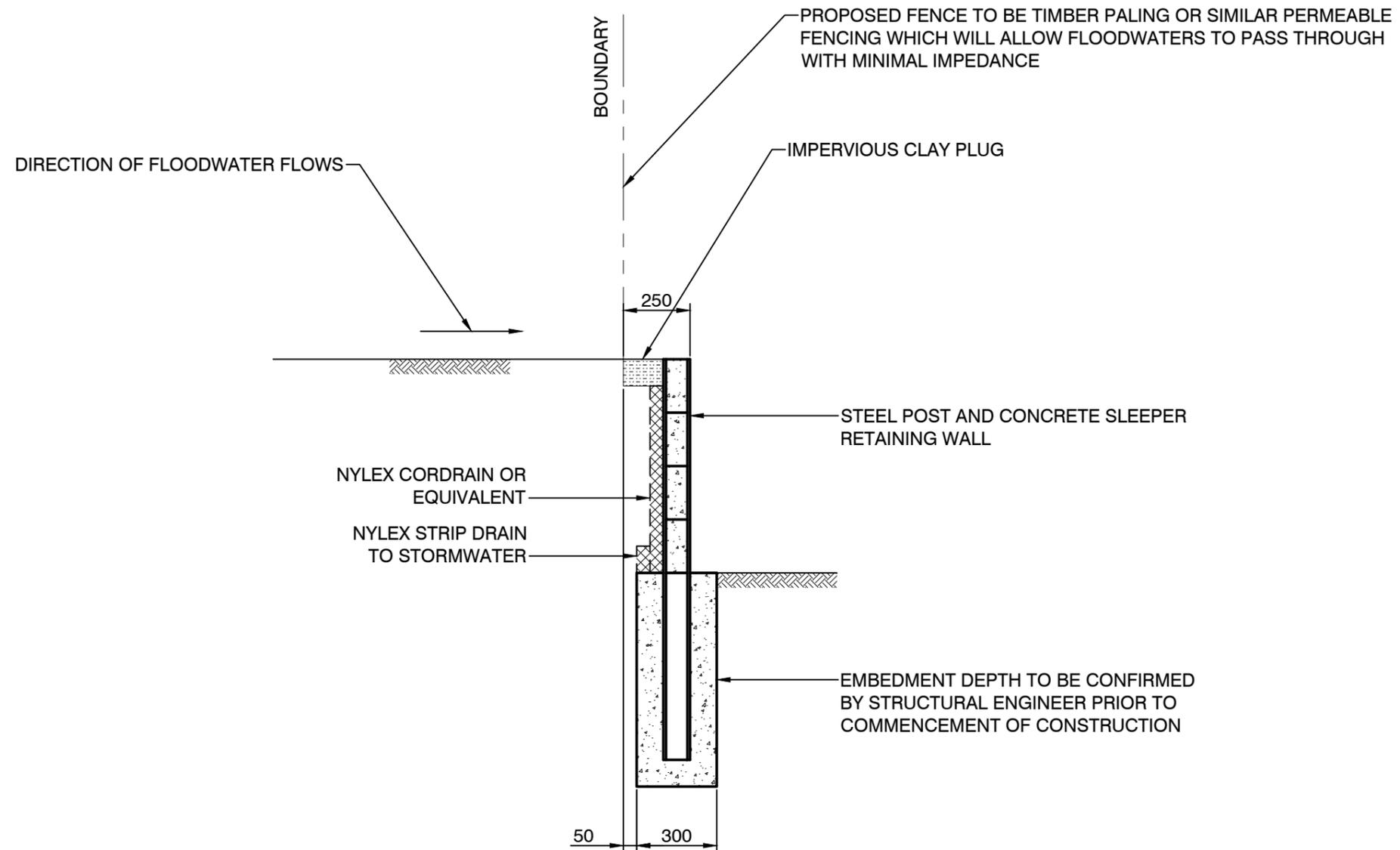
**RETAINING WALL PROPOSED**

**C J L CONSULTING**  
CIVIL & STRUCTURAL ENGINEERS  
ABN: 46 325 765 329  
PO Box 446 Fairy Meadow NSW 2519  
E: info@cjl.com.au  
M: 043 787 2985

DESIGN: C. LINDSAY MIEAust CPENG NER	SCALE: 1:100
DRAWN: C. J. L.	SET: 3 of 4
DWG: 17/779	SHEET: R3 REV: B

**RETAINING WALL PROPOSED**  
SCALE 1:100





**RETAINING WALL DETAIL**  
SCALE 1:20

ISSUE	DESCRIPTION	DATE
A	RETAINING WALL REVISED	21.09.18

**RETAINING WALL RECTIFICATION**  
**No 7 SPRAY STREET**  
**THIRROUL**  
**PERRINS**

**STRUCTURAL DESIGN**

**C J L CONSULTING**

*CIVIL & STRUCTURAL ENGINEERS*  
ABN: 46 325 765 329  
PO Box 446 Fairy Meadow NSW 2519  
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M: 043 787 2985

DESIGN: C. LINDSAY  
MIEAust CP Eng NER SCALE: 1:20

DRAWN: C. J. L. SET: 4 of 4

DWG: 17/779 SHEET: R4 REV: A

19 September 2018

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p. 02 4237 6770  
f. 02 4237 8962  
m. 0430 421 661  
e. ashley@footprinteng.com.au

footprint (nsw) pty. ltd.  
abn. 44 131 571 929

Mr Ken Perrins  
2 Robert Street  
THIRROUL, NSW, 2518

Dear Ken,

### **Proposed Rehabilitation and Revegetation of Watercourse - 7 Spray Street, Thirroul**

Reference is made to your request for Footprint to review and assess the hydraulic impact associated with the proposed rehabilitation and revegetation of the existing watercourse through the rear of 7 Spray Street, Thirroul.

In accordance with both the Vegetation Restoration Plan (VRP) by Southern Habitat dated December 2017 and the Vegetation Restoration Plan by Loco Landscape Design dated 02 April 2018 the works involve clearing of existing predominately weed species from the watercourse and rehabilitating the site with native species. Some landscape structures such as boulders and informal paths are included within the riparian corridor however no change to the topography of the watercourse is proposed. Within the watercourse engineering measures incorporating a section of rock lined channel is proposed to provide additional protection to an area at the western end that was disturbed during previous unauthorised works. Additional information is included in Section 3.4 of the Southern Habitat VRP.

An assessment of the proposed works was undertaken to determine whether the works as shown on the VRP plans by Loco Landscape Design would result in a net change in floodplain storage. This assessment is shown on Drawings 1758\_C01 and 1758\_C02 – Revision 3 (attached) by Footprint and demonstrates that the works will result in a marginal increase in floodplain storage volume and therefore will not result in any adverse impact on flooding.

Furthermore, the existing watercourse through the subject site is currently choked with reed and sedge species (including *Colocasia esculenta*, *Typha orientallis* and *Myriophyllum aquaticum* (Southern Habitat VRP, 2017). In accordance with the Modified Cowan method for determining channel roughness (Brisbane City Council, 2003), the type and density of existing vegetation present within the channel would result in an  $n_4$  value of between 0.025 and 0.05 based on vegetation height being approximately equal to flow depth in extreme flood events.

In accordance with the proposed planning list for zone 3 in the vegetation restoration plan prepared by Loco Landscape Design the proposed planting consists of reeds, sedges and grasses with a mature height range of between 0.8 and 1.0m and therefore would be assessed as having the same roughness as the current watercourse condition.

In accordance with Section 10.3.7 of Chapter E14 of the Wollongong DCP 2009 the modification of natural watercourses are generally not permitted, as they adversely impact on a number of issues, including; hydraulic function, channel pattern and form, long-term channel stability, aesthetic appearance, aquatic and bankside habitat diversity and water quality.

The proposed works are not considered to be modification of the watercourse but rather rehabilitation. Notwithstanding, the above issues have been addressed in Table 1 below.

Table 1: Assessment Against Section 10.3.7 of Chapter E14 of the WDCP 2009

<b>Issue</b>	<b>Response</b>
Hydraulic Function	The proposed works result in marginal increase in floodplain storage volume and will maintain a similar channel roughness to the present condition and therefore are not anticipated to result in any change to the hydraulic function of the watercourse.
Channel Pattern and Form	The topography within the watercourse is to remain largely unchanged as a result of the proposed works and therefore will retain the same pattern and form as the present condition.
Long Term Channel Stability	The proposed works, incorporating planting of the watercourse and banks and rock lining a section of previously disturbed channel, combined with the on-going maintenance specified in the VRP by Southern Habitat will ensure the long-term stability of the channel.
Aesthetic Appearance	The proposed works will greatly improve the aesthetic appearance of the watercourse.
Aquatic and Bankside Habitat Diversity	The watercourse within the subject site is currently assessed as having a very low habitat value (Southern Habitat, 2017). The proposed works incorporating native plantings and isolated rock boulders will significantly improve the habitat value.
Water Quality	The proposed works will not result in a reduction in water quality within the watercourse. Further stabilisation of a previously disturbed section of channel with rock boulders has the potential to improve water quality.

	During construction appropriate erosion and sediment controls will be installed to limit the potential for soil loss. Post construction maintenance of a dense ground cover of vegetation will ensure soil loss, and therefore water quality, is maintained.
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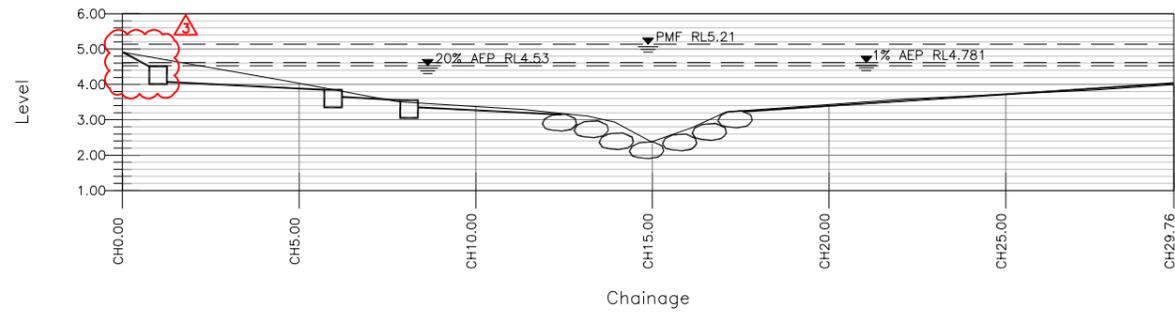
Should you require any further information please do not hesitate to contact the undersigned.

Yours sincerely

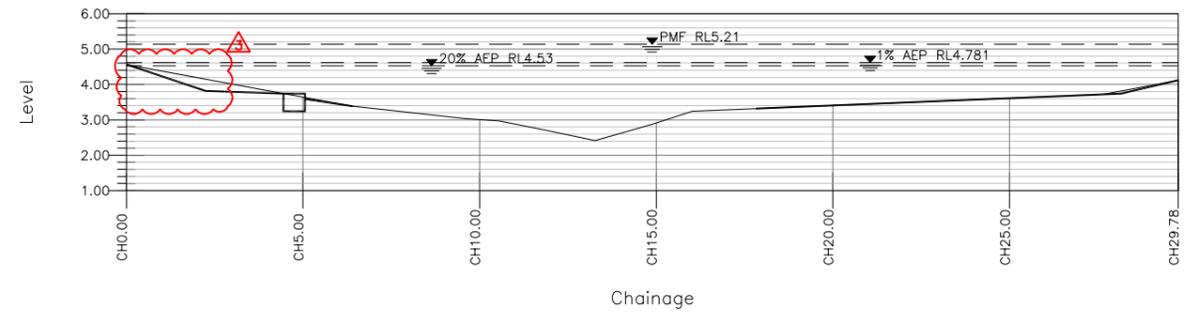


**Ashley Bond**  
Director/Principal Engineer

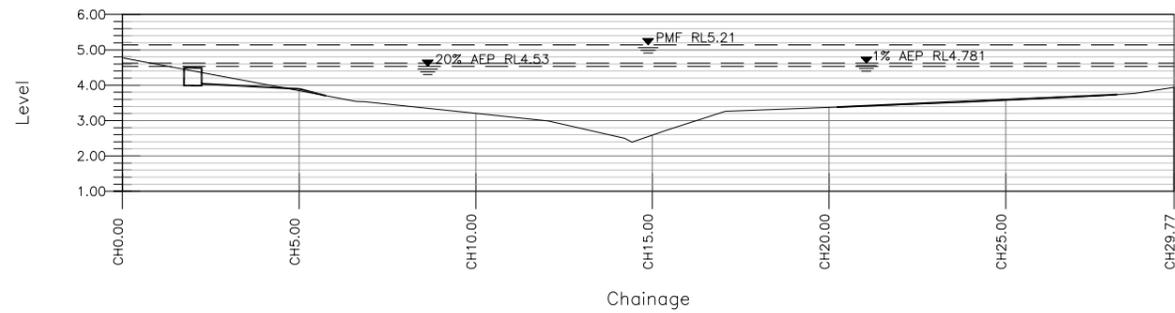




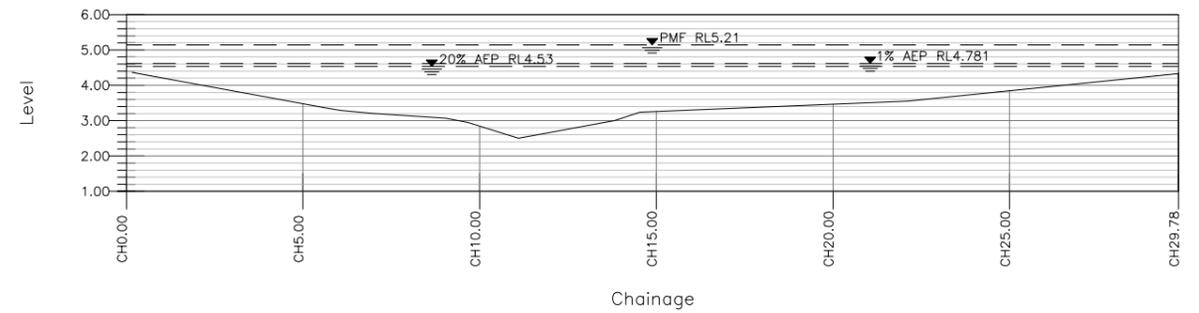
**A**  
SECTION  
SCALE 1:200



**C**  
SECTION  
SCALE 1:200



**B**  
SECTION  
SCALE 1:200



**D**  
SECTION  
SCALE 1:200

**KEY**

- EXISTING GROUND PROFILE
- PROPOSED GROUND PROFILE

**CHANGE IN CROSS SECTIONAL AREA (m<sup>2</sup>)**

SECTION	20% AEP (FLOOD LEVEL RL 4.53m AHD)		1% AEP (FLOOD LEVEL RL 4.78m AHD)		PMF (FLOOD LEVEL RL 5.21m AHD)	
	PRE	POST	PRE	POST	PRE	POST
A	27.51	30.13	30.02	32.76	45.25	48.15
B	31.02	31.20	33.60	33.74	49.01	49.19
C	32.42	33.20	35.10	35.88	49.39	51.35
D	30.91		33.39		48.83	

ISSUE	DESCRIPTION	DATE
3	RE-ISSUED FOR DEVELOPMENT APPLICATION	18/09/18
2	RE-ISSUED FOR DEVELOPMENT APPLICATION	10/04/18
1	FOR DEVELOPMENT APPLICATION	05/03/18

FOR DEVELOPMENT APPLICATION  
NOT FOR CONSTRUCTION

FOOTPRINT (NSW) PTY. LTD. AUTHORISE THE USE OF THIS DRAWING ONLY FOR THE PURPOSE DEMONSTRATED BY THE STATUS STAMP SHOWN ABOVE.

SCALES	ORIGINAL
1:200	A3
CLIENT:	K, PERRINS

SURVEYOR:	D.SMITH
DATUM:	AHD
AZIMUTH:	LOCAL
DRAWN:	AB
DESIGNED:	AB
DESIGNED DATE:	MAR '18
CHECKED:	AB

**footprint**  
sustainable engineering  
a. 15 meehan drive  
kiama downs nsw 2533  
p. 02 4237 6770  
f. 02 4237 8962

**7 SPRAY STREET, THIRROUL**  
PROPOSED LANDSCAPING WORKS  
FLOOD IMPACT ASSESSMENT  
CROSS SECTIONS

DRAWING NO.	1758-C02
ISSUE.	3
SHEET	2 OF 2

## Attachment 4 - Variation Statements

### MB Town Planning

Ste 10, 895 Pacific Hwy, PYMBLE NSW 2073 | PO Box 415, GORDON NSW 2072  
[www.mbtownplanning.com](http://www.mbtownplanning.com) | [mb@mbtownplanning.com](mailto:mb@mbtownplanning.com) | (02) 9144 7988

4. Please provide either amended plans detailing compliance with the below stated controls from Chapter B1 of the DCC, or submit a Variation Statement in relation to the following:
- Control 3, Clause 4.9 Fences: Any fence within the front setback area from the primary road frontage must be a maximum height of 1.2 metres. Submitted documentation indicated that the maximum height of the proposed front fence is 1.35 metres.
  - Control 10b, Clause 4.9 Fences – The combined height of the western side fence and retaining wall shall not exceed 2.2 metres. Current submitted plans indicate that the combined height of the fence and retaining wall exceeds 2.2 metres.
  - Control 1a, Clause 4.17 Retaining Walls – The maximum height of a retaining wall shall not exceed 600mm within 900mm of a side or rear boundary. Submitted plans indicate that the western side boundary retaining wall exceeds 6000mm in height. [Assumed typo – should say 600mm].
  - Control 9b, Clause 4.17 Retaining Walls – The maximum height of a fence and associated retaining wall shall not exceed 2.2 metres for a side boundary. Current submitted plans indicate that the combined height of the fence and retaining wall along the western boundary exceeds 2.2 metres in height.

*If you believe that a minor variation to any requirement of the DCP may be justified you should submit a detailed variation statement, prepared in accordance with Chapter A1 (cl18) of the DCP, explaining your reasons. This information will be considered with your revised plans when the application is determined. It should not be assumed that a variation will be granted.*

#### Comment:

Regarding Control 3, Clause 4.9 – the submitted landscape plan is being amended accordingly. That matter could be conditioned in any case.

Regarding Control 10b, Clause 4.9 – that control will not be complied with. The extent of departure may be by as much as around 600mm, depending on the final surveyed height of the retaining wall. The variation statement in support of that non-compliance is, hereby, that the proponent is simply retaining the neighbour's uncontrolled fill. The proponent shall be allowed to have a fence on his neighbour's yard level so as to provide appropriate, standard security to his rear yard. The proponent shall construct such fencing regardless of what the DCP purports to require in that regard.

Regarding Control 1a, Clause 4.17 – that control will not be complied with. The variation statement is the same as above in relation to control 10b, Clause 4.9.

Regarding Control 9b, Clause 4.17 – the response is the same as above.

Whether the proposed variations in respect of the retaining wall and fence height are considered minor or major, the neighbour's uncontrolled fill will be retained and a fence on top of that retaining wall (height measured from the neighbour's uncontrolled fill height) will be constructed. The notion that my client should have to have a lower than standard fence as measured from the neighbour's yard level is absurd. The area of uncontrolled fill is a usable part of the neighbour's yard and my client shall be permitted to have a fence there to provide the standard security treatment.

## MB Town Planning

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It is noted that the submitted Vegetation Restoration Plan should be taken to be updated to reflect the species indicated in the submitted landscape plan. That may be addressed at construction certificate stage and involves only minor adjustments.

The author of the hydraulic report notes that Council's engineering referral identifies flood levels for the site based upon the *Hewitt's Creek Flood Study 2002*, with a 1 in 100 year flood level of 5.02AHD. The proposed conditions of consent are based upon that level plus 500mm freeboard. However, the flood information advice received from Council prior to lodgement of the development application indicates a 1 in 100 year flood level of 4.78AHD. That advice is based upon the more recent *Review of Hewitt's Creek Flood Study 2015*. **Could you please ensure that the levels indicated in your conditions of consent are based upon that more current information.**

My updated response to your request for additional information is:

1. *Additional details in relation to all proposed retaining walls are required. To enable further assessment against Clause 4.17 Retaining Walls of the Wollongong Development Control Plan 2009 (DCP), please provide a revised retaining wall site plan showing the relative level at the base and top of all proposed retaining walls, and the location and extent of all retaining walls drawn to scale, and the method of disposal of surface and subsurface drainage. All levels are to be shown in Australian Height Datum (AHD).*

Comment:

There is now sufficient information for Council to understand the height and extent of the proposed retaining wall. The condition suggested above or similar wording will be sufficient.

2. *An amended landscape concept plan is required showing the location of stormwater drainage works. The location of drainage lines, pits and detention areas must not conflict with landscaped areas including proposed trees.*

Comment:

That is addressed in the submitted revised landscape plan.

3. *Revised landscape plans where the details shown on the landscape concept plan correspond with Section AA. Current submitted plans do not show the proposed sandstone logs in Section AA.*

Comment:

That is now addressed in the submitted additional information. For good measure, a condition may be imposed to require the final Construction Certificate plans to fully reflect the sectional details contained within the submitted hydraulic report.

4. *Please provide either amended plans detailing compliance with the below stated controls from Chapter B1 of the DCC, or submit a Variation Statement in relation to the following:*
  - *Control 3, Clause 4.9 Fences: Any fence within the front setback area from the primary road frontage must be a maximum height of 1.2 metres. Submitted documentation indicated that the maximum height of the proposed front fence is 1.35 metres.*

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- *Control 10b, Clause 4.9 Fences – The combined height of the western side fence and retaining wall shall not exceed 2.2 metres. Current submitted plans indicate that the combined height of the fence and retaining wall exceeds 2.2 metres.*
- *Control 1a, Clause 4.17 Retaining Walls – The maximum height of a retaining wall shall not exceed 600mm within 900mm of a side or rear boundary. Submitted plans indicate that the western side boundary retaining wall exceeds 6000mm in height. [Assumed typo – should say 600mm].*
- *Control 9b, Clause 4.17 Retaining Walls – The maximum height of a fence and associated retaining wall shall not exceed 2.2 metres for a side boundary. Current submitted plans indicate that the combined height of the fence and retaining wall along the western boundary exceeds 2.2 metres in height.*

*If you believe that a minor variation to any requirement of the DCP may be justified you should submit a detailed variation statement, prepared in accordance with Chapter A1 (cl18) of the DCP, explaining your reasons. This information will be considered with your revised plans when the application is determined. It should not be assumed that a variation will be granted.*

### Comment:

The front fence height is addressed in the amended information.

Regarding the height of the fence on top of the retaining wall, I reiterate my earlier advice that it is unreasonable and unacceptable for there to be a limitation on the total height of the retaining wall plus fence, on amenity grounds or the like, because that outcome is determined by the uncontrolled fill on the adjoining property which impacts upon the subject site. There is a basic entitlement to a standard side fence measured from the higher property's level.

Despite that however, my client is accepting of part of the fence being limited to a height of 1600mm and being of a completely open-type. The part that would be of that type is indicated in Figure 2 below. For the part that is of standard paling type, there would be parts that are up to around 300mm below the 1 in 100 year flood level. For those parts, the support posts would have flood compatible materials below the flood level and the spaces in between the support posts below the 1 in 100 year flood level would be open.

A suitable condition of consent to reflect the foregoing, and to reflect Figure 2, would be:

*The proposed side fencing shall be of an open, flood compatible construction below RL4.78 (being the 1 in 100 year flood level), except for the part that is within the drainage easement area within the rear part of the site which shall be of an open, flood compatible type with a maximum height of 1.6 metres above the level of the top of the retaining wall at any one point.*

It is noted that that condition would be consistent with the side fencing condition currently applicable under the development consent for the main dwelling house, being DA2017/345. That condition imposes the flood compatible fencing requirement based on a level of RL4.78, which is the 1 in 100 year flood level based on the 2016 updated flood study and does not impose any freeboard requirement on the side fencing.

Please note that the aforementioned approach to side fencing is different to the approach outlined in my 11 September 2018 letter.

# MB Town Planning

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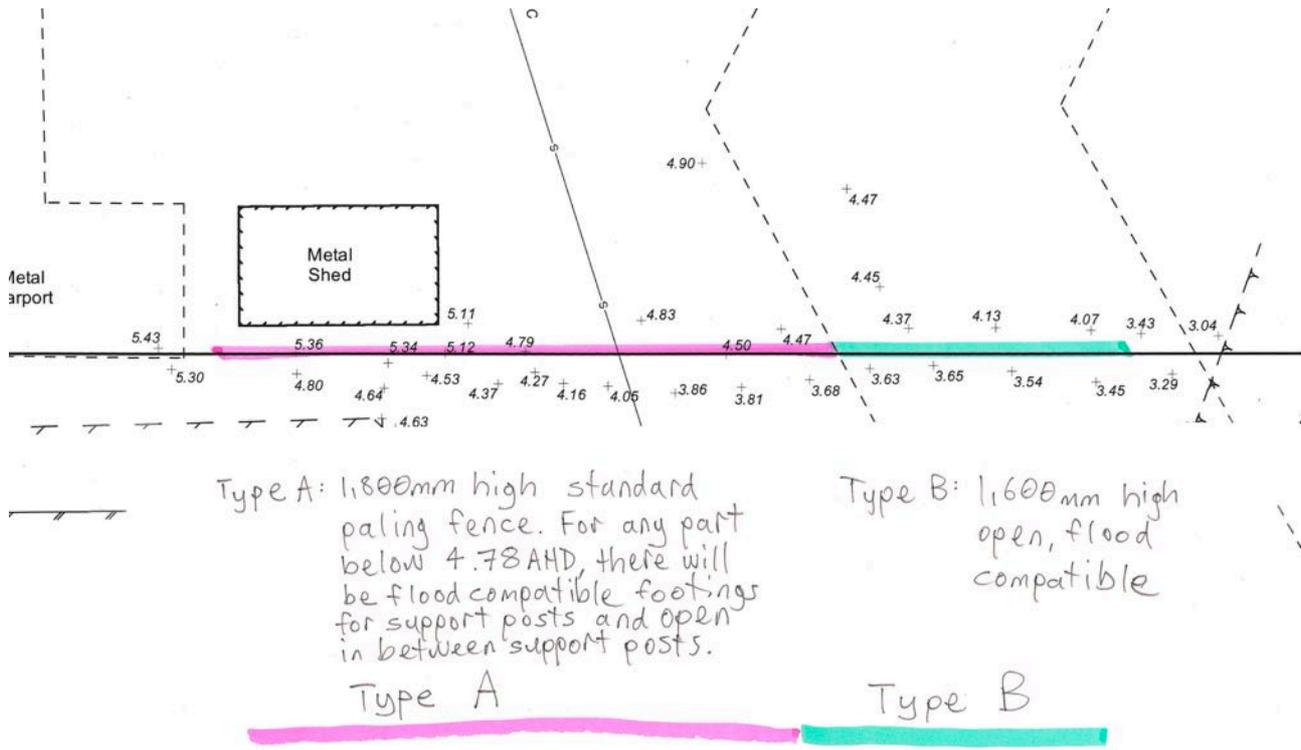


Figure 2: Proposed fencing

Please let me know if you have any questions.

Yours faithfully,

Matthew Benson  
Principal - MB Town Planning  
19 September 2018

## Attachment 5: Draft Conditions for DA-2018/819

### Approved Plans and Specifications

- 1) The development shall be implemented substantially in accordance with the details and specifications set out on Drawing No. 1, 2, 3, Revision B, dated 18 September 2018, prepared by Loco Landscape Design; and Drawing No. 1, 3, & 4, dated 21 September 2018, prepared by C J L Consulting; and Drawing No. 1 & 2, dated 18 September 2018, prepared by Footprint Sustainable Engineering; any details on the application form, and with any supporting information received, except as amended by the conditions specified and imposed hereunder.

### General Matters

- 2) **Building Work - Compliance with the Building Code of Australia**  
All building work must be carried out in compliance with the provisions of the Building Code of Australia.
- 3) **Construction Certificate**  
A Construction Certificate must be obtained from Council or an Accredited Certifier prior to work commencing.  
  
A Construction Certificate certifies that the provisions of Clauses 139-148 of the Environmental Planning and Assessment Amendment Regulations, 2000 have been satisfied, including compliance with all relevant conditions of Development Consent and the Building Code of Australia.  
  
**Note:** The submission to Council of two (2) copies of all stamped Construction Certificate plans and supporting documentation is required within **two (2)** days from the date of issue of the Construction Certificate, in the event that the Construction Certificate is not issued by Council.
- 4) **Occupation Certificate**  
An Occupation Certificate must be issued by the Principal Certifying Authority prior to occupation or use of the development. In issuing an Occupation Certificate, the Principal Certifying Authority must be satisfied that the requirements of section 6.9 of the Environmental Planning and Assessment Act 1979, have been complied with as well as all of the conditions of the Development Consent.
- 5) **Mailboxes**  
The developer must install a mailbox along street frontage of the property boundary in accordance with Australia Post Guidelines. Prominent house numbers are to be displayed, with a minimum number size of 150 mm in height for each number and letter in the alphabet. The developer must install minimum two (2 No.) reflective paint house number on face of kerb along street frontage of the property to assist emergency services/ deliveries/ visitors.

### Prior to the Issue of the Construction Certificate

- 6) **Present Plans to Sydney Water**  
Approved plans must be submitted online using Sydney Water Tap, available through [www.sydneywater.com.au](http://www.sydneywater.com.au) to determine whether the development will affect Sydney Water's sewer and water mains, stormwater drains and/or easements, and if further requirements need to be met.  
The Certifying Authority must ensure that Sydney Water has issued an approval receipt prior to the issue of a Construction Certificate.  
Visit [www.sydneywater.com.au](http://www.sydneywater.com.au) or telephone 13 20 92 for further information.
- 7) **Flood Level Requirements**  
The following requirements shall be reflected on the Construction Certificate plans, prior to the release of the Construction Certificate:

- a Any portion of the building or structure below RL 5.52 metres AHD should be built from flood compatible materials. Where materials are proposed and not listed in Appendix B of Chapter E13 of the Wollongong DCP2009, relevant documentation from the manufacturer shall be provided demonstrating that the materials satisfy the definition of 'flood compatible materials' as stated in Chapter E13 of the Wollongong DCP2009.
- b The proposed structures shall be designed to withstand the forces of floodwater, debris and buoyancy up to and including the 1 in 100 year flood level plus freeboard being RL 5.52 metres AHD or greater.

8) **Flows from Adjoining Properties**

Flows from adjoining properties shall be accepted and catered for within the site. Finished ground and top of retaining wall levels on the boundary shall be no higher than the existing upslope adjacent ground levels. The above requirements must be clearly shown on construction certificate plans prior to the release of the construction certificate.

9) **Works within the Floodplain – Details**

The construction certificate documentation must be designed by a suitably qualified civil engineer. Details of the proposed works must be provided with the construction certificate documentation. Details must include but not be limited to:

- Existing and proposed levels
- Existing and proposed Manning's roughness values including details of proposed planting
- Details of proposed retaining structures

The above information must be clearly shown on the construction certificate plans prior to the release of the construction certificate by the principal certifying authority.

10) **Works within the Floodplain – Development Outcomes**

The detailed design of the development must ensure the following outcomes are achieved:

- No filling in the floodplain
- No changes to Manning's roughness's within the floodplain
- No loss of floodplain storage
- No reduction in flow conveyance through the site

The detailed design of the development must ensure the above outcomes have been achieved and certification by a suitably qualified civil engineer that the development achieves the above must be provided to the principal certifying authority prior to the release of the construction certificate.

11) **Fencing**

Any fencing provided for the development shall be at full cost to the applicant/developer as follows:

- a) Front fence which faces the road shall be constructed of painted timber picket with stone clad feature walling; and;
- b) Side property boundaries (behind the building line and not located within the floodplain) are to be provided with minimum 1.8 metre high brick, timber lapped and capped, palisade or Colorbond fences; and;
- c) Any new fences on the site and located in the flood plain shall be of a type that will not obstruct the free flow of floodwaters and not cause damage to surrounding land in the event of a flood with a maximum height of 1.5 metres. Details of the proposed fencing must be provided on construction certificate plans and certification of the above outcomes must be provided by a suitably qualified civil engineer prior to the release of the construction certificate.

This requirement is to be reflected on the Construction Certificate plans.

- 12) The submission of certification from a suitably qualified and experienced landscape designer and drainage consultant to the Principal Certifying Authority prior to the release of the Construction Certificate, confirming that the landscape plan and the drainage plan are compatible.
- 13) The implementation of a landscape maintenance program in accordance with the approved Vegetation Restoration Plan, for a minimum period of 2 years, to ensure that all landscape work becomes well established by regular maintenance. Details of the program must be submitted with the Landscape Plan to the Principal Certifying Authority prior to release of the Construction Certificate.

14) **Landscaping**

The submission of a final Landscape Plan to the Principal Certifying Authority, prior to the release of the Construction Certificate. The final Landscape Plan shall address the following requirements:

- a planting of indigenous plant species typical of the Illawarra Region such as: *Syzygium smithii* (formerly *Acmena smithii*) Lilly pilly, *Archontophoenix cunninghamiana* Bangalow palm, *Backhousia myrtifolia* Grey myrtle, *Elaeocarpus reticulatus* Blueberry ash, *Glochidion ferdinandii* Cheese tree, *Livistona australis* Cabbage palm tree, *Brachychiton acerifolius* Illawarra Flame Tree.; A further list of suitable suggested species for the Thirroul area may be found in Wollongong Development Control Plan 2009 – Chapter E6: Landscaping;
- b a schedule of proposed planting, including botanic name, common name, expected mature height and staking requirements as well as number of plants and pot sizes;
- c the location of all proposed and existing overhead and underground service lines. The location of such service lines shall be clear of the dripline of existing and proposed trees;
- d any proposed hard surface under the canopy of an existing trees shall be permeable and must be laid such that the finished surface levels match the existing level. Permeable paving is to be installed in accordance with the manufacturer's recommendations;
- e The developer shall ensure that proposed planting is child friendly and must **not** include any of the types of plants listed below: **i)** plants known to produce toxins; **ii)** plant with high allergen properties; **vi)** any weed or potential weed species;
- f any tree planting to be progressively crown lifted to maintain a clear trunk; and;
- g sandstone logs to be laid roughly parallel to watercourse in east/west direction as indicated on Concept design by Loco Landscape Design Dwg. No. 1/3 dated 18. Sept 18 Rev B.

The completion of the landscaping works as per the final approved Landscape Plan is required, prior to the issue of Occupation Certificate or commencement of the development.

15) **Street Trees**

The developer must address the street frontage by installing street tree planting. The number and species for this development is one (1 No.) *Tristanopsis laurina* 'Luscious' 200 litre container size, in accordance with AS 2303:2015 Tree stock for landscape use. Street trees are to be installed in accordance with Wollongong Development Control Plan 2009 – Chapter E6: Landscaping. 'Dial Before You Dig' must be consulted prior to any excavation on site. Pot holing must be carried out to determine service location. Tree pits must be adequately mulched, plants installed and staking installed to the satisfaction of WCC Manager of Works. Staking is to consist of min. 3 x 2400 x 50 x 50mm hardwood stakes driven min 600mm into firm ground. Hessian webbing is to be utilised to secure plant stock to industry standard.

These requirements shall be reflected on the Construction Certificate plans and any supporting documentation.

16) **Retaining Wall on Common Boundary**

The western boundary retaining wall must be located wholly within the property, including footings and agricultural drainage lines. Construction of retaining walls or associated drainage work along common boundaries must not compromise the structural integrity of any existing structures.

The maximum height of a retaining wall located within 900mm of the adjoining boundary shall be 830mm as approved by this Development Application.

17) **Dilapidation Survey**

A dilapidation survey and report shall be submitted to the Principal Certifying Authority.

The dilapidation survey and report shall accurately reflect the condition of existing public and private infrastructure in the adjacent street(s) fronting the lots.

The report shall outline measures for the protection of existing public and private infrastructure during the works.

Any damage to infrastructure items and relics which is caused by the developer shall be repaired to the satisfaction of the Principal Certifying Authority prior to the issue of a Certificate of Practical Completion for Subdivision works.

**Prior to the Commencement of Works**

18) **Appointment of Principal Certifying Authority**

Prior to commencement of work, the person having the benefit of the Development Consent and a Construction Certificate must:

- a) Appoint a Principal Certifying Authority (PCA) and notify Council in writing of the appointment irrespective of whether Council or an accredited private certifier is appointed; and
- b) notify Council in writing of their intention to commence work (at least two days notice is required).

The Principal Certifying Authority must determine when inspections and compliance certificates are required.

19) **Residential Building Work – Compliance with the Requirements of the Home Building Act 1989**

Building work involving residential building work within the meaning of the Home Building Act 1989 must not be carried out unless the Principal Certifying Authority for the development to which the work relates

- a) in the case of work to be done by a licensee under that Act:
  - i) has been informed in writing of the licensee's name, contractor license number and contact address details (in the case of building work undertaken by a contractor under the Home Building Act 1989); and
  - ii) is satisfied that the licensee has complied with the requirements of Part 6 of the Home Building Act 1989; or
- b) in the case of work to be done by any other person:
  - i) has been informed in writing of the persons name, contact address details and owner-builder permit number; and
  - ii) has been given a declaration signed by the property owner(s) of the land that states that the reasonable market cost of the labour and materials involved in the work is less than the amount prescribed for the purposes of the definition of owner-builder work in Section 29 of the Home Building Act 1989 and is given appropriate information and declarations under paragraphs (a) and (b) whenever arrangements for the doing of the work are changed in such a manner as to render out of date any information or declaration previously given under either of those paragraphs.

**Note:** A certificate issued by an approved insurer under Part 6 of the Home Building Act 1989 that states that the specific person or licensed contractor is the holder of an insurance policy issued for the purposes of that Part of the Act is, for the purposes of this condition, sufficient evidence that the person has complied with the requirements of that Part of the Act.

20) **Sign – Supervisor Contact Details**

Before commencement of any work, a sign must be erected in a prominent, visible position:

- a) stating that unauthorised entry to the work site is not permitted;
- b) showing the name, address and telephone number of the Principal Certifying Authority for the work; and
- c) showing the name and address of the principal contractor in charge of the work site and a telephone number at which that person can be contacted at any time for business purposes.

This sign shall be maintained while the work is being carried out and removed upon the completion of the construction works.

21) **Temporary Toilet/Closet Facilities**

Toilet facilities are to be provided at or in the vicinity of the work site on which work involved in the erection or demolition of a building is being carried out at the rate of one toilet for every 20 persons or part of 20 persons employed at the site.

Each toilet provided must be:

- a) a standard flushing toilet; and
- b) connected to either:
  - i) the Sydney Water Corporation Ltd sewerage system or
  - ii) an accredited sewage management facility or
  - iii) an approved chemical closet.

The toilet facilities shall be provided on-site, prior to the commencement of any works.

22) **Structural Engineer's Details**

Structural engineer's details for all structurally designed building works such as reinforced concrete footings, reinforced concrete slabs and structural steelwork must be submitted to the Principal Certifying Authority, prior to the commencement of any works on the site.

23) **Enclosure of the Site**

The site must be enclosed with a suitable security fence to prohibit unauthorised access, to be approved by the Principal Certifying Authority. No building work is to commence until the fence is erected.

24) **Temporary Sediment Fences**

Temporary sediment fences (eg haybales or geotextile fabric) must be installed on the site, prior to the commencement of any excavation, demolition or construction works in accordance with Council's guidelines. Upon completion of the development, sediment fencing is to remain until the site is grassed or alternatively, a two (2) metre strip of turf is provided along the perimeter of the site, particularly lower boundary areas.

25) **Works in Road Reserve - Minor Works**

Approval, under Section 138 of the Roads Act must be obtained from Wollongong City Council's Development Engineering Team prior to any works commencing or any proposed interruption to pedestrian and/or vehicular traffic within the road reserve caused by the construction of this development.

The application form for Works within the Road Reserve – Section 138 Roads Act can be found on Council's website. The form outlines the requirements to be submitted with the application, to give approval to commence works under the roads act. It is advised that all applications are submitted and fees paid, 5 days prior to the works within the road reserve are intended to commence. The Applicant is responsible for the restoration of all Council assets within the road

reserve which are impacted by the works/occupation. Restoration must be in accordance with the following requirements:

- a All restorations are at the cost of the Applicant and must be undertaken in accordance with Council's standard document, "Specification for work within Council's Road reserve".
- b Any existing damage within the immediate work area or caused as a result of the work/occupation, must also be restored with the final works.

26) **Demolition Works**

All demolition work shall be carried out in accordance with Australian Standard AS2601 (2001): The Demolition of Structures or any other subsequent relevant Australian Standard and the requirements of the SafeWork NSW.

No demolition materials shall be burnt or buried on-site. The person responsible for the demolition works shall ensure that all vehicles leaving the site carrying demolition materials have their loads covered and do not track soil or waste materials onto the road. Any unforeseen hazardous and/or intractable wastes shall be disposed of to the satisfaction of the Principal Certifying Authority. In the event that the demolition works may involve the obstruction of any road reserve/footpath or other Council owned land, a separate application shall be made to Council to enclose the public place with a hoarding or fence over the footpath or other Council owned land.

**During Demolition, Excavation or Construction**

27) **Restricted Hours of Construction Work**

The developer must not carry out any work, other than emergency procedures, to control dust or sediment laden runoff outside the normal working hours, namely, 7.00 am to 5.00 pm, Monday to Saturday, without the prior written consent of the Principal Certifying Authority and Council. No work is permitted on public holidays or Sundays.

Any request to vary these hours shall be submitted to the **Council** in writing detailing:

- a the variation in hours required (length of duration);
- b the reason for that variation (scope of works);
- c the type of work and machinery to be used;
- d method of neighbour notification;
- e supervisor contact number;
- f any proposed measures required to mitigate the impacts of the works.

Note: The developer is advised that other legislation may control the activities for which Council has granted consent, including but not limited to, the Protection of the Environment Operations Act 1997.

28) **Provision of Waste Receptacle**

The developer must provide an adequate receptacle to store all waste generated by the development, pending disposal. The receptacle must be regularly emptied and waste must not be allowed to lie or accumulate on the property other than in the receptacle. Consideration should be given to the source separation of recyclable and re-usable materials.

29) **Acid Sulfate Soils**

The Wollongong Local Environmental Plan 2009 Acid Sulfate Soils Map has identified that this property may be affected by classes 3, 4 or 5 Acid Sulfate Soils. Acid Sulfate Soils contain iron sulfides which, when exposed to air due to drainage or disturbance, may produce sulfuric acid and release toxic quantities of iron, aluminium and heavy metals. The Acid Sulfate Soils Map is an indication only and you are advised that you may encounter acid sulfate soils during the excavation for the proposed development.

Any spoil material extracted or excavated from the foundations must be neutralised with commercial lime (calcium bicarbonate) by the addition of 10 kilograms of lime per 1 cubic metre

of spoil material before it is disposed of or re-used on-site. Lime is to be added by evenly distributing over all exposed surface areas, drilled piers and footing trenches on the site, prior to pouring concrete.

Council suggests the applicant refer to the Acid Sulfate Soils Assessment Guidelines contained in the Acid Sulfate Soils Manual, prepared by NSW Acid Sulfate Management Advisory Committee, August 1998 for further information.

30) **Vegetation Restoration Plan**

All works must be carried out in accordance with the Vegetation Restoration Plan, Revision dated 31 October 2018, prepared by Southern Habitat.

31) **No Adverse Run-off Impacts on Adjoining Properties**

The design of the development shall ensure there are no adverse effects to adjoining properties as a result of flood or stormwater run-off. Attention must be paid to ensure adequate protection for buildings against the ingress of surface run-off.

Allowance must be made for surface run-off from adjoining properties. Any redirection or treatment of that run-off must not adversely affect any other property.

32) **Screen planting**

Any screen planting located in Zone 2 adjacent to the western property boundary shall reach a maximum height of 2.5 metres at maturity. Recommended species: *Syzygium australe Aussie Boomer*, *Syzygium australe Baby Boomer*. Minimum spacing 1000mm. Minimum pot size 5 lt.

A further list of suitable suggested species may be found in Wollongong Development Control Plan 2009 – Chapter E6: Landscaping.

33) **Copy of Consent to be in Possession of Person carrying out Vegetation Removal**

The applicant must ensure that any person carrying out vegetation removal is in possession of this development consent and the approved landscape plan, in respect to the vegetation which has been given approval to be removed in accordance with this consent.

34) **Provision of Taps/Irrigation System**

The provision of common taps and/or an irrigation system is required to guarantee that all landscape works are adequately watered. The location of common taps and/or irrigation system must be implemented in accordance with the approved Landscape Plan.

**Prior to the Issue of the Occupation Certificate**

35) **Retaining Wall Certification**

The submission of a certificate from a suitably qualified and experienced structural engineer or civil engineer to the Principal Certifying Authority is required, prior to the issue of the Occupation Certificate or commencement of the use. This certification is required to verify the structural adequacy of the retaining walls and that the retaining walls have been constructed in accordance with plans approved by the Principal Certifying Authority.

36) **Structural Soundness Certification**

The submission of a report from a suitably qualified and experienced structural engineer to the Principal Certifying Authority is required, prior to the issue of the final Occupation Certificate and commencement of use. This report is required to verify that the structures can withstand the forces of floodwater, debris and buoyancy up to and including the 1 in 100 year flood level plus freeboard being RL 5.52 metres AHD or greater.

37) **Flood/Stormwater Affection Certification**

The submission of a report from a suitably qualified and experienced civil (hydrology) engineer to the Principal Certifying Authority is required, prior to the issue of the Occupation Certificate. This report is required to certify that the 'as-constructed' development will not result in any detrimental increase in flood affection to other development or properties due to loss of flood storage, changes in flood levels, diversion of floodwater flows, and/or alteration of flood conveyance. The report must also certify that the 'as constructed' development will not result in

any adverse stormwater impacts to the adjoining land due to obstruction and/or ponding of surface water runoff.

38) **Development WAE**

The developer shall obtain written verification from a suitably qualified civil engineer, stating that all structures and related work has been constructed in accordance with the approved plans. In addition, full works-as-executed plans, prepared and signed by a Registered Surveyor shall be submitted. These plans shall include levels and location for all structures and works, finished levels and pavement surface levels. This information shall be submitted to the Principal Certifying Authority prior to the issue of the final occupation certificate.

39) **Completion of Landscape Works**

The completion of the landscaping works as per the final approved Landscape Plan is required prior to the issue of Occupation Certificate.

DRAFT



Contact: Jeremy Morice  
Phone: 02 4224 9736  
Email: [Jeremy.Morice@dpi.nsw.gov.au](mailto:Jeremy.Morice@dpi.nsw.gov.au)

The General Manager  
Wollongong City Council  
Locked Bag 8821  
WOLLONGONG DC, NSW, 2500

Our ref: DA2018/819  
Our file: IDAS1108763  
Your ref: DA2018/819

**Attention:** Janelle Johnston

28 August 2018

Dear Sir

**Re: Integrated Development Referral – General Terms of Approval**  
**Development Reference: DA2018/819**  
**Description: Retaining Wall and Landscaping Works.**  
**Location: 7 Spray Street, Thirroul, NSW, 2515.**

I refer to your recent letter regarding an integrated Development Application (DA) proposed for the above location. Attached, please find the Natural Resource Access Regulator (NRAR) General Terms of Approval (GTA) for part of the proposed development requiring a Controlled Activity approval under the *Water Management Act 2000* (WM Act), as detailed in the subject DA.

Please note Council's statutory obligations under section 91A (3) of the *Environmental Planning and Assessment Act 1979* (EPA Act) which requires a consent, granted by a consent authority, to be consistent with the general terms of any approval proposed to be granted by the approval body.

If the proposed development is approved by Council, NRAR request these GTA's be included (in their entirety) in Council's development consent. Please also note NRAR requests notification:

- If any plans or documents are amended and these amendments significantly change the proposed development or result in additional works or activities (i) in the bed of any river, or lake or estuary; (ii) on the banks of any river, lake or estuary; (iii) on land within 40 metres of the highest bank of a river, lake or estuary; or (iv) any excavation which interferes with an aquifer.

NRAR will ascertain from the notification if the amended plans require review of or variation/s to the GTA. This requirement applies even if the amendment is part of Council's proposed consent conditions and do not appear in the original documentation.

- If Council receives an application under s96 of the EPA Act to modify the development consent and the modifications change the proposed work or activities described in the original DA.
- Of any legal challenge to the consent.

As the proposed work or activity cannot commence before the applicant applies for and obtains an approval, NRAR recommends the following condition be included in the development consent:

**The attached GTA issued by NRAR do not constitute an approval under the *Water Management Act 2000*.** The development consent holder must apply to NRAR for a Controlled Activity approval **after consent** has been issued by Council **and before** the commencement of any work or activity.

A completed application form must be submitted to NRAR together with any required plans, documents, application fee, security or bank guarantee (if required) and proof of Council's development consent. Finalisation of an approval can take up to eight (8) weeks from the date the application and all required supporting documentation is received.

Application forms are available from the NRAR website at:

[www.water.nsw.gov.au](http://www.water.nsw.gov.au) > [Water licensing](#) > [Approvals](#).

NRAR requests that Council provide a copy of this letter to the development consent holder.

NRAR also requests a copy of the determination for this development application be provided by Council as required under section 91A (6) of the EPA Act.

Yours sincerely



**Irene Zinger**  
**Water Regulation Officer**  
**Water Regulatory Operations**  
**Natural Resources Access Regulator**



## General Terms of Approval

for proposed development requiring approval  
under s89, 90 or 91 of the Water Management Act 2000

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<b>Reference Number:</b>	IDAS1108763
<b>Issue date of GTA:</b>	28 August 2018
<b>Type of Approval:</b>	Controlled Activity
<b>Description:</b>	Residential - retaining wall and landscaping works
<b>Location of work/activity:</b>	7 Spray Street THIRROUL
<b>DA Number:</b>	DA2018/819
<b>LGA:</b>	Wollongong City Council
<b>Water Sharing Plan Area:</b>	Greater Metropolitan Region Unregulated River Water Sources

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The GTA issued by NRAR do not constitute an approval under the *Water Management Act 2000*. The development consent holder must apply to NRAR for the relevant approval **after development consent** has been issued by Council **and before** the commencement of any work or activity.

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Condition Number	Details
<b>Design of works and structures</b>	
GT0009-00010	Before commencing any proposed controlled activity on waterfront land, an application must be submitted to Natural Resources Access Regulator, and obtained, for a controlled activity approval under the Water Management Act 2000.
GT0019-00003	Any proposed excavation on waterfront land must be undertaken in accordance with a plan submitted as part of a controlled activity approval, to be approved by Natural Resources Access Regulator.
<b>Erosion and sediment controls</b>	
GT0014-00007	A. The consent holder must ensure that any proposed materials or cleared vegetation, which may: i. obstruct water flow, or ii. wash into the water body, or iii. cause damage to river banks, are not stored on waterfront land, unless in accordance with a plan held by Natural Resources Access Regulator as part of a controlled activity approval. B. When the carrying out of the controlled activity has been completed, surplus materials must be removed from waterfront land.
GT0021-00004	The proposed erosion and sediment control works must be inspected and maintained throughout the construction or operation period of the controlled activity and must not be removed until the site is fully stabilised.
<b>Plans, standards and guidelines</b>	
GT0002-00482	A. This General Terms of Approval (GTA) only applies to the proposed controlled activity described in the plans and associated documents found in Schedule 1, relating to Development Application 2018.819 provided by Council to Natural Resources Access Regulator. B. Any amendments or modifications to the proposed controlled activity may render the GTA invalid. If the proposed controlled activity is amended or modified, Natural Resources Access Regulator, Parramatta Office, must be notified in writing to determine if any variations to the GTA will be required.
GT0005-00218	A. The application for a controlled activity approval must include the following plan(s): - i. Detailed Sediment and Erosion Control Plan; ii. Detailed Stormwater Management Plan including outlet design and scour protection; iii. Detailed Landscape Plan including instream swale treatment; iv. Final Vegetation Restoration Plan. B. The plan(s) must be prepared in accordance with Natural Resources Access Regulator's guidelines located on the website

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## General Terms of Approval

for proposed development requiring approval  
under s89, 90 or 91 of the Water Management Act 2000

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**Reference Number:** IDAS1108763  
**Issue date of GTA:** 28 August 2018  
**Type of Approval:** Controlled Activity  
**Description:** Residential - retaining wall and landscaping works  
**Location of work/activity:** 7 Spray Street THIRROUL  
**DA Number:** DA2018/819  
**LGA:** Wollongong City Council  
**Water Sharing Plan Area:** Greater Metropolitan Region Unregulated River Water Sources

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<https://www.industry.nsw.gov.au/water/licensing-trade/approvals/controlled-activities>.

- GT0010-00006 All documents submitted to Natural Resources Access Regulator as part of an application for a controlled activity approval must be prepared by a suitably qualified person.
- GT0012-00004 Any proposed controlled activity must be carried out in accordance with plans submitted as part of a controlled activity approval application, and approved by Natural Resources Access Regulator.
- GT0030-00006 The application for a controlled activity approval must include plans prepared in accordance with Natural Resources Access Regulator's guidelines located on the website <https://www.industry.nsw.gov.au/water/licensing-trade/approvals/controlled-activities>.
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### Rehabilitation and maintenance

- GT0023-00001 Vegetation clearance associated with the proposed controlled activity must be limited to where the controlled activity is to be carried out, as shown on the approved plan(s).
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### Reporting requirements

- GT0016-00003 The consent holder must inform Natural Resources Access Regulator in writing when any proposed controlled activity carried out under a controlled activity approval has been completed.

## **SCHEDULE 1**

The plans and associated documentation listed in this schedule are referred to in general terms of approval (GTA) issued by NRAR for integrated development associated with DA2018/819 as provided by Council:

- Statement of Environmental Effects
- Vegetation Restoration Plan
- Landscape Plan
- Site Analysis Plan
- Engineering Plan including
- Survey Plan