ITEM NUMBER 18.1

CONFIDENTIAL REPORT

FORMER BUFFALO SITE DESIGN

Pursuant to Section 83(5) of the Local Government Act 1999 the Report attached to this agenda and the accompanying documentation is delivered to the Council Members upon the basis that the Council consider the Report and the documents in confidence under Part 3 of the Act, specifically on the basis that Council will receive, discuss or consider:

k. tenders for the supply of goods, the provision of services or the carrying out of works.

Recommendation – Exclusion of the Public – Section 90(3)(K) Order

1 That pursuant to Section 90(2) of the *Local Government Act 1999* Council hereby orders that the public be excluded from attendance at this meeting with the exception of the Chief Executive Officer and Staff in attendance at the meeting in order to consider Report No: 140/23 Former Buffalo Site Design in confidence.

2. That in accordance with Section 90(3) of the *Local Government Act 1999* Council is satisfied that it is necessary that the public be excluded to consider the information contained in Report No: 140/23 Former Buffalo Site Design on the following grounds:

k. pursuant to section 90(3)(k) of the Act, the information to be received, discussed or considered in relation to this Agenda Item are tenders for the provision of the design services for the former Buffalo site.

3. The Council is satisfied, the principle that the meeting be conducted in a place open to the public, has been outweighed by the need to keep the information or discussion confidential.

Item No: 18.1

Subject: **FORMER BUFFALO SITE DESIGN**

Date: 26 April 2023

Written By: Recreation and Sport Planning Lead

General Manager: Strategy and Corporate, Ms P Jackson

SUMMARY

In August 2022, Council approved site investigations and analysis to commence on the former Buffalo site, seeking expert advice on the constructability of the concept design for the Buffalo site, specifically the interface with the Patawalonga. The results of these investigations have provided better insight to the cost and complexity of construction prior to commencing detailed design. The potential costs to deliver the concept design have been estimated to be in excess of $8,900,000.

The local community has provided continual feedback regarding the need to remediate the foundations where the Buffalo replica was situated. In consideration of the community feedback and associated risks and costs with the full redevelopment of the site, it is recommended that Council approve the development of the site and progress with a plan to cap, fill and pave over the existing foundations.

RECOMMENDATION

That Council:

1. **notes the findings of the Constructability Report and Analysis undertaken by Magryn & Associates;**

2. **approves Administration to undertake Option C as outlined in this report, to remediate, fill and construct over the former Buffalo site foundations;**

3. **approves the allocation of $2,200,000 in the Draft Annual Business Plan 2023/24 to proceed with 'Option C'; and**

RETAIN IN CONFIDENCE - Section 91(7) Order

4. **That having considered Agenda Item 140/23 Former Buffalo Site Design in confidence under section 90(2) and (3)(k) of the *Local Government Act 1999*, the Council, pursuant to section 91(7) of that Act orders that the report, attachments and minutes be**

retained in confidence and the Chief Executive Officer is authorised to release the documents when relevant financial information is redacted from the documentation and that this order be reviewed every 12 months.

This order is subject to section 91(8)(b) of the Act which provides that details of the identity of the successful tenderer must be released once Council has made a selection. In addition, section 91(8)(ba) of the Act requires details of the amount(s) payable by the Council under a contract for the provision of cleaning services must be released once the contract has been entered into by all concerned parties.

STRATEGIC PLAN

Through design services, this report relates to ensuring the City's Wellbeing Aspirations 2030 – Our beaches and Council-controlled public areas are accessible and inclusive. This project contributes to community wellbeing by establishing community hubs that integrate community support, recreational and commercial services.

Strategic alignments with the following documents:
Open Space and Public Realm Strategy 2018-2030
Disability Access and Inclusion Plan 2020-2024

COUNCIL POLICY

Procurement Policy

STATUTORY PROVISIONS

Local Government Act 1999 and Regulations

BACKGROUND

At a Council meeting on 12 April 2022, Council resolved (Motion C120422/2589) to endorse the concept design developed by City Collective for the revitalisation of the former Buffalo site. At this time, it was highlighted that the detailed design will be undertaken in consideration of a potential staging approach for implementation, specifically prioritising the interface with the edge of the Patawalonga. The concept design proposes a connection to the water's edge, increasing the complexity of construction and possible remediation of the site.

In June 2022, tenders received to undertake Detailed Design of the endorsed concept were ranging from $306,415 to $397,225. Total design budget at this time was $309,000, including the Open Space Grant received from State Government.

Due to the complexities of the design's interface with water, on 23 August 2022 Council endorsed in confidence (Motion C230822/7230):

That Council:

1. *Notes that further investigation and analysis be undertaken prior to commencing detailed design of the Buffalo site design;*
2. *Approves $30,000 of the former Buffalo site design budget to be allocated towards site investigations and analysis;*
3. *Notes a project update will be provided to the public via 'yourholdfast' and notification to the former Buffalo site consultation database.*

Subsequently, Magryn & Associates were engaged to investigate constructability, undertake soil sampling, testing and analysis to better understand the costs associated with developing the site where the foundations of the former Buffalo replica are situated. The Constructability Report (attached) investigated two options, Option A to remove the foundations completely, or Option B to cap, fill and pave over the existing foundations.

Refer Attachment 1

As a result of the potential costs associated with both Option A and Option B, an additional option has been developed for consideration, being Option C. These options were discussed at a Council workshop on 14 February 2023.

REPORT

The Constructability Report includes cost estimates which are based on concept plans, not detailed design and therefore are only approximate. Of the two options investigated (Option A and Option B), only Option A would be consistent with the concept design undertaken by City Collective. Option B would require revising the concept design and replacing the floating platform with landscaping or paving level with the rest of Wigley Reserve, removing the connection to water.

Option A: Remove foundations and timber retaining wall as per endorsed concept:

New concrete ramp/stairs and floating platform for water access	$4,384,582
Land based civil, landscape works and kiosk	$4,546,832
Construct the full project as per the original concept by City Collective	**$8,931,415**

The key consideration regarding this option is the potential for fill material being contaminated and requiring disposal as waste fill. The cost of excavation, treatment and disposal of waste material (including gate fees) for the proposed development is estimated to be a minimum of $822,000. The current estimate for waste material excavation and removal may increase once works commence and the actual extent of material needing excavation is known.

The water interface component of the concept, including the ramp/stairs and platform is likely to cost a minimum of $4,384,582 before undertaking the rest of the components of the concept developed by City Collective.

Option B: Infill and construct over the existing foundation, landscaping and kiosk:

Excavation, cap and infill over existing site including compaction, capping, rock wall extension and pavement over the foundations	$1,816,808
Land based civil, landscape works and kiosk	$4,546,832
Total cost to construct Option B	**$6,363,640**

The critical consideration for this option is the risk of contaminants migrating into the soil or marine environment in the long term. However, to ensure this does not happen, barriers can be implemented to effectively contain contaminated waste and prevent the migration of contaminants. A suitable barrier confirmed by environmental engineers can be safe and much more cost effective and of lower risk than what is proposed with disposal and removal of the foundations as specified in Option A.

Option B would impact the conditions of the State Government Grant received, requiring the return of the $100,000 grant to State Government. This would reduce the design budget to $179,000.

Option C: Infill and pave over the existing foundation

Option C is to proceed with fixing the existing foundations left by the Buffalo replica exclusively without consideration to the remaining works required for land based civil, landscaping and kiosk outlined in the endorsed concept by City Collective.

Works would include some remediation, excavation and clean infill over the existing site with a rock wall extension and capping, compacting and pavement on top at a cost of $1,816,808. This excludes integration into the existing site without further civil or landscaping. To undertake Option C, plus integration and landscaping into the existing site along with construction contingency is estimated to cost $2,200,000.

Concept plans for this option have previously been developed and can be found in Attachment 2.

Refer Attachment 2

Consultation

To date, the community has been informed that the concept developed by City Collective has been endorsed, which aligns with Option A. The constructability of Option A poses significant risks and high costs for remediation.

Community feedback received regarding the current site conditions has indicated the necessity to act on the remediation of the site in the first instance. Despite Options B and C differing from the endorsed plan for the Buffalo site, the importance of remediation of the site is the most common theme. Option B will still include the landscape-based works including the development of a kiosk but without access to the water which may cause negative community response. Option C may

cause further dissatisfaction due to not meeting community expectations previously set by endorsement of the concept design by City Collective.

Initial consultations have been undertaken with the Department of Environment and Water (DEW) regarding the concept design and the fluctuation of water levels. Conversations will continue throughout the design phase, predominantly relating to construction methodology and consultation with environmental engineers. Any feedback from DEW will be reported on as part of the detailed design process.

Kaurna will need to be consulted following the outcome of this report. A Buffalo Cultural Heritage Research Report and Oral Histories have already been undertaken for the site in preparation for the detailed design phase.

BUDGET

The existing budget available for detailed design is as follows:

City of Holdfast Bay (concept) (2020/2021)	$9,000
City of Holdfast Bay (detailed design) (2021/2022)	$200,000
Open Space Grant Program (detailed design) (2022)	$100,000
Site Investigations, Constructability Report	($30,000)
Total	**$279,000**

State Government Grant funding was secured based on Option A, the endorsed plan for the Buffalo site. Options B and C differ from the endorsed plan and therefore it is likely that this funding will be returned. If either Option B or C are endorsed, the budget for detailed design would be as follows:

City of Holdfast Bay (concept) (2020/2021)	$9,000
City of Holdfast Bay (detailed design) (2021/2022)	$200,000
Site Investigations, Constructability Report	($30,000)
Total	**$179,000**

A cost estimate to undertake detailed design of Option C has been received from Magryn & Associates, totalling $36,828, excluding contingencies. Therefore, detailed design of Option C can be achieved with the existing budget.

In addition to the design budget, $2,200,000 for construction of Option C has been proposed for the Draft Annual Business Plan 2023/24 for community consultation.

LIFE CYCLE COSTS

Unknown at this stage, pending final design and material selection.

Attachment 1

MAGRYN

REPORT ON CONSTRUCTABILITY

FORMER BUFFALO SITE RE-DEVELOPMENT
ADELPHI TERRACE, GLENELG NORTH

Prepared for: City of Holdfast Bay
Att. Julia Wallace

Project Number: 22560
Revision: C
Date: Feb. 2023

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SCOPE OF REPORT

Magryn & Associates were engaged by City of Holdfast Bay to:

- Arrange soil contamination testing for the area where Buffalo was located
- Review the current concept design for the proposed re-development of the former Buffalo Site
- Provide constructability advice and advice on the feasibility of the proposal
- Provide a cost estimate associated with excavation, treatment and disposal of material
- Arrange a hydrographic contour/feature survey of the area

Soil sampling and testing was completed to confirm the potential for contamination, and assess the cost implications associated with waste fill disposal.

GENERAL

The former HMS Buffalo replica was originally constructed in 1980 and operated as a restaurant. The Buffalo replica was demolished in 2019, however the surrounding timber retaining wall and the material contained within it remain.

The proposed re-development aims to reclaim the area and create a functional space that the community can enjoy.

The site is located within the Patawalonga lake system in Glenelg North.

PREVIOUS WORK COMPLETED

In 2019, Magryn and Associates completed a concept design and detailed design documentation for the Buffalo site re-development. The proposal included filling in the area with compacted fill, and providing rock revetment along the northern edge.

In 2021, Council engaged urban designers City Collective to complete a new concept design of the broader area. The feasibility of this revised concept design is the subject of this report.

The City Collective concept proposal for the former Buffalo site consists of two concept options. Both concepts include carparking, a kiosk and an ‘amphitheatre’, which provides a connection to the water.

An aerial photo of the existing site is shown in the figure below.

This report shall be read in conjunction with:

- Magryn and Associates concept plan
- Concept plan by City Collective
- Survey, by Symonds Ryan and Cornish
- Soil classification report, by TMK

Figure 1- Aerial view of the site, from Nearmap.

PATAWALONGA LAKE SYSTEM

The Patawalonga Lake normally operates as a tidal flushed lake. Water enters the southern end of the lake through the Glenelg Gates, and drains via the Barcoo Outlet at the northern end of the lake.

The Lake is fed by the Sturt River, Patawalonga Creek and the Airport Drain, in addition to water from the Gulf. The Lake is flushed twice daily (on average) by the tide. The flushing occurs by the tide entering at the southern end through the Glenelg Lock gates and exiting through Weir 2 at the northern end.

Once a predetermined level is reached, the Lock is then closed to restrict the maximum level in the Lake. During the falling tide, if the Lake level is higher than the diversion pond, one of the gates of Weir 2 is opened to allow the Lake water into the diversion pond. The water in the diversion pond then drains out to sea through the Barcoo Outlet under gravity.

Normal stormwater flows from the Sturt River are prevented from entering the Patawalonga Lake by Weir 2. As a result, stormwater flows out to sea through the Barcoo Outlet duct. In extreme storm events, where stormwater flows exceed the capacity of the outlet duct, gates in Weir 2 open spilling stormwater into the Lake to discharge the stormwater through the Lock, where tidal levels permit.

The layout of the Patawalonga System is shown below.

Figure 2 – Aerial View from Nearmap

DESIGN CONSIDERATIONS

CURRENT WATER LEVELS AT SITE

The level of the lake under normal conditions is maintained between a high water level of approximately 0.6 m AHD, and a low water level of approximately 0.0 m AHD.

The critical water level occurs when a storm surge occurs in conjunction with major rain event. During these events, the flows exceed the capacity of the Barcoo outlet, and the lake operates in flood mode, resulting in the water greatly exceeding the normal water levels. In these flood conditions, the lake acts a detention basin, until the point where the lake level exceeds the tide level, at which point the water flows out through the Glenelg Gates. Historically, these events have resulted in flooding to properties adjacent the Patawalonga.

Tide levels at site (based on tides at Brighton, the nearest port) outside of the Patawalonga (seaward of the Glenelg gates), as referenced from the Tide Tables for South Australian Ports published by Flinders Ports are:

	Chart datum (CD) (m)	Australian Height Datum (AHD) (m)
HAT	2.84	1.14
MHHW	2.3	0.6
MSL	1.4	-0.3
LAT	0.3	-1.4

The current 1 in 100 year Average Return Interval (ARI) High Water level for the Patawalonga is approximately 2.1m AHD, based on *'Stormwater Management Plan-Coastal Catchments Between Glenelg and Marino, by Tonkin Consulting, 2014'*. This level allows for tide, stormwater and associated wave effects combined.

The 1 in 100 year ARI High Water Level is the average highest water level which would occur once in a one hundred year period, or the level which has a probability of exceedance of approximately 1% in any one year. It is determined from water level records by The National Tidal Facility of the Bureau of Meteorology.

SEA LEVEL RISE

Coastal Protection Board (CPB) Policy 1.4 (b) states: *"The Board will seek to minimise the exposure of new and existing development to risk of damage from coastal hazards and risks to development on the coast".*

For compliance with the CPB policy, allowance for 0.3 metre sea level rise to the year 2050 is required. CPB policy also required that the development is capable, by reasonable practical means, of being protected, adapted or raised to withstand a further 0.7 metres of sea level rise to the year 2100.

Assuming the project would require at least a 50-year design life (to 2070), a design water level of 2.8m AHD would be adopted for the design.

High water event in the Patawalonga	Chart datum (CD) (m)	Australian Height Datum (AHD) (m)
100 ARI (2100)	4.8	3.1
100 ARI (2050)	4.1	2.4
100 ARI (2023)	3.8	2.1

WAVES AT SITE

Waves at site are minimal, due to the site being with a well protected marina with limited fetch (distance over which wind waves are generated). Waves due to boat wash are likely to be minimal, due to vessel speed limit restrictions.

CONTOUR SURVEY

A site contour/feature survey was provided by Symonds, Ryan and Cornish (licensed surveyors), and is attached to this report. The survey captured the bathymetry around the site, as well as the surface levels of the 'mound' within the former Buffalo area.

The survey assisted in providing volume estimates for the waste material to removed.

The survey is to AHD (Australian Height Datum).

SUMMARY OF SOIL CLASSIFICATION REPORT

Lab and Field were engaged to obtain soil samples at the site. Drilling at site was carried out via hand drilling and hand auger due to access limitations. Soil samples were taken at 9 locations, of varying depths.

TMK was engaged as a sub-consultant to interpret the soil test results and produce a soil classification report. The soils were classified based on two parameters, which were:

- Potential for the soils being referred to as acid sulphate soils (ASS)
- Potential for soils being classified as waste fill, so that use of material can be taken into consideration (onsite use or off-site disposal), in accordance to SA EPA waste soil classification guidelines

The soils were found to not be classified as ASS. However, there is a possibility that the soil can change in pH once removed from the current environment. It is TMK's opinion that lime is mixed with the site soil to ensure acidic conditions do not manifest once material is removed from the marine environment, in the long term.

Additional testing

Additional soil analysis was carried out after the initial primary testing for metals. The results showed the following:

- Arsenic, copper and soil lead (Pb) have been found to be elevated (above Waste Fill Criteria)
- None of these metals were found to be above the SA EPAs Intermediate Waste guidelines
- No ProUCL value was found to be above the SA EPA Waste Fill guidelines
- Metal concentrations are considered acceptable to meet the Waste Fill Criteria in accordance to SA EPA guidelines across the investigation area.

The TMK report strongly suggests that the soils would be classified as waste fill in accordance to SA EPA Waste disposal guidelines. The level of contamination for disposal would be classified as 'low', hence can be disposed of as waste fill.

However, some samples analysed were above both SA EPA Waste Fill as well as Intermediate Waste Fill guidelines, with two soil samples reporting levels which are above the SA EPA's Low Level Contaminated Waste

(LLCW) criteria. Therefore, at least some of the material cannot be classified or disposed of as LLCW and would require further testing / investigations if proposed to be disposed of off site.

While contamination values were been found to be elevated, there were no sample locations that returned values above any human health investigation level for a commercial / Industrial site. Special requirements are not required if material is to be excavated etc (i.e. extra worker protection is not required).

Refer to the attached report by TMK for further details on the soil sampling, testing, and results.

CONSTRUCTABILITY OF CONCEPT PROPOSAL

CONCEPT PLANS BY CITY COLLECTIVE

Two concept layouts were developed by City Collective (option 1 and 2 shown below). The current level of detail is high level conceptual only, but includes:

- Steps/ramp from the general pavement level, down to a lower platform (amphitheatre) closer to the water level
- Vertical wall surrounding the amphitheatre
- Precast concrete pavers, leading to a floating platform for option 1
- Insitu concrete (exposed aggregate) pavement for the amphitheatre pavement for option 2

This report focuses on the constructability of the ‘amphitheatre’ and the floating pontoon, to be located approximately in the location of the former Buffalo replica.

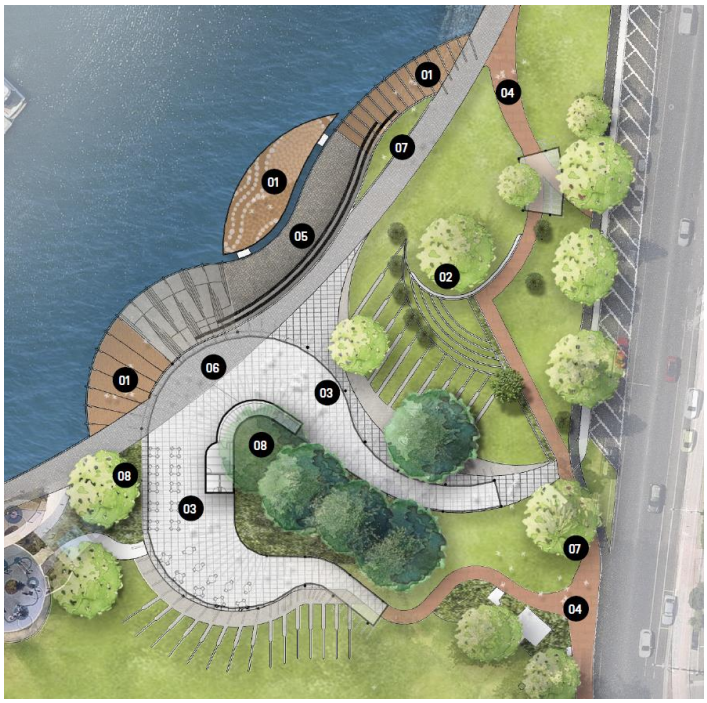

Figure 3- City Collective concept option 1

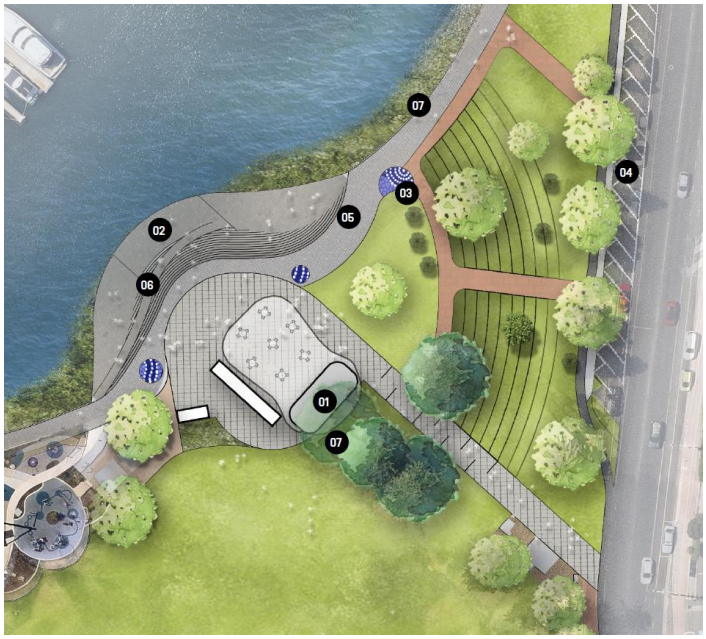

Figure 4- City Collective concept option 2

In addition to the general layout, two methods for the construction are to be considered, option A and option B as described below.

Option A: Removal of foundation and associated timber retaining wall. The key consideration regarding this option is the potential for fill material being contaminated and requiring disposal as waste fill.

Option B: Infill over the existing foundation. The critical consideration for this option is the risk of contaminants migrating into the soil or marine environment in the long term.

<u>General concept layout</u>

The general concept layout for both option 1 and 2 is feasible. The primary intent of the design appears to be to establish a connection to the water, by providing a lower platform close to water level.

The following pages discuss the key considerations in regards the construction of the amphitheatre.

<u>Filling over the existing waste fill (option B)</u>

When filling and paving over contaminated waste fill material, there are several key considerations to keep in mind, including:

- Remediation: It is important to properly remediate the contaminated material before filling and paving over it. This may involve covering it with a barrier to prevent migration of contaminants.
- Compaction: The existing fill material should be compacted to a sufficient density to support the new pavement, and minimise any potential long term post-construction settlement.

Note: Based on the previous geotechnical investigations undertaken, the existing fill material is suitable to provide compacted fill and pavement over. Removal of the top layer of waste fill material would still be required (nominally 600mm material).

- Monitoring: It is important to monitor the site after filling and paving to ensure that the contaminants are not spreading and that the fill material is stable.
- Compliance with regulations: It is important to comply with all relevant regulations and guidelines regarding the management and disposal of contaminated waste.

There are several types of barriers that can be used to effectively contain contaminated waste and prevent the migration of contaminants, including:

- Clay barriers, such as a clay liner or clay cap
- Plastic barriers, such as a high-density polyethylene (HDPE) liner
- Concrete barriers, such as a concrete cap.
- Geosynthetic barriers, such as geomembranes, geocomposites, or geosynthetic clay liners

The choice of the barrier depends on the type of contaminants, soil properties, and the regulations and guidelines that apply to the management and disposal of contaminated waste. The most suitable type of barrier should be confirmed by an environmental engineer. As the level of contamination is low and there are minimal human health risks, it is anticipated that a clay liner will be sufficient.

If the existing material remains in-situ, the primary risk is that contaminants may continue to leach out into the Patawolonga in the long term, posing threats to water quality and marine life. This can be mitigated by careful design and construction of the barrier (clay liner or similar).

Removal of waste fill (option A)

The volume of fill material to be removed was calculated to be approximately 650 cubic metres. This volume was calculated based on the survey, assuming the fill would be completely removed, down to the level of the existing seabed (outside the moat area). Assuming a material density of 2 tonne per cubic metre, the total weight of waste fill material is 1300 tonne.

It is anticipated that the waste material can be excavated using a long arm excavator from the land. This would be significantly more economical and less disruptive than working from a barge. However, this would need to be confirmed with the contractor and incorporated in the contractor's construction, environmental management plan (CEMP).

The existing timber retaining wall surrounding the area may be able to be remain in place during excavation (to contain the material and minimise spilling into the marina), and then removed after. Silt curtains would need to surround the site during the entire construction process, to prevent sediment plumes contaminating the marina during the works.

There are several risks associated with the contaminated waste fill material, whether it is removed and disposed of, or remains insitu and is filled over.

Based on the risk assessment conducted, in our opinion removal of the waste material carries the higher risk, both from an economical and environmental perspective.

Removal and disposal of contaminated waste material from a marine environment can present several risks. Refer to the risk assessment in the appendix of this report, which outlines the hazards, mitigation measure and residual risk. The specific risks associated with removal of the waste material include:

- Environmental risks: Removing and disposing of contaminated waste material can have negative impacts on the surrounding marine ecosystem, such as harming marine life and altering the chemical composition of the water.
  Note: While on site, a local community member pointed out that there has been a dolphin sited in the Patawolonga. Further advice from a marine biologist (or similar expert) is recommended, to confirm the presence of dolphins, and advise on risk mitigation measures to be taken to ensure no impact during construction.
- Human health risks: Exposure to contaminated waste material can pose health risks to workers involved in the removal and disposal process, as well as to nearby communities.
- Economic risks: The cost of removing and disposing of contaminated waste material is significant, as outlined in the cost estimate in the appendix.

To mitigate these risks, a number of measures can be taken:

- Conducting environmental impact assessments to identify potential risks and impacts, and then implementing mitigation measures to reduce or eliminate them.
- Using appropriate personal protective equipment for workers handling contaminated waste material, and implementing safety protocols to minimize the risk of exposure.
- Using best management practices for waste disposal, and transporting them to an appropriate disposal facility.
- Engaging local communities and stakeholders in the process, to ensure their concerns and needs are considered and addressed.
- Monitoring and testing the marine environment before and after the removal and disposal of contaminated waste material, to ensure that no negative impacts are present and to detect any unforeseen issues.

Overall, it's important to have a detailed plan and procedures in place to minimise the risks and negative impacts associated with the contaminated waste material.

As summarised in the cost estimate, the removal and remediation of contaminated soil can be extremely costly. Additionally, any necessary permits or approvals from regulatory agencies (such as the EPA) must be obtained before construction can begin.

Compaction of material

Achieving the required material compaction may be problematic for the material below the water line. As specified in the previous Magryn documentation for the development, it is recommended to place 40-80mm screenings within the fill area, to above water level. This provides a base layer to fill over the top of. Placement and compaction of the rubble fill can then be undertaken in layers to the finished level.

A cofferdam structure may be required to form a safe working area for foreshore works, and a temporary ramp may need to be constructed to allow compaction equipment to access the site. A service barge / platform may also be required, to allow access to working area to construct the cofferdam. Specific requirements for this would need to be confirmed with the contractor and incorporated in the contractor's construction, environmental management plan (CEMP).

Suspended deck

Consideration has been given to the lower 'amphitheatre' platform being suspended, either over the top of the existing contaminated fill material, or over the natural seabed (if the waste fill is removed).

If the existing waste fill remains, it would still need to be contained by constructing a barrier over the fill (as discussed above). This is still likely to be significantly cheaper than removal and disposal of the waste fill.

The suspended deck solution requires more ongoing maintenance than pavement on compacted fill, and has potential problems with rubbish collecting under.

Sheet piles

The concept proposal shows vertical retaining walls surrounding the development, adjacent the marina. This is a feasible alternative to the rock revetment walls designed previously for the area by Magryn and Associates. The primary benefit for vertical walls is they take up much less space, so the functional area is maximised. The type of vertical wall or material was not nominated in the concept design, and careful consideration should be given to this. Some criteria to consider is constructability, durability, cost and maintenance.

Some options for the retaining wall are:

- Steel or Fibre reinforced polymer (FRP) sheet piling
- Steel or FRP piles, with precast concrete panels supported between

The first option noted above would involve significantly more piling, which comes at a high cost and increases disruption to the local community and marine environment.

Materials

The type of piles selected for the vertical retaining wall as well as for the pontoon should consider the project design criteria (such as economic impacts, environmental impacts, maintenance requirements).

FRP piles do come at a higher cost compared to conventional steel piles, but have the following benefits:

- Corrosion resistance: FRP is not affected by corrosion, which is a major problem for steel piles in marine environments.
- Non-conductive: FRP is an insulator and does not conduct electricity, which may be an advantage.

If precast concrete panels are adopted for the vertical wall, it is suggested that they are reinforced with glass fibre reinforced polymer (GFRP). Similar to FRP piles, the corrosion resistance and durability of the concrete will be significantly increased.

Due to the potential for seawater inundation, the durability of the pavement material is a key design consideration.

Pavement levels

Based on the site survey, the existing levels around the former Buffalo site are approximately 2.5m AHD. There is approximately a 300mm step up to the general pavement area at approximately 2.8m AHD.

The finished floor levels were not indicated on the concept plans, however based on the 3D graphics, the lower amphitheatre platform level appears to be approximately 400-500mm above water level. The high water level of the lake under normal operating conditions is 0.6m AHD. Hence, it is assumed that the finished level of the platform would be approximately 1m AHD. This area would be subject to flooding during storm events (based on the flood levels noted above), which is an important design consideration, and would affect any electrical systems installed at the lower platform level.

The pavement level adjacent the amphitheatre is assumed to match into the existing surrounding levels of 2.8m AHD. This would be above flood level for a 2050 flood event (100 ARI), but not for a 2100 flood event.

The level of the kiosk should be protected from a 100 ARI water level event for 2050 at least. Constructability of the kiosk is beyond the scope of this report.

Figure 5- Existing pavement surrounding the Buffalo replica (now removed)

COST ESTIMATE

Preliminary cost estimates were prepared by this office, associated with option A and option B as outlined below.

Option A- Excavation, treatment and disposal (incl gate fees) of waste material for the proposed development, as well supply and placement of new material to specified levels. The cost is estimated to be between **$ 2,000,000 to 2,500,000**.

Option B- Supply and placement of new fill material (to specified levels) over existing material (as well as removal and re-compaction of existing material)
The cost is estimated to be between **$ 1,300,000 to 1,600,000**.

Refer to attached cost estimate for a detailed breakdown of the costs.

The cost estimate has been complied with all due care, however the estimate is preliminary and this office accepts no liability in the accuracy of the estimate.

FLOATING PONTOON PROPOSAL

The proposal to install a floating pontoon (as shown for option 1) has been reviewed. The general concept of a floating pontoon structure is feasible, particularly in a sheltered marina environment. The indicative concept render for the proposed floating platform is shown below.

A key advantage of a floating pontoon structure (over a fixed platform) is that the water level variation can be easily accommodated, and the users of the facility can maintain close access to the water.

Given the Patawalonga is not generally for swimming, and there is minimal water level variation under normal conditions, it is our opinion that a floating structure is not warranted. Nevertheless, some design considerations are discussed below.

The gangways (suspended walkways) connecting the fixed pavement to the floating platform would need to be compliant with AS 3962 (presumably DDA compliant). In order to estimate the required length of the gangway, the following is assumed:

- The finished level of paved area adjacent the floating platform is 1m AHD,
- The water level in the Patawalonga being approximately 0m AHD (minimum),
- The pontoon has a freeboard of 0.6m

Based on the above, the length of the gangway would need to be approximately 5.6m, to achieve 1:14 slope at all times. A shorter gangway may be acceptable, to achieve 1:14 slope for 80% of the time (requirement for accessibility, as shown in the table below).

Table 3.5 — Gangway slope

Duration of required slope	Accessible marina berths	General marina berths
For a minimum of 80 % of the time	1:14 for a maximum length of 25 m	1:4
For a maximum of 20 % of the time	1:8 for a maximum length of 25 m	1:4
NOTE 1 Where the general tidal change prevents the achievement of the slope requirements then a combination of a ramped jetty to minimize the height difference to the pontoon platform may be considered.		
NOTE 2 Where extreme tidal change (greater than 3 m) prevents the achievement of the slope requirements then a reduction in the time duration of a 1:14 slope should be incorporated and identified.		

Figure 6-Table from AS3962.

The proposed floating pontoon structure has been depicted in the concept proposal as a tear drop shape. It is possible to construct a tear drop shaped floating pontoon structure, although the feasibility would depend on various factors. This would be a bespoke design and may come with a high cost, compared to a typical rectangular shape which would be ‘off the shelf’ from pontoon manufacturer. The overall structure would need to consist of several segments (rather than a single element), connected together to allow for articulation. The shape of the pontoon would also have an impact on its stability, wave resistance, and ease of construction. These factors would need to be reviewed carefully during the design process.

In terms of material for the pontoon modules, it is recommended that concrete is considered (as opposed to other alternatives such as aluminium or plastic frames), for the following reasons:

- Greater design flexibility and customization options
- Concrete systems tend to have a higher maximum load capacity and are more stable/ durable

If a concrete pontoon is selected, the concrete should be GFRP reinforcement, to maximise durability.

In order to restrain the pontoons laterally, guide piles will be required. The height of the piles will need to extend to the maximum design flood level, to ensure the pontoon remains serviceable following flood events.

As noted above, the lengths of the gangways would also need to accommodate the varying water levels. The gangway slope would only need to be compliant during normal high and low water levels. During extreme flood events, there would not be anyone using the facility, hence the slope of the gangway is not critical.

Figure 7- 3D render showing floating pontoon

PREVIOUS CONCEPT PLAN, BY MAGRYN

In 2019, Magryn and Associates completed a proposal which included filling in the area with compacted fill, and providing rock revetment along the northern edge. This is still considered a viable and cost effective solution.

RISK ANALYSIS

The site is located in the marina of the Patawalonga, within 50m of functioning berths and a popular reserve. There are many potential safety, ecological and economical risks associated with the development. It is important that all risks and mitigation strategies are carefully considered and implemented throughout the design and construction process.

A detailed risk analysis has been undertaken for the proposed development (concept proposed by City Collective).

Risks and mitigation strategies have been addressed for both options, and are summarised in the risk assessment table in the appendix of this report.

CONCLUSION

Overall, the constructability of the proposed reclamation area at the former Buffalo site will include challenges, but is feasible. Careful planning, design and execution of the project, will lead to a successful outcome.

Recommended construction option

As discussed above, it is our opinion that consideration should be given to leaving the contaminated waste material insitu, and filling over the top of it (option B). This would avoid the high costs (refer cost estimate attached) and risks associated with removal and disposal of the material.

It should be noted that removal of the top layer of existing fill material (nominally the top 600mm of soft material) would still be required, to get down to a firm base for the new compacted fill. However, the volume of material to be removed would be approximately half, compared to removing all fill (down to natural ground level).

There are minimal risks to human health associated with working with the insitu material (as noted in the TMK soil report). It will be more economical to spread and compact this material on site, rather than dispose of it off-site and import additional new fill. Clay lining can be constructed over the existing material relatively cost effectively, to minimise risks associated with contamination leaching into the surrounding marine environment.

To enable re-use as compacted (engineered) fill, the existing material will need to be suitably graded and compliant with the required specifications for fill material. Some treatment of the material may be required, such as blending with imported rubble.

Further geotechnical investigations are recommended to be undertaken by the contractor during construction, to ascertain the extent of existing fill to be excavated, and the required treatment of the existing fill material to enable re-use as compacted fill. Post construction settlement is not anticipated, although this should be reassessed during construction.

Magryn and Associates would be pleased to assist with ongoing detailed design work for this exciting and critical project for the Holdfast Bay area.

For Magryn & Associates Pty. Ltd.

W. Souter
B. Arch. Eng. (Hons.) MIEAust CPEng NER

Attachments:

- Risk Assessment
- Cost estimate
- Concept plan by City Collective
- Survey, by Symonds Ryan and Cornish
- Soil classification report, by TMK
- Magryn and Associates concept plan

Risk Assessment- Rev B

Description	Hazard	Consequence	Probability	Risk Category	Control measure	Residual Consequence	Residual Probability	Residual risk Category	Comment
Construction									
Removal and disposal of existing fill material (option A only)	Risk of some of the material being contaminated with levels higher than 'Low' and requiring disposal as per EPA requirements.	Major	Possible	Very High	Further soil testing and investigation, to determine extent of fill that is above Low Level Contaminated Waste criteria	Moderate	Possible	High	Consequence is primarily economic, as well as environmental.
Removal of existing fill material (option A only)	Excavated material becoming acidic following removal from site	Major	Unlikely	High	Mix excavated material with lime as per recommendations in the environmental report.	Major	Rare	High	
Placement of compacted fill over the top of existing material (option B only)	Risk of post-construction settlement of the in-situ fill material	Major	Unlikely	High	Monitoring during construction. If required, placement of preload on top of the existing material to allow for settlement during construction. To be removed after a specified settlement period.	Major	Rare	High	Control measure may result in construction delays. The required settlement period is unknown.
Placement of compacted fill over the top of existing material (option B only)	Risk of migration of contaminants in the long term	Major	Possible	Very High	Design and construction of clay liner over the existing fill material.	Major	Unlikely	High	
New sheet piling works	Noise and vibration (pile driving) affecting persons in immediate and surrounding area	Moderate	Almost Certain	Very High	SWMS to be prepared by the Contractor prior to commencement of works. Piling methodology to be prepared by a NPER registered engineer and followed by the Contractor. Regarding persons in surrounding area, Contractor to operate within development approval conditions and hours of work. Recommend Contractor consult with Council to inform them of expected noise/vibration levels at times.	Minor	Almost Certain	Moderate	
General construction	Potential for people in the vicinity to be injured by moving plant, and materials not contained on the site	Substantial	Possible	Very High	A dedicated contractor's compound to be available for site offices and storage of materials, plant and equipment. Contractor to develop a site management plan, including material and waste storage as well as areas for loading, unloading and parking for all vehicles.	Substantial	Rare	High	
General construction	Access of general public into the site work area	Moderate	Possible	High	The work area to be clearly marked as an exclusion zone, and fenced off from the public. The boundaries of the exclusion zone shall be adjusted depending on the work being done.Pedestrian management plan to be prepared and followed by the Contractor.	Moderate	Rare	Moderate	
Piling and earthworks	Potential for generation of silt plume as a result of pile driving or earthworks, leading to a negative impact on the marine environment.	Moderate	Likely	Very High	Contractor to use appropriately positioned silt curtains around the work area, as approved by council in accordance with the development approval and EPA conditions.	Moderate	Rare	Moderate	
Operation and Maintenance									
General operation	Leakage of Glenelg Gates, resulting in flooding of Patawalonga	Major	Possible	Very High	Maintenance of gate seals, and replacement of gates. Routine maintenance inspections.	Major	Unlikely	High	
Floating pontoon	Damage to pontoons due to wave action or general wear/tear	Moderate	Unlikely	High	Careful selection of materials and design of pontoon elements, for the specific site conditions	Moderate	Rare	Moderate	
Sheet piles	Corrosion	Moderate	Unlikely	High	Careful selection of materials and design for the specific site conditions	Moderate	Rare	Moderate	

Cost Estimate (Rev B) for Buffalo Site Reclamation Glenelg South Australia

For	***City of Holdfast Bay***
Project No:	22560
Prepared by:	WS
Date:	13/02/2023
Refer to :	Report on Constructability, 22560- Rev B

This cost estimate is for the works associated with excavation, treatment and disposal (incl gate fees) of material within the former Buffalo site, as well as placement of new fill material. Costs for any other items (such as rock revetment, sheet piling, pavement, stormwater) are not included.

This cost estimate is for budgeting purposes only, and should not be considered as comparable to a tender price for the works.

This cost estimate is based on Rawlinson's Australian Construction Cost Guide (2020) and rates obtained from local contractors. The cost estimate complete by Capisce Quantity Surveyors has been used as a reference.

The estimate has been compiled with all due care, however Magryn & Associates Pty Ltd accepts no liability for the accuracy of the estimate.

MAGRYN

BUFFALO SITE RECLAMATION, Glenelg, S.A.

Option A- Removal of waste material and placement of new fill

ITEM DESCRIPTION		QUANTITY	UNITS	RATE	TOTAL	ITEM TOTAL
Preliminaries						
Mobilisation and demobilisation					$ 270,000.00	
Construction of temporary cofferdam					$ 350,000.00	
Allowance for dewatering					$ 135,000.00	
						$755,000.00
Removal / disposal of existing fill						
Excavate and remove existing material	Excavate only, no allowance for mixing with lime	650	m^3	$140.00	$91,000.00	
Disposal of contaminated material as per EPA requirements	Cart to approved landfill, dispose of low level contaminated fill, including landill/ gate fee	1300	tonnes	$222.00	$288,600.00	
EPA levy		1300	tonnes	$149.00	$193,700.00	
Remove existing timber retaining around site					$40,000.00	
						$613,300.00
Placement of new fill						
Imported rubble fill to specified levels (assumed to be 1m AHD)	supply and compact	1000	m^3	$190.00	$190,000.00	
Allowance for compaction testing					$10,000.00	
						$200,000.00
		SUBTOTAL				**$1,568,300.00**
		Allow Contractor Preliminaries			**10%**	**$156,830.00**
		Allow Contract Contingency			**10%**	**$156,830.00**
		Allow Builders margin			**10%**	**$156,830.00**
		Allow CITB levy			**0.25%**	**$5,096.98**
		NETT TOTAL				**$2,043,886.98**
		GST			**10%**	**$204,388.70**
		TOTAL:				**$2,248,275.67**
		COST RANGE (+ 10%)				**$ 2,473,103**
		COST RANGE (- 10%)				**$ 2,023,448**

Option B- Re-use of insitu material and placement of new fill

ITEM DESCRIPTION		QUANTITY	UNITS	RATE	TOTAL	ITEM TOTAL
Preliminaries						
Mobilisation and demobilisation					$ 270,000.00	
Construction of temporary cofferdam					$ 350,000.00	
Allowance for dewatering					$ 135,000.00	
						$755,000.00
Removal / treatment of existing fill						
Excavate existing material to firm base	Excavate only	300	m^3	$140.00	$42,000.00	
Construction of imported clay capping over fill		180	m^3	$190.00	$34,200.00	
Remove existing timber retaining around site					$40,000.00	
						$116,200.00
Placement of new fill						
Imported rubble fill to specified levels (assumed to be 1m AHD)	supply and compact	650	m^3	$190.00	$123,500.00	
Re-compaction of existing material	place and compact	350	m^3	$50.00	$17,500.00	
Allowance for compaction testing					$10,000.00	
						$151,000.00
		SUBTOTAL				**$1,022,200.00**
		Allow Contractor Preliminaries			**10%**	**$102,220.00**
		Allow Contract Contingency			**10%**	**$102,220.00**
		Allow Builders margin			**10%**	**$102,220.00**
		Allow CITB levy			**0.25%**	**$3,322.15**
		NETT TOTAL				**$1,332,182.15**
		GST			**10%**	**$133,218.22**
		TOTAL:				**$1,465,400.37**
		COST RANGE (+ 10%)				**$ 1,611,940**
		COST RANGE (- 10%)				**$ 1,318,860**

Attachment 2

BUFFALO SITE REDEVELOPMENT
GLENELG NORTH

GENERAL NOTES

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS AND WITH SUCH SITE INSTRUCTIONS AS MAY BE ISSUED.
G2. ANY DISCREPANCY BETWEEN DRAWINGS OR SPECIFICATIONS SHALL BE REPORTED TO THE SUPERINTENDENT BEFORE WORK PROCEEDS.
G3. ALL DIMENSIONS SHALL BE VERIFIED ON SITE, DRAWINGS SHALL NOT BE SCALED.
G4. ALL CONSTRUCTION SHALL BE MAINTAINED IN A STABLE CONDITION DURING ERECTION AND OVERSTRESSING SHALL BE PREVENTED. WHERE NECESSARY PROVIDE ALL TEMPORARY BRACING.
G5. LEVELS ARE SHOWN TO AUSTRALIAN HEIGHT DATUM AND ARE IN METRES.
G6. DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
G7. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE RELEVANT SAA CODES INCLUDING ALL AMENDMENTS, AND THE LOCAL STATUTORY AUTHORITIES EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
G8. NO SUBSTITUTIONS SHALL BE MADE OR SIZES OF STRUCTURAL MEMBERS VARIED WITHOUT OBTAINING THE APPROVAL OF THE ENGINEER, THE APPROVAL OF SUBSTITUTION FROM THE ENGINEER SHALL NOT BE AN AUTHORISATION FOR AN EXTRA. AUTHORISATION FOR ANY VARIATION SHALL BE OBTAINED FROM THE SUPERINTENDENT IN WRITING PRIOR TO ANY WORK COMMENCING.

SAFETY–IN–DESIGN REVIEW

MAGRYN & ASSOCIATES (MAGRYN) HAVE CONDUCTED A PRELIMINARY SAFETY–IN–DESIGN REVIEW OF THE DESIGN SHOWN ON THESE DRAWINGS. THE REVIEW IS BASED GENERALLY ON THE PROCEDURE OUTLINED IN THE SAFE WORK AUSTRALIA PUBLICATION "SAFE DESIGN OF STRUCTURES CODE OF PRACTICE" (JULY 2012).

THE DESIGN HAS NOT BEEN REVIEWED WITH A CONTRACTOR/BUILDER AT THE TIME OF ISSUE FOR TENDER OR CONSTRUCTION. CONSTRUCTION METHODS VARY BETWEEN CONTRACTORS SO IT IS NOT POSSIBLE FOR MAGRYN TO PERFORM AN EXHAUSTIVE SAFETY–IN–DESIGN OR SAFETY–IN–CONSTRUCTION REVIEW. ONCE APPOINTED, THE CONTRACTOR IS REQUIRED TO UNDERTAKE A THOROUGH REVIEW OF THE DESIGN WITH THEIR SUB–CONTRACTORS TO IDENTIFY SAFETY RISKS DURING CONSTRUCTION.

CONTRACTORS ARE RESPONSIBLE AT THEIR OWN COST TO REVIEW THEIR PROPOSED ERECTION PROGRAMS/SEQUENCE AND TO DESIGN AND CERTIFY THE TEMPORARY FRAMING TO SUPPORT STRUCTURAL ELEMENTS. (IF REQUIRED)

DIAL BEFORE YOU DIG www.1100.com.au

LOCATION OF UNDERGROUND AND ABOVE GROUND SERVICES

1. MAGRYN HAS NOT CARRIED OUT A DIAL–BEFORE–YOU DIG REVIEW DURING THE DESIGN PHASE. THE CONTRACTOR SHALL UNDERTAKE A REVIEW OF THEIR OWN TO VERIFY SERVICES ENTERING THE SITE AND IN PROXIMITY TO THE BOUNDARY IN THE STREET/SURROUNDING THE SITE.
2. DIAL–BEFORE–YOU–DIG DOES NOT CONFIRM THE LAYOUT OF SERVICES WITHIN THE SITE. THE CONTRACTOR SHALL ALLOW TO ENGAGE A SERVICES LOCATION CONTRACTOR TO CONDUCT A SURVEY OF ALL SERVICES ON THE SITE.

EXCAVATIONS

1. BATTER SLOPES SHALL BE IN ACCORDANCE WITH GEOTECHNICAL RECOMMENDATIONS AND SHALL BE INSPECTED BY THE GEOTECHNICAL ENGINEER TO CONFIRM ADEQUACY (INCLUDING REVIEW OF PROPOSED DURATION OF BATTER).
2. EXCAVATIONS GREATER THAN 1.0m DEEP REQUIRE SHORING AND SHALL NOT BE ACCESSED BY PERSONNEL WITHOUT APPROPRIATE CONFINED SPACE TRAINING.
3. PROVIDE BARRIERS TO ALL EXCAVATIONS TO PREVENT FALLS.
4. ENSURE MEASURES TO PROTECT ADJACENT PROPERTY / STRUCTURES ARE FOLLOWED STRICTLY IN ACCORDANCE WITH THESE DRAWINGS. IF IN DOUBT CONTACT MAGRYN.

VERIFICATION OF SOIL CONDITIONS

1. THE GEOTECHNICAL INVESTIGATION WAS BASED ON A LIMITED SURVEY VIA BORE HOLES IN DISCRETE LOCATIONS AROUND THE SITE (REFER TO THE GEOTECHNICAL REPORT REFERENCED ON THESE DRAWINGS). THE CONTRACTOR SHALL HAVE THE SOIL DESIGN PARAMETERS VERIFIED DURING EXCAVATION. ALLOW TO ENGAGE THE GEOTECHNICAL ENGINEER TO CONDUCT A REVIEW OF THE SOIL DURING CLEARING / EXCAVATION OF THE SITE.

SITE WORKS

GENERAL

SW1. FOR AREAS TO BE RUBBLE OR PAVED, OR WHERE STRUCTURES ARE TO BE BUILT OVER, STRIP AND REMOVE ALL TOP SOIL, ASPHALT AND ORGANIC MATERIAL FROM SITE. (TOP SOIL MAY BE RETAINED IF SUITABLE FOR LANDSCAPING).
SW2. CUT TO NEW SUBGRADE LEVELS AS DETAILED ON THESE DRAWINGS, OR TO GOOD FIRM GROUND.
SW3. EXISTING FILL OR SUBGRADE SHALL BE PROOF ROLLED WITH 3 PASSES OF A 5 TONNE SMOOTH WHEELED VIBRATING ROLLER PRIOR TO PLACING ADDITIONAL FILL. EXCAVATE AND RE–COMPACT ANY SOFT AREAS AS NOTED ABOVE IF REQUIRED.
SW4. THE CONTRACTOR SHALL MAINTAIN THE SITE FREE DRAINING DURING AND ON COMPLETION OF ALL EARTHWORKS.

FILLING, COMPACTION AND PAVEMENTS

SW5. FILL MATERIAL SHALL BE FREE OF ORGANIC MATTER, TREE STUMPS, ROOTS, RUBBISH, LARGE STONES, BUILDING MATERIAL AND EXCESSIVE CLAY OR SILT.
SW6. QUARRY RUBBLE SHALL BE 40mm RUBBLE WHICH SHALL COMPLY IN ALL RESPECTS WITH THE DPTI SPECIFICATION NUMBER PM3/40QG. FINE CRUSHED ROCK SHALL COMPLY IN ALL RESPECTS WITH THE DPTI SPECIFICATION NUMBER PM1/20QG.
SW7. COMPACTIONS NOTED ARE % MDD (MAXIMUM DRY DENSITY) (MODIFIED) IN ACCORDANCE WITH AS 1289.
SW8. FILLING SHALL BE UNDERTAKEN IN LAYERS NOT EXCEEDING 200mm THICKNESS (COMPACTED DEPTH). FILL SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY (MODIFIED). SUBGRADE SHALL BE COMPACTED TO 98% DRY DENSITY (MODIFIED). EACH LAYER SHALL BE COMPACTED AND APPROVED PRIOR TO THE NEXT LAYER BEING LAID OVER. ALL COMPACTION TESTS TO AS1289.
SW9. TO ACHIEVE THE ABOVE COMPACTION, VIBRATING SMOOTH DRUM ROLLERS (FOR GRANULAR MATERIAL) OF VIBRATING SHEEPS FOOT ROLLERS (FOR CLAYS) ARE REQUIRED. CONTRACTOR TO TAKE CARE WITH VIBRATING ROLLERS AROUND EXISTING STRUCTURES.
SW10. FILL COMPACTION SHALL BE TESTED AT THE RATE OF ONE TEST PER 200 CUBIC METRES OF FILL (DISTRIBUTED REASONABLY EVENLY THROUGHOUT FULL DEPTH AND AREA), OR ONE TEST PER LAYER OF FILL, WHICH EVER REQUIRES THE GREATER NUMBER OF TESTS.
SW11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR QUALITY CONTROL TO ENSURE THAT ALL WORKS COMPLY WITH THE DRAWINGS AND SPECIFICATION. WHEN, IN THE OPINION OF THE CONTRACTOR, THE SPECIFIED COMPACTION HAS BEEN ACHIEVED HE SHALL ARRANGE FOR COMPACTION TESTING TO BE UNDERTAKEN. THE SUPERINTENDENT SHALL HAVE THE RIGHT TO NOMINATE THE EXACT LOCATION AT WHICH SAMPLES SHALL BE TAKEN. THE COST OF ALL TESTING SHALL BE AT THE CONTRACTORS EXPENSE. THE TESTING SHALL BE UNDERTAKEN BY A NATA REGISTERED LABORATORY.
SW12. NO RUBBLE SHALL BE PLACED UNTIL APPROVED BY THE SUPERINTENDENT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ALL GRADING CURVES AND TECHNICAL INFORMATION AS REQUIRED.

CONCRETE

C1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600. ALL CONCRETE SHALL BE TESTED BY AN APPROVED NATA INDEPENDENT TESTING LABORATORY.
C2. CONCRETE SHALL BE GRADE N40.
C3. COVER TO STEEL REINFORCEMENT SHALL BE 45mm UNLESS SHOWN OTHERWISE ON THE DRAWINGS. EXPOSURE CLASSIFICATION TO AS3600–2009 IS B2.
C4. CONDUITS SHALL NOT BE PLACED WITHIN THE CONCRETE COVER.
C5. CONCRETE ADDITIVES SHALL NOT BE USED WITHOUT THE APPROVAL OF THE ENGINEER.
C6. SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES AND SHALL NOT BE ALTERED WITHOUT THE APPROVAL OF THE ENGINEER.
C7. CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN OR SPECIFICALLY APPROVED BY THE ENGINEER.
C8. FREE DROPPING OF CONCRETE FROM A HEIGHT GREATER THAN 1200mm SHALL NOT BE PERMITTED.
C9. CONCRETE SHALL BE COMPACTED WITH SUITABLE MECHANICAL VIBRATORS TO AS3600.
C10. CONCRETE SHALL BE PLACED IN ONE CONTINUOUS POURING OPERATION BETWEEN SPECIFIED CONSTRUCTION JOINTS.
C11. REINFORCEMENT SHALL BE SUPPORTED ON APPROVED PLASTIC STOOLS OR MORTAR BLOCKS OF EQUAL STRENGTH AND DURABILITY TO THE CONCRETE MIX, AT NOT MORE THAN 800mm CENTRES.
C12. CURE CONCRETE (WATER TO BE POTABLE) FOR 7 DAYS AFTER FINAL POUR. WATER CURE WITH PLASTIC MEMBRANE, FLOODED.
C13. CONCRETE SHALL NOT BE PLACED IN THE WORKS IF THE TEMPERATURE OF THE SURROUNDING AIR FALLS BELOW 5 DEGREES(°) CELCIUS(C), OR IS HIGHER THAN 32°C OR WIND SPEEDS EXCEED 25km/h.
C14. REINFORCING SYMBOLS:
N – GRADE 500, HOT ROLLED DEFORMED BAR, COMPLYING WITH AS4671.

STORMWATER

STW1. STORMWATER PIPES SHALL BE REINFORCED CONCRETE PIPES WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
STW2. PIPES SHALL BE INSTALLED IN ACCORDANCE WITH AS3725 WITH TYPE H1 SUPPORT. LAY PIPES TRUE AND EVEN TO GRADE.
STW3. PIPE BED ZONE MATERIAL SHALL BE SAND AND OR GRAVEL AS APPROVED. REFILLING MATERIAL AROUND THE PIPE SHALL BE COMPACTED TO ACHIEVE 95% MDD.
STW4. PIPEWORK SHALL BE LAID TO POSITION AND LEVEL TOLERANCE OF + OR – 15mm.

SERVICES

1. ALL UNDERGROUND SERVICES SHALL BE FINALISED AND INSTALLED PRIOR TO CONCRETE BLOCK PAVING OF RIGHT OF WAY.
2. THE INSTALLATION OF ALL SERVICES SHALL COMPLY WITH THE BUILDING CODE OF AUSTRALIA, RELEVANT STANDARDS AND AUTHORITY REQUIREMENTS.
3. MAKE ALL NECESSARY APPLIACTIONS AND PROCURE ALL NECESSARY PERMITS AND CONSENTS PRIOR TO COMMENCEMENT OF WORKS. PAY ALL FEES ASSOCIATED WITH THESE WORKS.
4. PROVIDE EVIDENCE THAT THE INSTALLATION MEETS AUTHORITY APPROVALS. ALLOW TO CONDUCT ALL TESTS NECESSARY, AND WHERE REQUIRED ENGAGE THE SERVICES OF A RECOGNISED FIRM TO PROVIDE THE COMPLIANCE CERTIFICATION. PAY ALL NECESSARY FEES.
5. BACKFILL ALL TRENCHES WITH CRUSHED ROCK IN LAYERS COMPACTED IN ACCORDANCE WITH SITEWORKS NOTES ABOVE.
6. PLACE ONE STRIP OF 200mm WIDE WARNING TAPE IN ALL SERVICE TRENCHES 200mm BELOW THE SURFACE.
7. WHERE POSSIBLE LOCATE SERVICES IN COMMON SERVICE TRENCH.
8. ALLOWANCE SHALL BE MADE FOR THE FOLLOWING SERVICES: MAINS WATER, SEWER, ELECTRICITY, TELECOMMUNICATIONS.
9. REFER TRINAMIC SERVICES DRAWINGS AND DOCUMENTATION FOR FURTHER DETAILS.

ISSUE	AMENDMENTS	INT./DATE
A	PRELIMINARY ISSUE	WS 22.08.19

MAGRYN

ENGINEERING CONSULTANTS

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www.magryn.com.au

> MINING
> STRUCTURAL
> COASTAL
> CIVIL

CLIENT:
CITY OF HOLDFAST BAY

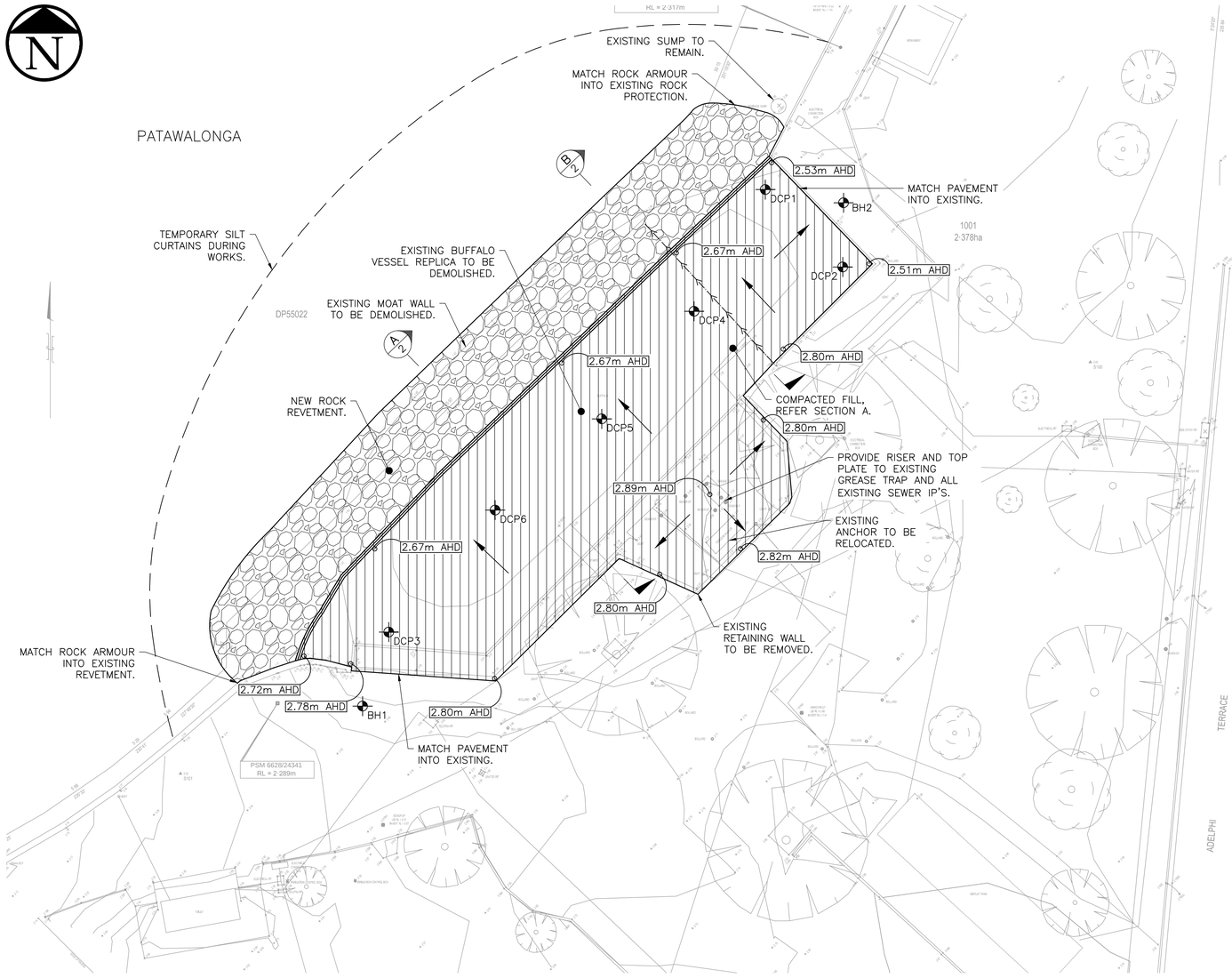
PROJECT:
BUFFALO SITE REDEVELOPMENT

PROJECT ADDRESS:
ADELPHI TCE, GLENELG NORTH

TITLE:
SITE PLAN & SECTION

CONTRACTORS MUST VERIFY ALL DIMENSIONS PRIOR TO ANY OFF SITE FABRICATION.

DESIGN: WS	SCALE: AS SHOWN	DATE: JUN. 2019
SHEET SIZE: A1	DRAWING NUMBER: 19222–0	REVISION: A

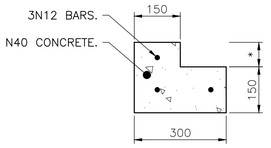


SURVEY NOTES

- SURVEY BY WEBER FRANKIW SURVEYORS
- DETAIL & CONTOUR SURVEY – GLENELG NORTH PORTION OF ALLOTMENT 1001 IN DP 49600 HUNDRED OF NOARLUNGA
- CONTOUR INTERVAL OF 0.200m.
- HEIGHT DATUM IS AHD VIDE PSM 6628/24341
- SURVEY DATES: 26/03/2014, 02/11/2017

LEGEND

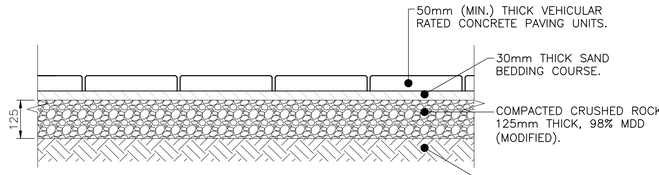
- EXTENT OF COMPACTED FILL, REFER SECTION A.
- 0.00m AHD – SURFACE FINISHED PAVEMENT LEVEL.
- DIRECTION OF PAVEMENT SLOPE.
- STORMWATER PIPE EXTENSION, REFER SECTION B.
- BH1 – BOREHOLE LOCATIONS, REFER GEOTECHNICAL REPORT AND BOREHOLE LOGS.
- DCP1 – DYNAMIC CONE PENETROMETER TEST LOCATION, REFER GEOTECHNICAL REPORT.



CONCRETE EDGING DETAIL

SCALE 1:10

NOTES:
- SHRINKAGE CONTROL JOINTS SHALL BE PROVIDED AT 2.4m CTS. JOINTS SHALL BE 20mm DEEP.
- * – HEIGHT OF EDGING TO SUIT THICKNESS OF PAVERS & BEDDING SAND.



TYPICAL PAVING DETAIL

SCALE 1:10

NOTES:
- THE ABOVE DETAIL IS FOR PEDESTRIAN AND LIGHT VEHICLE USE ONLY (UP TO 3 TONNE VEHICLES).
- PAVER SIZE AND COLOUR SHALL MATCH THE EXISTING SURROUNDING PAVERS AS CLOSE AS PRACTICAL, TO COUNCILS DIRECTION.
- IF THE EXISTING BLOCK STYLE PAVERS CAN BE REINSTATED, THEN THE NEW PAVERS SHALL BE BLOCK PAVERS TO MATCH. HOWEVER IF THE EXISTING BLOCK STYLE PAVERS CANNOT BE REINSTATED, THEY SHALL BE REPLACED WITH HERRINGBONE STYLE PAVERS TO MATCH EXISTING.

0 4 8 12 16 20

DIMENSIONS ARE IN METRES

1:200 AT A1

SITE PLAN

SCALE 1:200

NOTE: THE PROJECT SUPERINTENDENTS APPROVAL SHALL BE OBTAINED PRIOR TO REMOVAL OF ANY EXISTING SERVICES OR STRUCTURES NOT NOTED ABOVE.

ISSUE	AMENDMENTS	INT./DATE
C	MINOR AMENDMENTS	WS 03.10.19
B	DETAILED DESIGN	WS 22.08.19
A	PRELIMINARY ISSUE	TH 28.06.19

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> COASTAL
> CIVIL

CLIENT:
CITY OF HOLDFAST BAY

PROJECT:
BUFFALO SITE REDEVELOPMENT

PROJECT ADDRESS:
ADELPHI TCE, GLENELG NORTH

TITLE:
SITE PLAN & DETAILS

CONTRACTORS MUST VERIFY ALL DIMENSIONS PRIOR TO ANY OFF SITE FABRICATION.

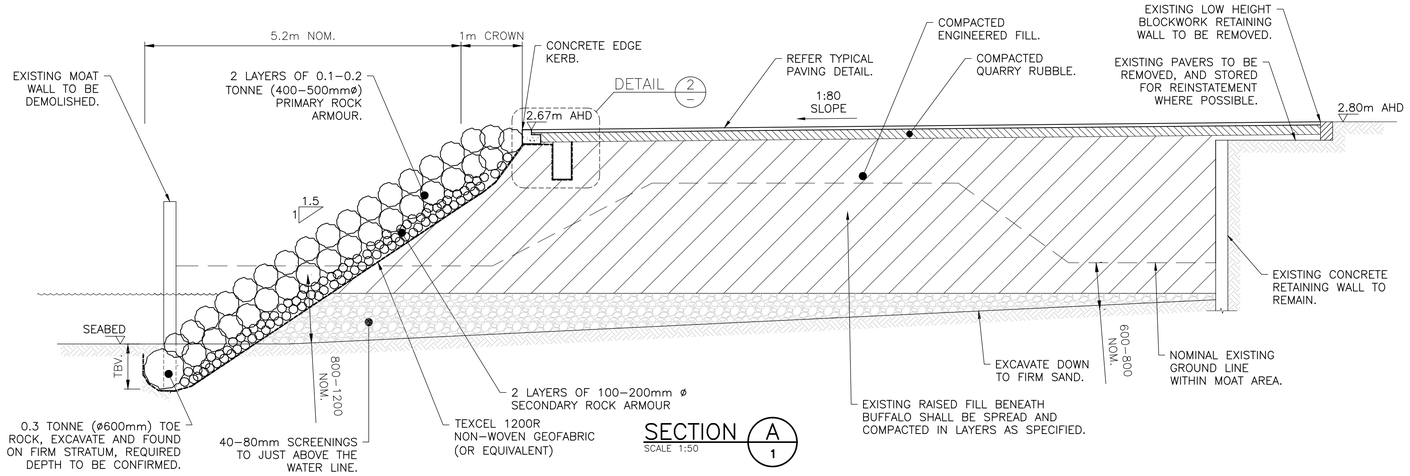
DESIGN: WS	SCALE: AS SHOWN	DATE: JUN. 2019
SHEET SIZE: A1	DRAWING NUMBER: 19222–1	REVISION: C

WATER LEVEL DATA

	CD	AHD
UPPER LIMIT	2.30m	0.60m
LOWER LIMIT	1.70m	0.00m

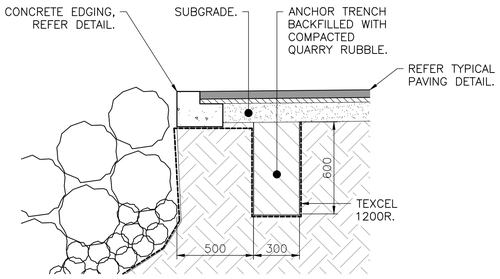
CD – CHART DATUM.
AHD – AUSTRALIAN HEIGHT DATUM.

NOTE: UPPER AND LOWER LIMITS SHOWN ARE THE CURRENT OPERATIONAL LIMITS FOR THE PATAWALONGA.



SECTION A
SCALE 1:50

NOTE:
– REQUIRED DEPTH OF EXCAVATION SHALL BE CONFIRMED DURING CONSTRUCTION.



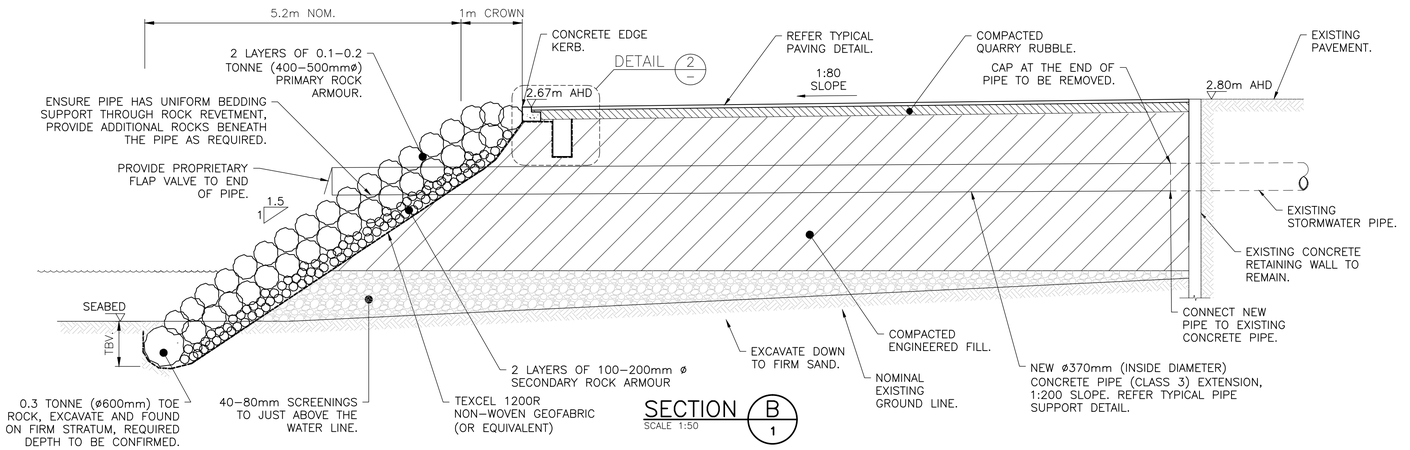
DETAIL 2
SCALE 1:20

WATER LEVEL DATA

	CD	AHD
UPPER LIMIT	2.30m	0.60m
LOWER LIMIT	1.70m	0.00m

CD – CHART DATUM.
AHD – AUSTRALIAN HEIGHT DATUM.

NOTE: UPPER AND LOWER LIMITS SHOWN ARE THE CURRENT OPERATIONAL LIMITS FOR THE PATAWALONGA.



SECTION B
SCALE 1:50

NOTE: EXISTING GROUND LINE IN MOAT AND MOAT WALL NOT SHOWN FOR CLARITY.

DRAINAGE TRENCH BACKFILLING NOTES

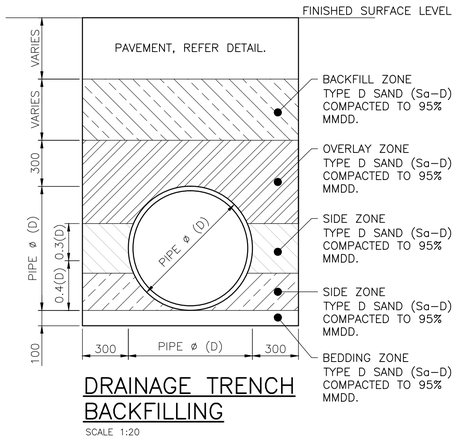
1. INSTALLATION OF DRAINAGE PIPES MUST BE IN ACCORDANCE WITH AS 3725–2007 AND THE CONCRETE PIPE ASSOCIATION OF AUSTRALIA – 'MANUAL FOR CONCRETE PIPE SELECTION AND INSTALLATION HANDBOOK'.
2. EXCAVATED MATERIAL SHALL NOT BE RE–USED IN THE REINSTATEMENT OF THE TRENCHES AND SHALL BE REMOVED FROM SITE.
3. FOR PAVEMENT REINSTATEMENT, REFER TO THE DESIGN PLANS.
4. ALL ZONES SHALL HAVE MATERIAL PLACED IN LAYERS NOT EXCEEDING 200mm (UNCOMPACTED) THICKNESS. MATERIAL TO BE COMPACTED AT THE OPTIMUM MOISTURE CONTENT TO ACHIEVE A MINIMUM COMPACTION OF 95% MMDD.

BACKFILL ZONE – LAYERS SHALL BE COMPACTED BY CONVENTIONAL MECHANICAL METHODS.

OVERLAY ZONE – LAYERS SHALL BE COMPACTED BY CONVENTIONAL MECHANICAL METHODS, WITH THE LAST 150mm TO BE COMPACTED BY TAMPING OR VIBRATING.

HAUNCH ZONE – LAYERS SHALL BE COMPACTED CONVENTIONAL MECHANICAL METHODS.

BEDDING ZONE – BEDDING SAND SHALL EXTEND OVER THE FULL WIDTH OF THE TRENCH. TAMPING, ROLLING OR VIBRATING COMPACTION METHODS MAY BE USED.



DRAINAGE TRENCH BACKFILLING
SCALE 1:20

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ADELPHI TCE, GLENELG NORTH

TITLE:
SECTIONS

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SHEET SIZE: A1	DRAWING NUMBER: 19222–2	REVISION: B