Proposed Kariong Sand and Soil Supplies Facility – SSD8660

Water Cycle Impact Asessment and Soil and Water Management Plan

Response to Submissions: Supplementary Report A
Prepared for: Kariong Sand and Soil Supplies

December 2020
Project No. 197

Prepared by:
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.TABLE OF CONTENTS

1.0 INTRODUCTION

1.1. Background

Sustainability Workshop was engaged by Kariong Sand and Soil Supplies to prepare a water cycle management plan for a proposed state significant development at Kariong.

The proposal is known as SSD 8660.

This report has been produced in response to second exhibition of the EIS and is aimed at addressing remaining concerns and questions provided to the Applicant from the Department of Planning, Infrastructure and Environment (DPIE), NSW EPA and the Biodiversity and Conservation team within DPIE.

This supplementary report is to be read in conjunction with previous work and where noted it supersedes previous work.

There have been three changes to the proposal which are described in detail in this report and include:

1) The Floating Treatment Wetland has been removed from the proposal
2) The proposed 5,000 m^3 storage pond will be operated with a 5 day trigger to discharge meaning that it will discharge treated water to the environment under controlled conditions once water quality criteria have been achieved to reduce the frequency of predicted uncontrolled discharges. This is explained further in this report.
3) Both the crusher and mulching operations will be fully enclosed within a building.

Section 2 of this report details the agency submission and next to it, the Applicant's response.

Section 3 of this report describes the changes to the crusher and mulcher operation and qualitatively assesses this change on water quality.

2.0 RESPONSES TO SUBMISSIONS

2.1. Responses to DPIE

Number	Agency Comment (DPIE)	Proponent Responses to agency comment
1	The Department reiterates its previous concerns about the effectiveness of the proposed floating wetland for water treatment. The Department notes Section 7.10 of the WCIA states: *we note that we have not modelled the benefit of the proposed floating wetlands in the MUSIC model because it is believed that the science behind the FTWs is still in its infancy and needs further research under a broader range of conditions before the models being considered rigorous. Research to date has not measured the performance under a configuration such as the one proposed in this project where the pond is also used for stormwater harvesting. In conclusion, at this time, there is a lack of suitable scientific data available with which to model FTWs as proposed on this project. Results in this report are therefore to be considered somewhat conservative.* Considering these uncertainties and that the water treatment pond would treat both a mix of clean stormwater and leachate, please include justification and evidence the proposed floating wetland is suitable and effective in treating the collected water in the RtS. Furthermore, please clarify what is meant by the results of the WCIA are "considered somewhat conservative".	It has been made clear in Section 7.10 in the WCIA report that the floating wetland was never included in the water quality modelling undertaken for the project and therefore inclusion of the floating wetlands in the proposal could only result in even better water quality than what has been predicted using the MUSIC model. Please refer to the following paragraph also extracted from Section 7.10 which puts the adjacent DPIE/EPA paragraph into its correct context: "*We note that we have not modelled the benefit of the proposed floating wetlands in the MUSIC model because it is believed that the science behind the FTWs is still in its infancy and needs further research*" The above statement means that the MUSIC model never included the benefit of the floating treatment wetland. The Applicant has provided both verbal and written assurances that the floating treatment wetland would have only improved water quality above and beyond what was predicted/modelled (this is what "conservative modelling" means) and despite this DPIE has maintained its concerns. To help make it easier for DPIE to assess the proposal the Applicant has therefore decided to remove the floating treatment wetland from the proposal.

<table>
<tr><th>Number</th><th>Agency Comment (DPIE)</th><th>Proponent Responses to agency comment</th></tr>
<tr><td></td><td></td><td>
<u>This will not change the predicted water quality in any way</u> because the floating wetland was never included in the water quality model predictions.

Despite the removal of the floating treatment wetland from the proposal, the conclusion of the WCIA remains that this State Significant Development proposal would not have significant adverse impacts on receiving water quality as the proposed development would comply with Table 3.3.2 (Default Trigger Values for slightly to moderately disturbed ecosystems) ANZECC Guidelines as well as with any EPL limits such as ensuring TSS remains below 50 mg/L which are not covered by ANZECC Guidelines.

The ANZECC Guideline default trigger values from Table 3.3.2 are repeated below:
<table>
<tr><th>Parameter</th><th>ANZECC DGV (mg/L)</th></tr>
<tr><td>Total Phosphorus*</td><td>0.05</td></tr>
<tr><td>Filterable Reactive Phosphorus</td><td>0.015</td></tr>
<tr><td>Total Nitrogen*</td><td>1.0</td></tr>
<tr><td>Ammonia</td><td>0.013</td></tr>
<tr><td>Nitrogen Oxides</td><td>0.015</td></tr>
<tr><td>Dissolved Oxygen (% saturation)</td><td>90-110</td></tr>
<tr><td>pH</td><td>6.5-7.5</td></tr>
</table>
</td></tr>
</table>

Number	Agency Comment (DPIE)	Proponent Responses to agency comment
		* Value based on Gosford City Council Trigger Values for Brisbane Waters Estuary and Tributaries (Gosford City Council, 2015, Waterway Health Report) which has been adopted as a reference waterway in accordance with ANZECC Guidelines. For more information please refer to Section 4.1 of the WCIA.
2	The Department notes Figures 2.5 and 2.6 of the Somersby Industrial Park Plan of Management show the southern part of the site is covered by Hawkesbury Coastal Banksia Woodland, sandstone hanging swamps and heaths, and exposed Hawkesbury Woodland which provides significant habitats. The WICA states the proposed water treatment pond would discharge to Kangoo Road via the retained bushland eight times per year. The Department reiterates its previous concerns about the potential impacts of discharging water on the ecological value of the retained bushland and downstream receivers and water users. Unlike recycled water used on-site which would be treated by a stormwater treatment plant, the only treatment for discharged water would be the water treatment pond comprising an OSD basin and a floating wetland. The WCIA only includes water quality criteria for recycled water to be used on-site and did not provide an appropriate monitoring program including all pollutants of concern and relevant criteria for the discharged water as requested by the Department in its SEARs and previous adequacy review comments. Further, considering the uncertainty of the effectiveness of the floating wetland, please ensure a downstream impact assessment and a monitoring program including all pollutants of concern and relevant criteria is included in the RtS.	We break down DPIE's main concern into its parts below: a) The proposed water treatment pond would discharge to bushland 8 times per year. **Response**: The proposal has been revised to operate the proposed water quality pond in line with the NSW Government publication, Managing Urban Stormwater (MUS) Volume 2E. The basin is classified as a Type D Sediment basin with a trigger to discharge over the 5 days following each rainfall event. The treatment pond volume was sized assuming a sensitive receiving environment and a 5 day cumulative rainfall percentile of 99.3mm for the subject area. The required pond volume is 4300 m^3. 5,000 m^3 of storage has been provided and this will further enhance discharge water quality above and beyond the 95th percentile 5 day design criteria. Based on revised modelling assuming an MUS Volume 2E pump out basin, this would achieve an average uncontrolled discharge frequency of 3 events per year (previously estimated to be 8). This will further enhance protection of receiving waters and further reduce the risk of an uncontrolled discharge. This follows the requirements of the MUS Volume 2E Guideline.

Number	Agency Comment (DPIE)	Proponent Responses to agency comment
		This revised approach would use the same basin volume of 5,000m^3 as has already been proposed (which is larger than a MUS Vol 2E basin sized at the 95th percentile 5 day rainfall event). It would pump water out to the bushland provided the trigger to discharge was first achieved. The proposed trigger to discharge is discussed in more detail at point 3 below. Despite the fact that we predict 3 average annual uncontrolled discharges to bushland we remind DPIE of joint conclusions reached both by the Proponent's Consultant and the EPA that the proposal is unlikely to have an adverse impact on the receiving waters and the risks from the proposal can be adequately managed to produce water quality which complies with ANZECC Guidelines. b) "the only treatment for discharged water would be the water treatment pond comprising an OSD basin and a floating wetland. " **Response**: The floating wetland has been removed from the proposal due to repeated concerns raised by DPIE. The modelling which did not include the floating wetland has predicted excellent discharge water quality which would comply with ANZECC criteria. See Point 1 above for further information regarding relevant physico-chemical stressors from Table 3.3.2 in the ANZECC Guidelines. The DPIE statement does not consider the other numerous treatment systems proposed for the site including gross pollutant traps on every catchment, a bioretention system, rainwater tanks, filter sausages, on-line water quality monitoring and reserve storage etc and a CDS unit for the high risk catchment – each of these measures contributes to the treatment train for this site and the treatment train is what determines the discharge water quality.

Number	Agency Comment (DPIE)	Proponent Responses to agency comment
		We conclude the discharge would not have an adverse impact and the Applicant concurs with the NSW EPA's assessment that the water quality risk of the proposal can be adequately managed to ensure no pollution of soils, waterways or groundwater occurs. We therefore conclude that if the discharge frequency is to be very low (3 events per annum) and the discharge quality will comply with ANZECC Guidelines (Table 3.3.2) at the relevant flow percentile then the proposal would not have an adverse impact on the bushland. Furthermore, to ensure that the real world risk can be managed so that there is no adverse impact on bushland, soils or ground or surface waters, the Proponent has committed to undertaking an extensive water quality validation and soil testing programme. c) "The WCIA only includes water quality criteria for recycled water to be used on-site and did not provide an appropriate monitoring program including all pollutants of concern and relevant criteria for the discharged water " **Response**: Section 10.6.1 in the report included Table 21 which identified a list of recommended analytes to be included in the validation programme. The relevant criteria for each analyte would be determined in consultation with the NSW EPA (as required by the EPA) as part of the validation work. Please refer to the EPAs recommended conditions of consent which require this. The relevant criteria will be ANZECC Guidelines for slightly to moderately disturbed aquatic ecosystems applied at the relevant flow percentile (see Point 1 above). Toxicant criteria will need to factor in hardness, dilution, background levels and any other relevant criteria.

Number	Agency Comment (DPIE)	Proponent Responses to agency comment
		In addition to this the proposed stormwater reuse plant will need to go through a proving period to demonstrate it complies with relevant human health risk criteria (Australian Drinking Water Guidelines and NSW MUS Stormwater Harvesting Guidelines) which were identified in the WCIA report.
3	The Department previously requested clarification of the triggers for water to discharge from the water treatment pond. The WCIA only states the frequency has been reduced from 25 to 8 times per year but does not provide clarification of the trigger. Please provide the trigger in the RtS.	The proposed water quality pond is to be 5,000 m^3 in volume and has been sized several ways with the largest recommended size adopted as follows: 1) Based on NSW State Government MUS Volume 2E Guidelines sized to ensure the storage volume is larger than the 95^{th} percentile 5 day cumulative rainfall event. The 5 day 95^{th} percentile cumulative rainfall is 99.3mm, the site area draining to the basin is 4.816 Ha and so using a conservative runoff coefficient of 0.9 the basin volume is 4,303 m^3. The Applicant is proposing a basin with a volume of 5,000m^3 with a reserve volume of 500 m^3 for emergency spills. In accordance with MUS Volume 2E, water in the basin will be reused on site for dust suppression and other non-potable purposes to reduce the demand on the potable system and to reduce the volume of water discharged from the site. 2) Sized using MUSIC with the objective of achieving a TSS value during an uncontrolled discharge of < 50 mg/L. This results in the proposed pond size of 5,000 m^3. The following triggers to discharge, as required by MUS Volume 2E, are therefore proposed: **Triggers for controlled discharge:**

Number	Agency Comment (DPIE)	Proponent Responses to agency comment
		a) Prior to discharge, the water quality must meet the agreed criteria – for example TSS is less than 50 mg/L. During the validation phase of the project the Applicant will agree a suitable range of digitally measurable water quality proxies for TSS with the EPA such as conductivity or pH or turbidity if appropriate. **Trigger for uncontrolled discharge:** a) For rainfall events exceeding the 5 day 95th percentile rainfall of 99.3 mm as specified in Volume 2E of the MUS Guidelines, the basin will overflow an average of 3 times per year.
4	Post Approval - The proponent should include a Groundwater Monitoring and Management Plan in an updated version of the Soil and Water Plan for the operation of the proposed site and provide it to the DPIE - Water for review.	The proponent agrees and will prepare and execute such a plan once agreed with DPIE- Water.

2.2. Responses to EPA

Number	Agency Comment (EPA)	Proponent Responses to agency comment
5	The WQIA refers to the construction and use of Floating Treatment Wetlands to treat or improve water quality prior to discharge. The EPA is concerned about the lack of evidence about the ability of the Floating Treatment Wetland to carry out its intended function. This is highlighted in the following statements taken from the WQIA:	It has been made clear in Section 7.10 in the WCIA report that the floating wetland was never included in the water quality modelling undertaken for the project and therefore inclusion of the floating wetlands in the proposal could only result in even better water quality than what has been predicted using the MUSIC model.

	"We note that we have not modelled the benefit of the proposed floating wetlands in the MUSIC model because it is believed that the science behind the FTWs is still in its infancy and needs further research under a broader range of conditions prior to the models being considered rigorous. Research to date has not measured the performance under a configuration such as the one proposed in this project where the pond is also used for stormwater harvesting. Research to date has focussed on measuring performance in a water quality pond where the water level was mostly static. In this project the water level in the pond will fluctuate considerably." "In conclusion at this time there is a lack of suitable scientific data available with which to model FTWs as proposed on this project. Results in this report are therefore to be considered somewhat conservative." *we note that we have not modelled the benefit of the proposed floating wetlands in the MUSIC model because it is believed that the science behind the FTWs is still in its infancy and needs further research under a broader range of conditions before the models being considered rigorous. Research to date has not measured the performance under a configuration such as the one proposed in this project where the pond is also used for stormwater harvesting. In conclusion, at this time, there is a lack of suitable scientific data available with which to model FTWs as proposed on this project. Results in this report are therefore to be considered somewhat conservative.* Considering these uncertainties and that the water treatment pond would treat both a mix of clean stormwater and leachate, please include justification and evidence the proposed floating wetland is suitable and effective in treating the collected water in the RtS. Furthermore, please clarify what is meant by the results of the WCIA are "considered somewhat conservative".	Please refer to the following paragraph also extracted from Section 7.10 which puts the adjacent DPIE/EPA paragraph into its correct context: *"We note that we have not modelled the benefit of the proposed floating wetlands in the MUSIC model because it is believed that the science behind the FTWs is still in its infancy and needs further research"* The above statement means that the MUSIC model never included the benefit of the floating treatment wetland. The Applicant has provided both verbal and written assurances that the floating treatment wetland would have only improved water quality above and beyond what was predicted/modelled (this is what "conservative modelling" means) DPIE has maintained its concerns. To help make it easier for DPIE to assess the proposal the Applicant has therefore decided to remove the floating treatment wetland from the proposal. This will not change the predicted water quality in any way because the floating wetland was never included in the water quality model predictions. Despite the removal of the floating treatment wetland from the proposal, the conclusion of the WCIA remains that this State Significant Development proposal would not have an adverse impact on water quality and it has been predicted that the proposed development would comply with ANZECC Guidelines as well as with any EPL limits such as ensuring TSS remains below 50 mg/L which are not covered by ANZECC Guidelines. Please refer to Section 2.1 point 1 for further details of ANZECC DGV compliance. The proposed treatment pond, with a volume of 5,000 m^3, complies with the NSW State Government Guideline, Managing Urban Stormwater, Volume 2E which will ensure the proposal would not have an adverse water quality impact on receiving waters.

6	Consistent with advice previously provided by the EPA, residual risks to water quality can be appropriately managed through conditions of consent. The EPA has updated the previously recommended conditions of consent to reflect the updated terminology in the June 2020 report. The following conditions of approval are recommended to manage residual soil and water quality risks: 1. The southern portion of the site (approximately 4ha) will remain as an undeveloped, vegetated buffer during the life of the facility. 2. The fate and potential impacts of any leachate from inside the warehouse is considered and appropriately managed (such as an internal sump). 3. Prior to construction the applicant must prepare a Soil and Water Management Plan including, but not be limited to: a) maintenance and inspection schedules of water quality treatment measures b) inspection of the 'floodplain' downstream for erosion following each overflow event c) a Trigger, Action, Response Plan with contingency measures to be implemented if water quality triggers are reached or other unpredicted impacts (such as the formation of erosional channels or contamination of soils) and to ensure corrective actions are implemented. 4. Prior to construction the applicant must prepare a soil and water quality monitoring program in consultation with the EPA including but not limited to: a) soil and water quality monitoring locations b) analyte list and sampling frequency for each monitoring location	We thank the EPA for its water quality expertise and time in assessing this complex proposal and strongly agree that water quality risks can and will be managed appropriately with due regard to both human health and environmental risks. We make the following observations in relation to the 6 recommended conditions of consent: 1.) The modelling and predictions for this work have been based on a discharge point at the level spreader. The Applicant is not reliant on the remaining part of the site to achieve the predicted water quality outcomes. DPIE's rigorous assessment has been at the point of discharge with the aim of protecting the bushland and treating it as if it were an aquatic ecosystem which it is not. We are therefore not reliant on the buffering afforded by the downstream bushland. While the Applicant has no current intention of further developing his land we consider there is not a link between the recommended condition and the development proposal. 2.) The Applicant agrees to point 2. The fate and potential impacts of any leachate inside the warehouse will remain inside the warehouse and managed appropriately. 3.) The Applicant agrees to point 3. A detailed operation and maintenance plan will be prepared that identifies all maintenance activities, the required frequency of maintenance, rectification measures, maintenance records that must be kept including records of waste disposal, photos, completed check lists and worksheets as well as a risk assessment of all maintenance activities.

	c) the sampling method for each location d) the method of analysis for each analyte (as per Approved Methods for the Sampling and Analysis of Water Pollutants in NSW, 2004) and practical quantitation limit e) a Trigger, Action, Response Plan detailing water quality triggers and operational responses for exceedances. 5. The applicant must prepare and submit for approval a Water Quality Validation Programme within six months of operation commencement to confirm that residual sediment and water quality is consistent with appropriate state and national guidelines (such as the Environmental Guidelines: Use of Effluent by Irrigation' (DECC 2004) and the ANZECC/ARMCANZ (2000) long-term irrigation criteria) 6. The applicant must conduct surface water monitoring and prepare ongoing annual reports to demonstrate that mitigation measures are effective as expected volumes of waste processed on site increases.	This will also include checks of the floodplain following uncontrolled discharge events and periodically regardless (at least quarterly). A trigger, action and response plan will be prepared as part of a comprehensive risk management plan for the site. This will include key water quality triggers – for both diversion of spills to the emergency spill basin as well as discharge of water from the pond once it has satisfied all relevant criteria. It will also include trigger values (for remedial action) for uncontrolled discharged water quality. 4.) The Applicant agrees to point 4 and will prepare a soil and water quality monitoring program in consultation with the EPA. 5.) The Applicant will prepare and submit for approval a Water Quality Validation Programme within 6 months of operation to ensure treated water is fit for purpose and meets all relevant guidelines. 6.) Once the water quality monitoring program has been approved by the EPA the Applicant agrees to execute the monitoring plan for the life of the development.

2.3. Response to the Biodiversity and Conservation Division

Number	Agency Comment (BCD)	Proponent Responses to agency comment
7	Insufficient information has been provided to assess the site water balance The proponent has used the MUSIC water quality modelling software to assess the quality of water discharged from the site. The MUSIC-link modelling results report and the MUSIC file (*.sqz) are required to assess the adequacy of the modelling parameters and the validity of the site water balance. Evapotranspiration losses appear to have been underestimated. The evaporation loss calculations in Section 6.1.3 of the Water Cycle Impact Assessment and Soil and Water Management Plan (Appendix I) suggests annual losses of around 46 megalitres (ML), based on a 905mm/annual evaporation depth over an area of 5.1 hectares. However, Table 15 states that the post-development losses are 34ML. The site water balance may not have correctly modelled water harvested from the detention pond for dust suppression. The assessment states that stockpiles will be irrigated to suppress dust. Excess water will drain through the stockpiles to the impermeable geomembrane liner underlying the site and return to the pond. The circulation of irrigation water is not shown in the post development MUSIC model configuration diagram (Figure 7).	The MUSIC model included requested (non-potable or reuse) water demand from the pond of 48.162 ML per annum. This is largely made up of 46 ML demand for dust suppression plus some additional minor demands (2ML) leading to a total demand of just over 48 ML. This is based on irrigating an average of 3.2mm of depth per day which is enough to keep dust supressed but not so much that the depth of irrigation will cause runoff. Please refer to Section 6.1.3 of the WCIA for the derivation of this information. If the pond were able to supply all of this demand the losses would be 48 ML and other additional losses (evaporation etc). However, the pond can supply only a proportion of this demand. The pond is predicted to supply only 27.65 ML of the requested 48.162 ML demand and the remainder will need to be imported from Council's potable supply network. The pond water balance result from MUSIC is shown below for reference. The reason for this is that the demand from the pond is high and the relative volume of runoff is low and so all the water requested cannot be supplied from the pond. This is the difference between demand and supply of non-potable water from the pond. We also note that dust suppression will be stopped well before stockpiles become saturated. However, should stockpiles becomes very saturated from large rainfall events then the stockpiles would drain into or onto the pavement and directed to the pond. There are other losses related to initial losses and evaporation from the site and site stockpiles, evaporation from the pond, infiltration at the level spreader etc. Together the 27.65 ML (actual reuse volume) and the other losses comprise 34 ML. We welcome scrutiny of this model and would be happy to explain any aspect further.

<table>
<tr>
<td></td>
<td>Recommendation: BCD requests that the proponent provide the MUSIC-link modelling results report and the MUSIC file (*.sqz) for review. The proponent should also review the post-development evaporation losses and harvested water values used in the water balance.</td>
<td>
<table>
<tr><th></th><th>Flow (ML/yr)</th><th>TSS (kg/yr)</th><th>TP (kg/yr)</th><th>TN (kg/yr)</th><th>GP (kg/yr)</th></tr>
<tr><td>Flow In</td><td>41.84965</td><td>3021.29500</td><td>8.73610</td><td>75.37050</td><td>7.97970</td></tr>
<tr><td>ET Loss</td><td>1.49421</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td></tr>
<tr><td>Infiltration Loss</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td></tr>
<tr><td>Low Flow Bypass Out</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td></tr>
<tr><td>High Flow Bypass Out</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td></tr>
<tr><td>Pipe Out</td><td>12.57330</td><td>472.84550</td><td>1.79614</td><td>20.19095</td><td>0.00000</td></tr>
<tr><td>Weir Out</td><td>0.35426</td><td>21.24595</td><td>0.06475</td><td>0.62053</td><td>0.00000</td></tr>
<tr><td>Transfer Function Out</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td></tr>
<tr><td>Reuse Supplied</td><td>27.64455</td><td>380.27500</td><td>2.64080</td><td>37.15185</td><td>0.00000</td></tr>
<tr><td>Reuse Requested</td><td>48.45665</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td></tr>
<tr><td>% Reuse Demand Met</td><td>57.05006</td><td>0.00000</td><td>0.00000</td><td>0.00000</td><td>0.00000</td></tr>
<tr><td>% Load Reduction</td><td>69.10952</td><td>83.64637</td><td>78.69889</td><td>72.38776</td><td>100.00000</td></tr>
</table>
</td>
</tr>
<tr>
<td>8</td>
<td>A maintenance manual is required for the bioswales, floating wetlands and the water quality pond

Grassed bioretention swales, a floating wetland and a water quality pond have been included in the surface water treatment system for the proposal. The swales and the pond are designed to be a depositional tool and over time, their depth will reduce due to sedimentation and maintenance will be required to reinstate their design depths. The floating wetland will require ongoing removal of weeds and rubbish and inspection of the anchoring system.

Maintenance staff will be required to conduct on-going monitoring, maintenance and management of the proposed system.</td>
<td>A detailed operation and maintenance plan will be prepared that identifies all maintenance activities, the required frequency of maintenance, rectification measures, maintenance records that must be kept including records of waste disposal, photos, completed check lists and worksheets as well as a risk assessment of all maintenance activities.

This will also include checks of the floodplain following uncontrolled discharge events and periodically regardless (at least quarterly).

A trigger, action and response plan will be prepared as part of a comprehensive risk management plan for the site. This will include key water quality triggers – for both diversion of spills to the emergency spill basin as well as discharge of water from the pond once it has satisfied all relevant criteria. It will also include trigger values (for remedial action) for uncontrolled discharged water quality.</td>
</tr>
</table>

	Recommendation: BCD recommends that the proponent develops a maintenance manual that instructs plant operators how to maintain the bioswale, water quality pond and floating wetland and keep them functioning through the life of the facility.	

3.0 ECLOSURE OF MULCHER AND CRUSHER

The Applicant has amended the proposal to now include fully enclosed buildings and bunkers around both the crusher and mulcher operations.

While the primary purpose of this to alleviate air and noise concerns and additional benefit of this action will be an improvement in water quality arising from enclosure and containment of both the activity and the product storage. We have not amended the MUSIC model to reflect this recent change but we do note the action can only improve the quality of water flowing into the pond.

Note the drawings included in Appendix A of the WCIA have been updated to reflect:

1) The addition of a pump to enable the pond to function as a Type D sediment retention pond whereby water that is compliant with agreed discharge requirements will be discharged from the pond in a controlled manner when feasible.
2) The addition of bunkers around the mulcher and crusher.

The revised drawings are now included in Appendix A of this supplementary report.

Appendix A
Site Drawings

NOTES:

1. ALL DIMENSIONS IN METRES UNO.
2. HP GAS MAIN PRESENT ON GINDURRA ROAD.
3. EXISTING CONTOURS ARE AT 0.5m INTERVALS

CRUSHER OPERATION BUILDING. REFER TO RAYBAL PLAN 01011

STORMWATER TREATMENT PLANT TO SUPPLY 240m^3/DAY FOR OPERATIONAL USES. WASTE TO SEWER (TRADE WASTE)

MULCHER OPERATION BUILDING. REFER TO RAYBAL PLAN 01011

SECURITY FENCE 2m HIGH ALONG BOUNDARY - POSITIONED IN LINE WITH RETAINING WALL, BLACK IN COLOUR, OPEN TYPE PICKET FENCE

12m x 3m WEIGHBRIDGE OFFICE (DEMOUNTABLE BUILDING) (1m CLEARANCE BETWEEN OFFICE AND INBOUND/OUTBOUND WEIGHBRIDGES)

OUTBOUND WEIGHBRIDGE (23m x 4m) TO BE INSTALLED ONCE FACILITY REACHES 100KTPA

BAY MOUNTED SPRINKLERS FOR DUST SUPPRESSION

6m WIDE GATE FOR MAINTENANCE ACCESS

MAXIMUM HEIGHT OF SECURITY FENCE AND GATES TO BE 2m ABOVE EXISTING GROUND LEVEL, BLACK IN COLOUR AND OPEN TYPE PICKET FENCE

COMBINED WATER QUALITY & OSD POND
POND VOL = 5ML
OSD VOL = 2,500m^3

MELALEUCA BICONVEXA BUFFER AREA (IRRIGATED WITH RECYCLED WATER)

LANDSCAPING STORAGE (CONCRETE BLOCK BAYS TO BE ADJUSTED WITHIN AREA AS REQUIRED)

RET WALL 01

PLANT STORAGE AREA

SPILLWAY

BOUNDARY

SECURITY GATE 26m FROM BOUNDARY WITH 2m HIGH PALISADE FENCING FROM GATE TO BOUNDARY AS PER STAGE 1 DA

REFER TO PLANS 115 & 116 FOR STORMWATER DETAILS

BLENDING AREA - MOBILE PLANT AND EQUIPMENT

PROCESSING AREA - MOBILE PLANT AND EQUIPMENT

EMERGENCY QUARANTINE AREA

AGGREGATE STORAGE

EX STRUCTURE TO BE DEMOLISHED

MODIFY SITE ENTRANCE & LAYBACKS AS PER SECA SOLUTIONS DESIGN (KERBING TO PREVENT RIGHT HAND TURN INTO GINDURRA ROAD)

RAW TIMBER STOCKPILE

PROPOSED WEIGHBRIDGE

EX TREE TO BE REMOVED

LANDSCAPE STORAGE

3m HIGH CONCRETE BLOCK WALL FOR NOISE ATTENUATION

BOOM GATE & TRAFFIC LIGHTS

EX TREE TO BE REMOVED

50m LEVEL SPREADER

TIP AND SPREAD AREA 1

TIP AND SPREAD AREA 2

TIP AND SPREAD AREA 3

NEW CENTRE LINE MARKINGS

EMERGENCY SPILL POND VOLUME = 0.5ML

MIXED BUILDING WASTE

TIMBER

ASPHALT

METALS

BOOM GATE & TRAFFIC LIGHTS

ADMIN OFFICE AND AMENITIES

MULCHED TIMBER IN STORAGE BAYS EACH SIDE

3m HIGH CONCRETE BLOCK WALL FOR NOISE ATTENUATION

WASTE STORAGE BAYS

APPROVED BUILDING UNDER DA 52541/2017 AND MODIFIED UNDER DA 52541/2017-2

AWNING

1.2 m WIDE PEDESTRIAN PATH

TRUCK PARKING AREA

BOUNDARY

GINDURRA ROAD

MAXIMUM HEIGHT OF SECURITY FENCE AND GATES TO BE 2m ABOVE EXISTING GROUND LEVEL, BLACK IN COLOUR AND OPEN TYPE PICKET FENCE

WASTE STORAGE AREA (MOVABLE CONCRETE BLOCK BAYS ADJUSTED WITHIN AREA AS REQUIRED)

ENM ENM ENM VENM

BOUNDARY

DEBENHAM ROAD

CONCRETE MASONRY TILES

BUND TO BE PROVIDED TO PERIMETER OF TIP AND SPREAD AREA TO SEPARATE RUNOFF

WAITING AREA

RECYCLING PLANT

EXISTING STRUCTURE TO BE DEMOLISHED

3m HIGH CONCRETE BLOCK WALL FOR NOISE ATTENUATION

FOR SWALE DETAILS REFER TO SHEET 115

TIP AND SPREAD BUILDING AS PER RAYBAL PLANS 01-12 AND 01-13 (ROOFED & BUNDED) WITH CONCRETE BAYS & CONCRETE FLOOR

EMERGENCY QUARANTINE AREA (FOR WASTE MATERIALS FROM WAREHOUSE)

RET WALL 02

PROVIDE MIN. 20KL RAINWATER TANK FOR WASH BAY

10x18kL RAINWATER TANKS (FOR DUST SUPPRESSION INSIDE TIP AND SPREAD BUILDING).

COALESCING PLATE SEPERATOR AND TREATED WATER TO SEWER. (TRADE WASTE)

AWNING OVER VEHICLE WASH BAY (HEIGHT IN LINE WITH BUILDING AWNING.)

PLAN
SCALE 1:750

LEGEND

- 5m HIGH CONCRETE PANEL NOISE WALL
- IRRIGATED LANDSCAPED BUFFER (5m) - SEE LANDSCAPE ARCHITECTUAL PLANS
- MELALEUCA BICONVEXA PROTECTION AREA - APZ
- PAVEMENT AREA (CONCRETE)
- SEALED SURFACE (ASPHALT)
- RECYCLED CRUSHED CONCRETE ROADBASE WITH GEOTEXTILE MEMBRANE
- CONCRETE KERB AND GUTTER
- PROPOSED RETAINING WALL
- 3m HIGH CONCRETE BLOCK WALL FOR NOISE ATTENUTATION
- DISH DRAIN
- TRUCK PARKING AREA
- WAITING AREA
- PROPOSED SPRINKLER OUTLET FOR DUST SUPPRESSION.
- PROPOSED MISTING OUTLET FOR DUST SUPPRESSION.
- BARRAMY GROSS POLUTANT TRAP (4 OFF)
- PROPOSED BUILDINGS
- BIOSWALE. REFER TO SHEET 115 FOR DETAILS

DIAL BEFORE YOU DIG www.1100.com.au

0 7,5 15 22,5 30 37,5 45 52,5 60
SCALE 1:750 (A1) SCALE 1:1500 (A3)

REV	DATE	DESCRIPTION	BY	CKD
5	10/12/2020	REVISED FOR DA - MULCHER & CRUSHER BUILDINGS REVISED	ML	ML
4	07/04/2020	REVISED FOR DA	AB	ML
3	27/03/2020	REVISED FOR DA	GA	ML
2	20/01/2020	FOR DA	GA	ML

Sustainability Workshop
T: +61 (0) 247878428
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4 Park Ave, Blackheath, NSW
www.sustainabilityworkshop.com

PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
GENERAL ARANGEMENT PLAN

CLIENT: KARIONG SAND & SOIL SUPPLIES

JOB REF No: 197

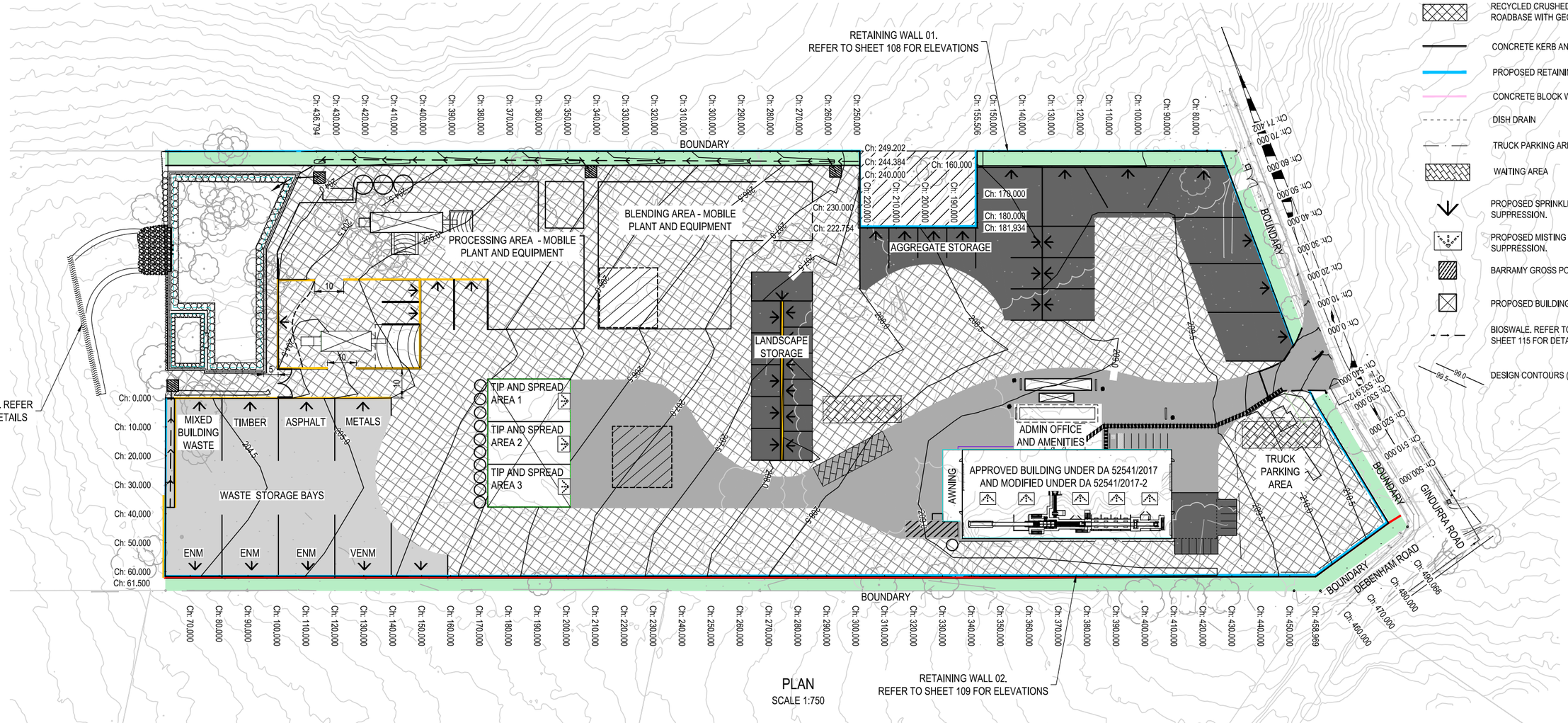
DESIGNED: G. ABDULAHED
DRAWN: G. ABDULAHED
CHECKED: M. LIEBMAN

SHEET: 106
SHEET No: 1 OF 9
SCALE: 1:750
COORD. ORIGIN:

DATE: 10/12/2020
SIZE: A1
DATUM: AHD

NOTES:

1. ALL DIMENSIONS IN METRES UNO.
2. HP GAS MAIN PRESENT ON GINDURRA ROAD.



PLAN
SCALE 1:750

LEGEND

- 5m HIGH CONCRETE PANEL NOISE WALL
- IRRIGATED LANDSCAPED BUFFER (5m) - SEE LANDSCAPE ARCHITECTUAL PLANS
- MELALEUCA BICONVEXA PROTECTION AREA - APZ
- PAVEMENT AREA (CONCRETE)
- SEALED SURFACE (ASPHALT)
- RECYCLED CRUSHED CONCRETE ROADBASE WITH GEOTEXTILE MEMBRANE
- CONCRETE KERB AND GUTTER
- PROPOSED RETAINING WALL
- CONCRETE BLOCK WALL
- DISH DRAIN
- TRUCK PARKING AREA
- WAITING AREA
- PROPOSED SPRINKLER OUTLET FOR DUST SUPPRESSION.
- PROPOSED MISTING OUTLET FOR DUST SUPPRESSION.
- BARRAMY GROSS POLUTANT TRAP (4 OFF)
- PROPOSED BUILDINGS
- BIOSWALE. REFER TO SHEET 115 FOR DETAILS
- DESIGN CONTOURS (0.5m INTERVALS)

DIAL BEFORE YOU DIG
www.1100.com.au

0 7,5 15 22,5 30 37,5 45 52,5 60
SCALE 1:750 (A1) SCALE 1:1500 (A3)

REV	DATE	DESCRIPTION	BY	CKD
5	10/12/2020	REVISED FOR DA - CRUSHER AND MULCHER BUILDING CHANGED	ML	ML
4	07/04/2020	REVISED FOR DA	AB	ML
3	27/03/2020	REVISED FOR DA	GA	ML
2	20/01/2020	FOR DA	GA	ML

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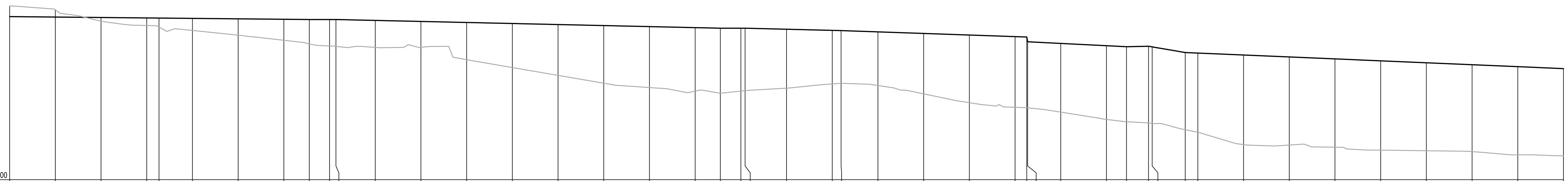
www.sustainabilityworkshop.com

PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
CIVIL WORKS PLAN
CLIENT: KARIONG SAND & SOIL SUPPLIES
JOB REF No: 197

DESIGNED: G. ABDULAHED
DRAWN: G. ABDULAHED
CHECKED: M. LIEBMAN

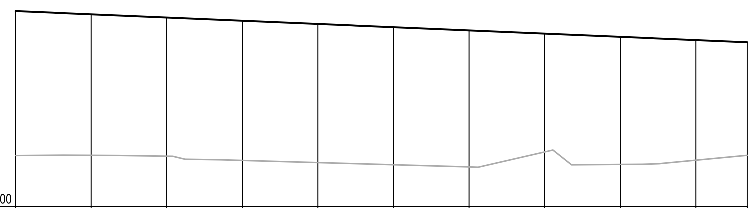
SHEET: 107
SHEET No: 2 OF 9
SCALE: 1:750
DATE: 10/12/2020
SIZE: A1
DATUM: AHD
COORD. ORIGIN:



Chainage	Wall Height	Design Levels	Existing Levels
0.000	-0.937	210.000	210.937
10.000	-0.641	209.961	210.602
20.000	+0.318	209.922	209.604
30.000	+0.664	209.883	209.219
32.682	+0.789	209.872	209.083
40.000	+1.059	209.844	208.785
50.000	+1.434	209.805	208.371
60.000	+1.844	209.766	207.922
65.570	+2.145	209.744	207.599
70.000	+2.316	209.744	207.428
71.402	+2.336	209.744	207.408
80.000	+2.368	209.666	207.298
90.000	+2.273	209.576	207.303
100.000	+3.263	209.485	206.222
110.000	+3.864	209.395	205.531
120.000	+4.460	209.304	204.844
130.000	+5.057	209.214	204.157
140.000	+5.345	209.123	203.778
150.000	+5.568	209.033	203.465
155.506	+5.708	208.983	203.275
160.000	+5.515	208.983	203.468
160.921	+5.476	208.983	203.507
170.000	+5.169	208.892	203.723
180.000	+4.697	208.792	204.095
181.934	+4.623	208.773	204.150
190.000	+4.705	208.661	203.956
200.000	+5.298	208.523	203.225
210.000	+5.933	208.384	202.451
220.000	+6.202	208.245	202.043
222.563	+6.203	208.210	202.007
222.754	+5.789	207.793	202.004
230.000	+6.023	207.647	201.624
240.000	+6.467	207.447	200.980
244.384	+6.578	207.360	200.782
249.202	+6.728	207.400	200.672
250.000	+6.704	207.345	200.641
257.234	+6.774	206.850	200.076
260.000	+6.946	206.803	199.857
270.000	+7.856	206.632	198.776
280.000	+7.726	206.462	198.736
290.000	+7.746	206.292	198.546
300.000	+7.838	206.121	198.283
310.000	+7.713	205.951	198.238
320.000	+7.624	205.780	198.156
330.000	+7.733	205.610	197.877
340.000	+7.643	205.439	197.796

WALL01 ELEVATION (CH0.000 - CH340.000)

SCALES H 1:500
V 1:200



Chainage	Wall Height	Design Levels	Existing Levels
340.000	+7.643	205.439	197.796
350.000	+7.461	205.269	197.808
360.000	+7.337	205.099	197.762
370.000	+7.391	204.928	197.537
380.000	+7.336	204.758	197.422
390.000	+7.280	204.587	197.307
400.000	+7.225	204.417	197.192
410.000	+6.262	204.247	197.985
420.000	+6.751	204.076	197.325
430.000	+6.356	203.906	197.550
436.794	+5.983	203.790	197.807

WALL01 ELEVATION (CH340.000 - CH436.794)

SCALES H 1:500
V 1:200

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REV	DATE	DESCRIPTION	BY	CKD
4	07/04/2020	REVISED FOR DA	AB	ML
3	27/03/2020	REVISED FOR DA	AB	ML
2	20/01/2020	REVISED FOR DA	GA	ML
1	16/12/2019	FOR DA	GA	ML

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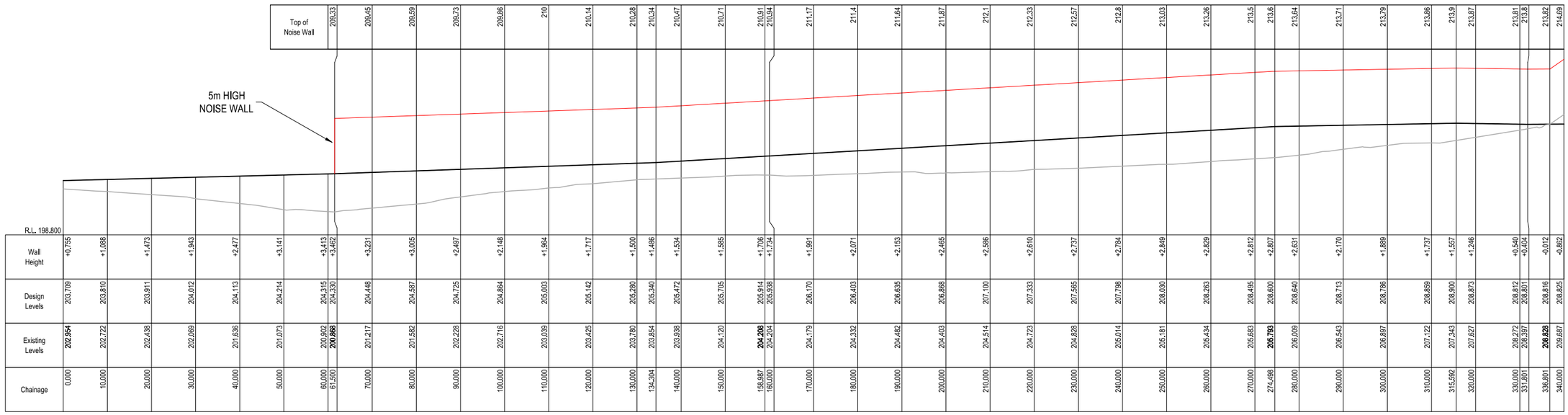
www.sustainabilityworkshop.com

PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
RETAINING WALL LONG SECTIONS - SHEET 1 OF 2

CLIENT: KARIONG SAND & SOIL SUPPLIES
JOB REF No: 197

DESIGNED: G. ABDULAHED
DRAWN: G. ABDULAHED
CHECKED: M. LIEBMAN

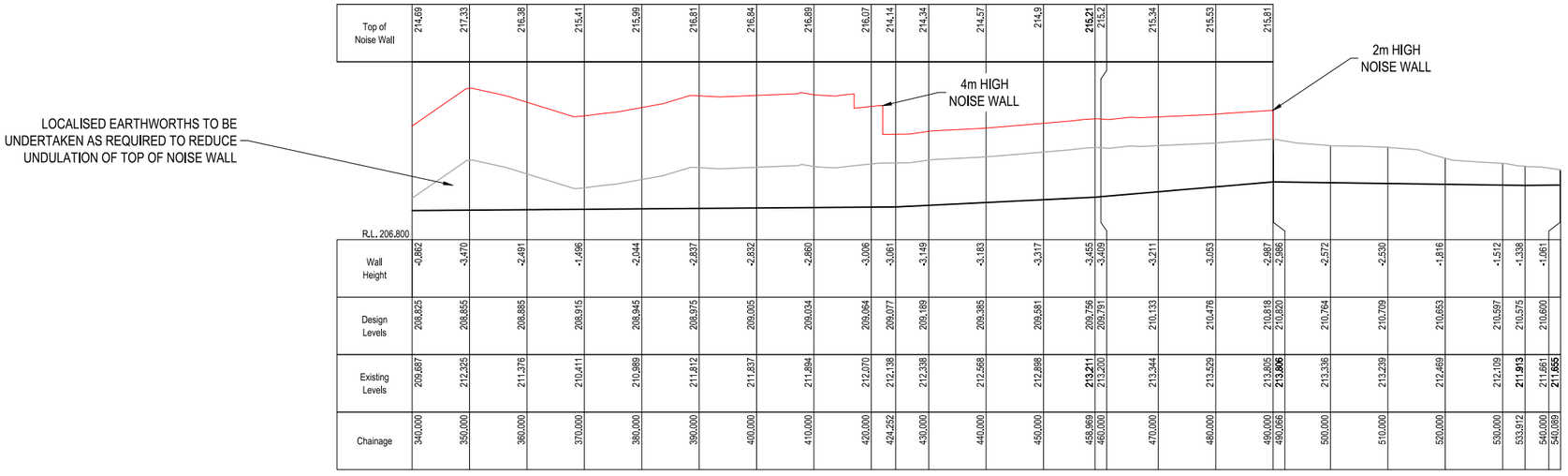
SHEET: 108
SHEET No: 3 OF 9
SCALE:
COORD. ORIGIN:
DATE: 07/04/2020
SIZE: A1
DATUM: AHD



Top of Noise Wall	209.33	209.45	209.59	209.73	209.86	210	210.14	210.28	210.34	210.47	210.71	210.91	210.94	211.17	211.4	211.64	211.87	212.1	212.33	212.57	212.8	213.03	213.26	213.5	213.6	213.64	213.71	213.79	213.86	213.9	213.87	213.81	213.8	213.82	214.69
Wall Height	+0.755	+1.088	+1.473	+1.943	+2.477	+3.141	+3.413	+3.462	+3.231	+3.005	+2.497	+2.148	+1.964	+1.717	+1.500	+1.486	+1.534	+1.585	+1.706	+1.734	+1.991	+2.071	+2.153	+2.465	+2.596	+2.610	+2.737	+2.784	+2.849	+2.829	+2.812	+2.807	+2.631	+2.170	+1.889	+1.737	+1.557	+1.246	+0.540	+0.404	-0.012	+0.862
Design Levels	203.709	203.810	203.911	204.012	204.113	204.214	204.315	204.330	204.448	204.587	204.725	204.864	205.003	205.142	205.280	205.340	205.472	205.705	205.914	205.938	206.170	206.403	206.635	206.868	207.100	207.333	207.565	207.798	208.030	208.263	208.495	208.600	208.640	208.713	208.786	208.859	208.900	208.873	208.812	208.801	208.816	208.825
Existing Levels	**202.954**	202.722	202.438	202.069	201.636	201.073	200.902	**200.868**	201.217	201.582	202.226	202.716	203.039	203.425	203.780	203.854	203.938	204.120	**204.208**	204.204	204.179	204.332	204.482	204.403	204.514	204.723	204.828	205.014	205.181	205.434	205.683	**205.793**	206.009	206.543	206.897	207.122	207.343	207.627	208.272	208.397	**208.828**	209.687
Chainage	0.000	10.000	20.000	30.000	40.000	50.000	60.000	61.500	70.000	80.000	90.000	100.000	110.000	120.000	130.000	134.304	140.000	150.000	158.987	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	274.498	280.000	290.000	300.000	310.000	315.592	320.000	330.000	331.801	336.801	340.000

WALL02 ELEVATION (CH0.000 - CH340.000)

SCALES H 1:500
V 1:200



Top of Noise Wall	214.69	217.33	216.38	215.41	215.99	216.81	216.84	216.89	216.07	214.14	214.34	214.57	214.9	**215.21**	215.2	215.34	215.53	215.81
Wall Height	-0.862	-3.470	-2.491	-1.496	-2.044	-2.837	-2.832	-2.860	-3.006	-3.061	-3.149	-3.183	-3.317	-3.455	-3.409	-3.211	-3.053	-2.887	-2.986	-2.572	-2.530	-1.816	-1.512	-1.338	-1.061
Design Levels	208.825	208.855	208.885	208.915	208.945	208.975	209.005	209.034	209.064	209.077	209.189	209.385	209.581	209.756	209.791	210.133	210.476	210.818	210.820	210.764	210.709	210.653	210.597	210.575	210.800
Existing Levels	209.687	212.325	211.376	210.411	210.989	211.812	211.837	211.894	212.070	212.138	212.338	212.568	212.898	**213.211**	213.200	213.344	213.529	213.805	**213.806**	213.336	213.239	212.469	212.109	**211.913**	211.681	**211.655**
Chainage	340.000	350.000	360.000	370.000	380.000	390.000	400.000	410.000	420.000	424.252	430.000	440.000	450.000	458.969	460.000	470.000	480.000	490.000	490.066	500.000	510.000	520.000	530.000	533.912	540.000	540.089

WALL02 ELEVATION (CH340.000 - CH540.089)

SCALES H 1:500
V 1:200

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REV	DATE	DESCRIPTION	BY	CKD
4	07/04/2020	REVISED FOR DA	AB	ML
3	27/03/2020	REVISED FOR DA	AB	ML
2	20/01/2020	REVISED FOR DA	GA	ML
1	16/12/2019	FOR DA	GA	ML

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www.sustainabilityworkshop.com

PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
RETAINING WALL LONG SECTIONS - SHEET 2 OF 2

CLIENT: KARIONG SAND & SOIL SUPPLIES

JOB REF No: 197

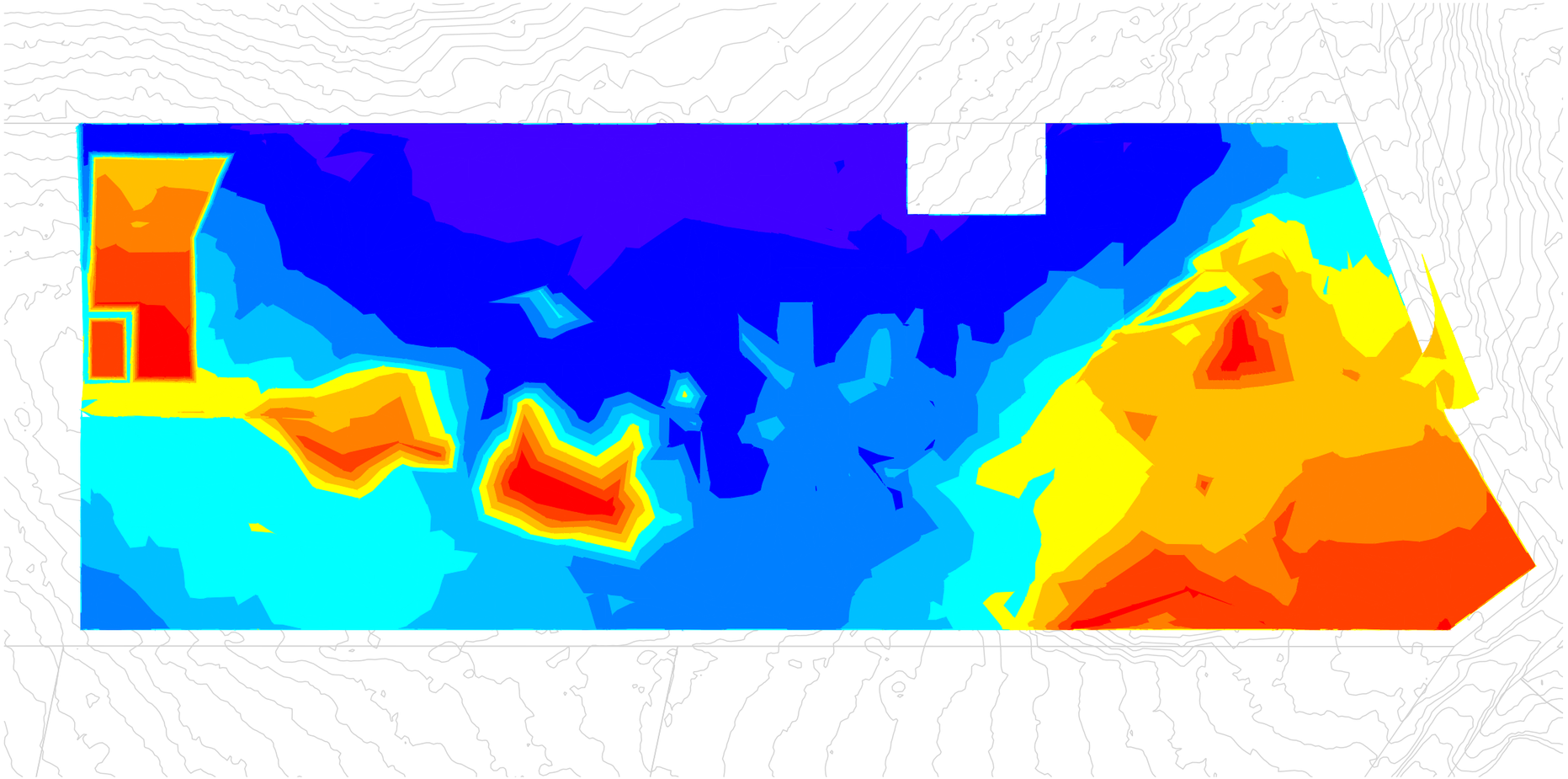
DESIGNED: G. ABDULAHED
DRAWN: G. ABDULAHED
CHECKED: M. LIEBMAN

SHEET: 109
SHEET No: 4 OF 9
SCALE:
COORD. ORIGIN:

DATE: 07/04/2020
SIZE: A1
DATUM: AHD

NOTES:

1. NET FILL VOLUME ABOVE EXISTING SURFACE = 107,200m³
2. NET CUT VOLUME BELOW EXISTING SURFACE = 35,900m³
3. BALANCE OF CUT : FILL = (107,200m³ - 35,900m³) = 71,300m³ FILL REQUIRED
4. PAVEMENT VOLUME = 25,200m^3
5. DRAINAGE LAYER VOLUME = 8,400m^3
6. CONCRETE AREA = 6,600m^2
7. ASPHALT AREA = 11,500m^2
8. UNSEALED PAVEMENT AREA = 30,500m^2
9. ALL ABOVE AREAS ARE EXCLUDING BUILDINGS



Levels Table			
Number	Minimum Level	Maximum Level	Colour
1	-6.000	-4.000	
2	-4.000	-3.000	
3	-3.000	-2.000	
4	-2.000	-1.000	
5	-1.000	0.000	
6	0.000	1.000	
7	1.000	2.000	
8	2.000	3.000	
9	3.000	5.000	
10	5.000	8.000	

PLAN
SCALE 1:750

DIAL BEFORE YOU DIG
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0 7,5 15 22,5 30 37,5 45 52,5 60
SCALE 1:750 (A1) SCALE 1:1500 (A3)

REV	DATE	DESCRIPTION	BY	CKD
4	07/04/2020	REVISED FOR DA	AB	ML
3	27/03/2020	REVISED FOR DA	AB	ML
2	20/01/2020	REVISED FOR DA	GA	ML
1	16/12/2019	FOR DA	GA	ML

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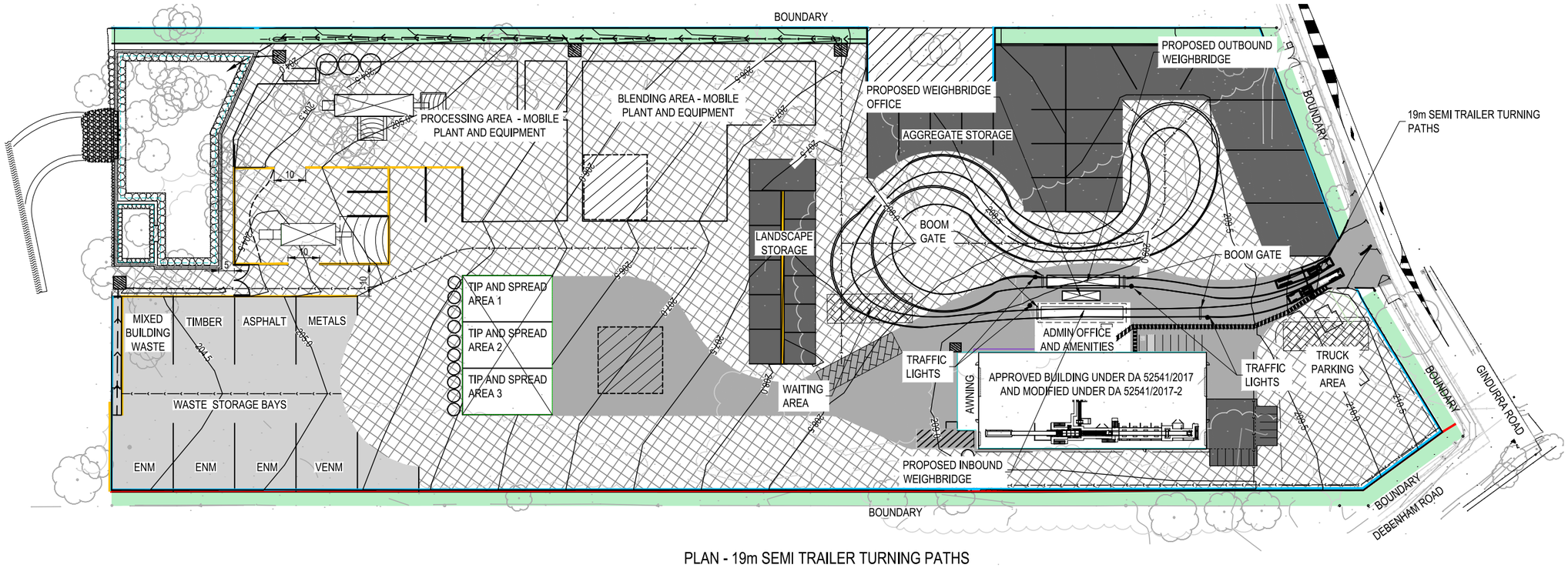
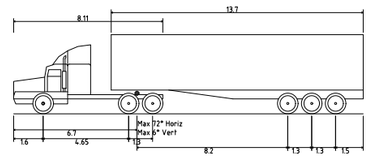
PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
BULK EARTHWORKS PLAN
CLIENT: KARIONG SAND & SOIL SUPPLIES
JOB REF No: 197
DESIGNED: G. ABDULAHED
DRAWN: G. ABDULAHED
CHECKED: M. LIEBMAN
SHEET: 110
SHEET No: 5 OF 9
SCALE: 1:750
COORD. ORIGIN:
DATE: 07/04/2020
SIZE: A1
DATUM: AHD



PLAN - 19m SEMI TRAILER TURNING PATHS

SCALE 1:750

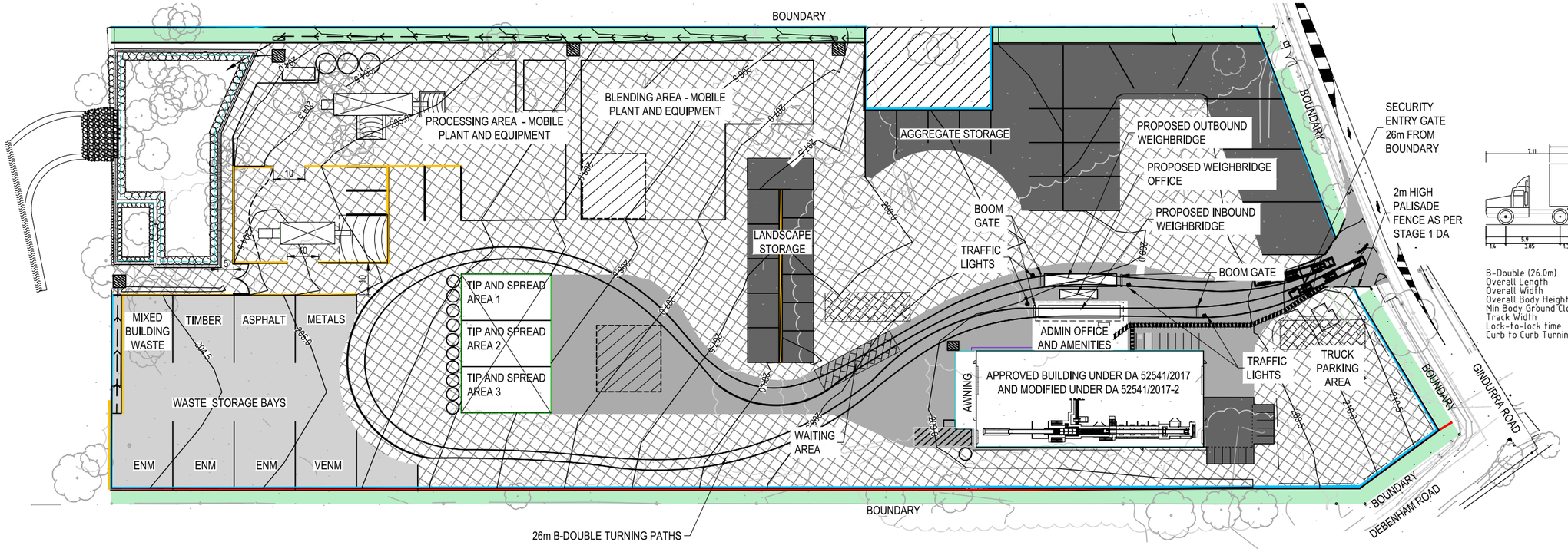


Prime mover and semi-trailer (19 m)

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

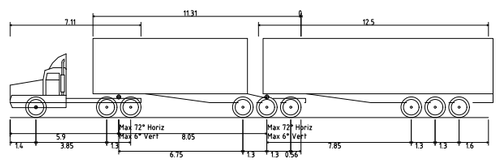
LEGEND

99.5 99.0 DESIGN CONTOURS (0.5m INTERVALS)



PLAN - 26m B-DOUBLE TURNING PATHS

SCALE 1:750



B-Double (26.0m)

Overall Length	26.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

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0 7.5 15 22.5 30 37.5 45 52.5 60

SCALE 1:750 (A1) SCALE 1:1500 (A3)

REV	DATE	DESCRIPTION	BY	CKD
5	10/12/2020	REVISED FOR DA	AB	ML
4	07/04/2020	REVISED FOR DA	AB	ML
3	27/03/2020	REVISED FOR DA	GA	ML
2	20/01/2020	FOR DA	GA	ML

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PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
TURNING MOVEMENTS PLAN

CLIENT: KARIONG SAND & SOIL SUPPLIES

JOB REF No: 197

DESIGNED: G. ABDULAHED

DRAWN: G. ABDULAHED

CHECKED: M. LIEBMAN

COORD. ORIGIN:

SHEET: 111

SHEET No: 6 OF 9

SCALE: 1:750

DATE: 10/12/2020

SIZE: A1

DATUM: AHD

PROPOSED OUTBOUND WEIGHBRIDGE TO BE INSTALLED ONCE FACILITY REACHES 100KTPA

PROPOSED WEIGHBRIDGE OFFICE (DEMOUNTABLE BUILDING)

WAITING AREA

TRAFFIC LIGHTS

BOOM GATE

BOOM GATE

TRAFFIC LIGHTS

PROPOSED INBOUND WEIGHBRIDGE

EXIT

EXIT

ADMIN OFFICE AND AMENITIES

1.2 m WIDE PEDESTRIAN PATH

EXIT

70mm HIGH CONCRETE ROLLOVER BUND INSIDE PERIMETER OF SHED TO CONTAIN FIRE FIGHTING WATER. 114 M^3 OF BUNDED STORAGE TO BE PROVIDED.

EXIT

ROLLER DOOR

APPROVED BUILDING UNDER DA 52541/2017 AND MODIFIED UNDER DA 52541/2017-2

AWNING

EXIT

ROLLER DOOR

WASH BAY

EXIT

ROLLER DOOR

EXIT

BOUNDARY

CONCRETE NOISE WALL

RETAINING WALL 02

PLAN
SCALE 1:200

DIAL BEFORE YOU DIG
www.1100.com.au

SCALE 1:200 (A1) SCALE 1:400 (A3)

REV	DATE	DESCRIPTION	BY	CKD
5	20/04/2020	REVISED FOR DA	AB	ML
4	7/04/2020	REVISED FOR DA	AB	ML
3	23/01/2020	REVISED FOR DA	GA	ML
2	20/01/2020	FOR DA	GA	ML

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PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
DETAILED SECONDARY PROCESSING BUILDING PLAN

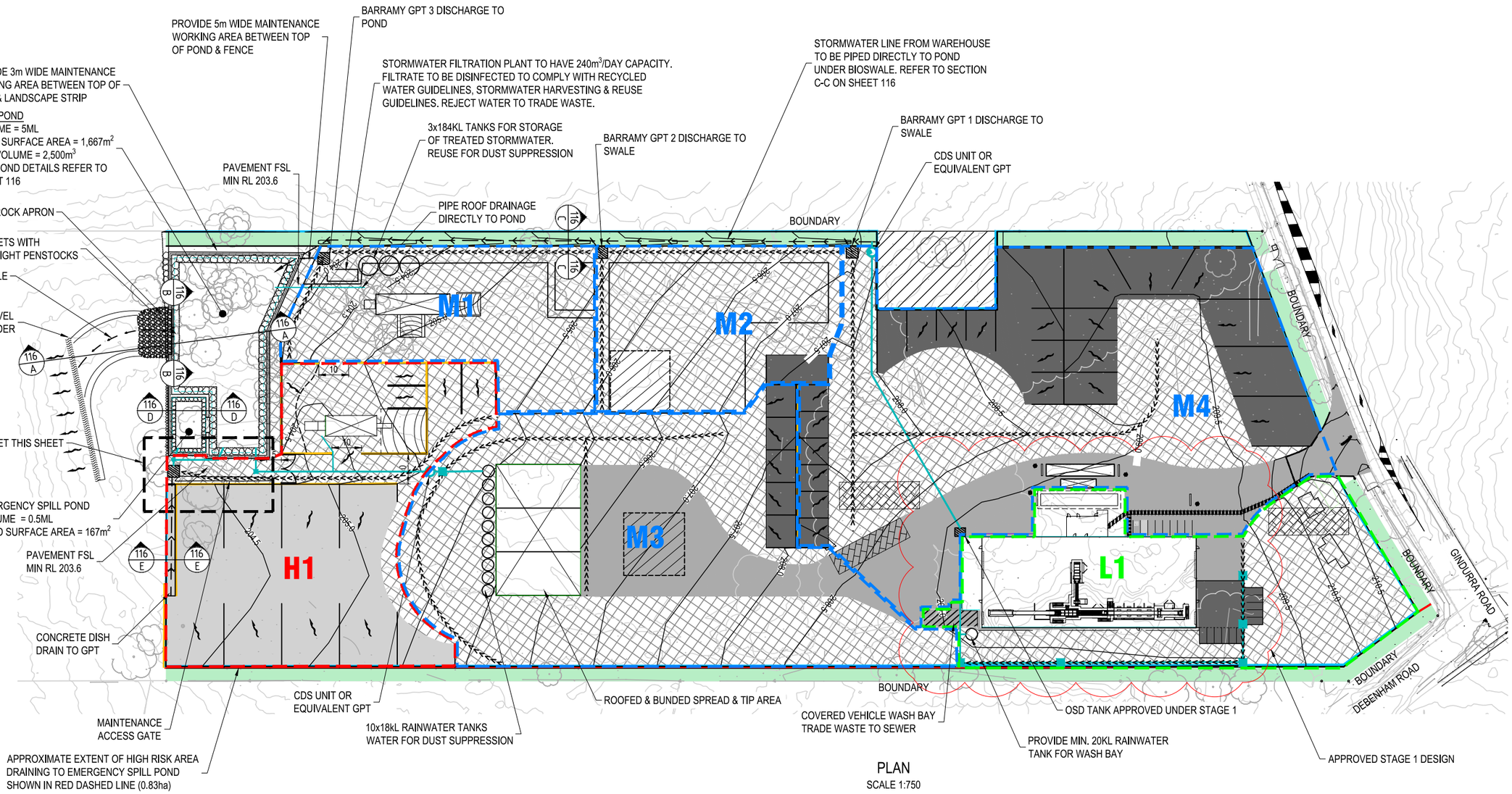
CLIENT: KARIONG SAND & SOIL SUPPLIES

JOB REF No: 197

DESIGNED: G. ABDULAHED
DRAWN: G. ABDULAHED
CHECKED: M. LIEBMAN

SHEET: 113
SHEET No: 7 OF 9
SCALE: 1:200
COORD. ORIGIN:

DATE: 20/04/2020
SIZE: A1
DATUM: AHD



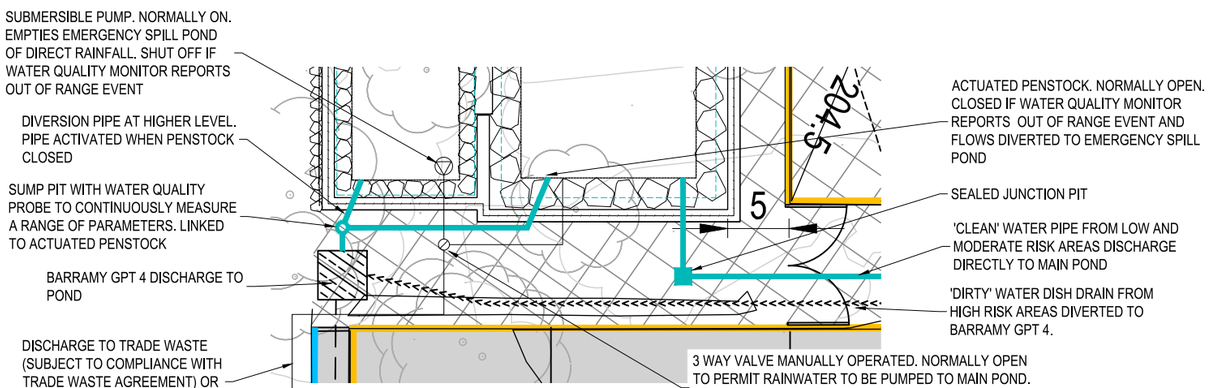
PLAN
SCALE 1:750

LEGEND

- DISH DRAIN
- 2m HIGH CHAIN WIRE FENCE WITH FAUNA FRIENDLY "FLOPPY TOP" AROUND POND
- DIRECTION OF FALL
- DESIGN CONTOURS (0.5m INTERVALS)
- RCP AT 1% MIN. GRADE
- BARRAMY GROSS POLUTANT TRAP (4 OFF)
- 1200 x1200 CLASS D GRATED PIT
- H1 APPROX EXTENT OF HIGH RISK AREAS
- M1 APPROX EXTENT OF MEDIUM RISK AREAS
- L1 APPROX EXTENT OF LOW RISK AREAS

NOTES:

1. ALL UNSEALED AREAS TO HAVE EITHER HDPE OR GCL LINER BELOW TO PROTECT GROUNDWATER



INSET
SCALE 1:250

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0 7,5 15 22,5 30 37,5 45 52,5 60
SCALE 1:750 (A1) SCALE 1:1500 (A3)

REV	DATE	DESCRIPTION	BY	CKD
5	10/12/2020	REVISED FOR DA - FTW REMOVED	AB	ML
4	07/04/2020	REVISED FOR DA	AB	ML
3	27/03/2020	REVISED FOR DA	GA	ML
2	20/01/2020	FOR DA	GA	ML

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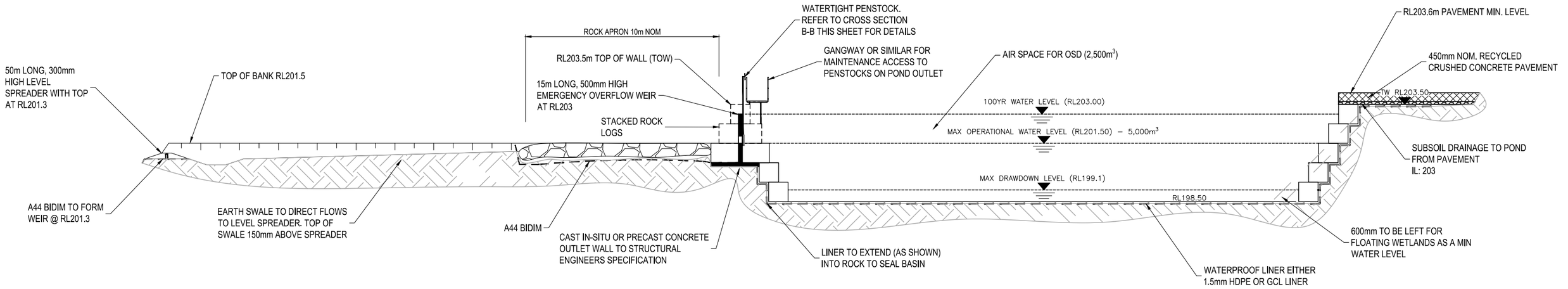
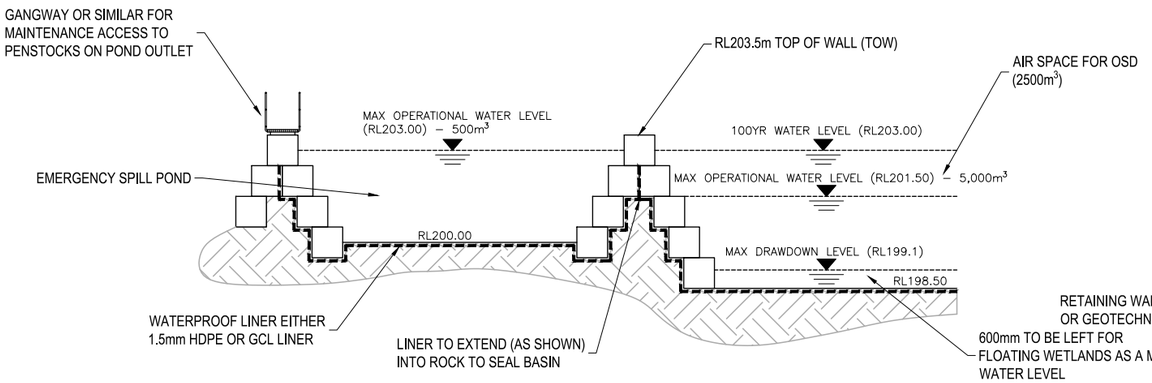
PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
STORMWATER PLAN
CLIENT: KARIONG SAND & SOIL SUPPLIES
JOB REF No: 197
DESIGNED: G. ABDULAHED
DRAWN: G. ABDULAHED
CHECKED: M. LIEBMAN
SHEET: 115
SHEET No: 8 OF 9
SCALE: AS SHOWN
DATUM: AHD
DATE: 10/12/2020
SIZE: A1
COORD. ORIGIN:



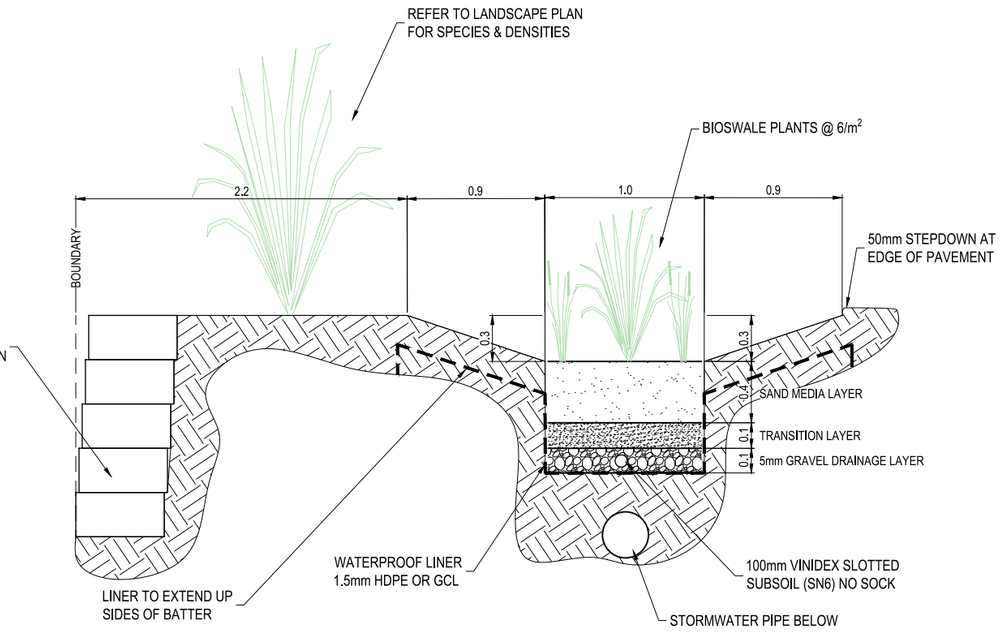
CROSS SECTION A-A THROUGH POND & WEIR

SCALE: NTS



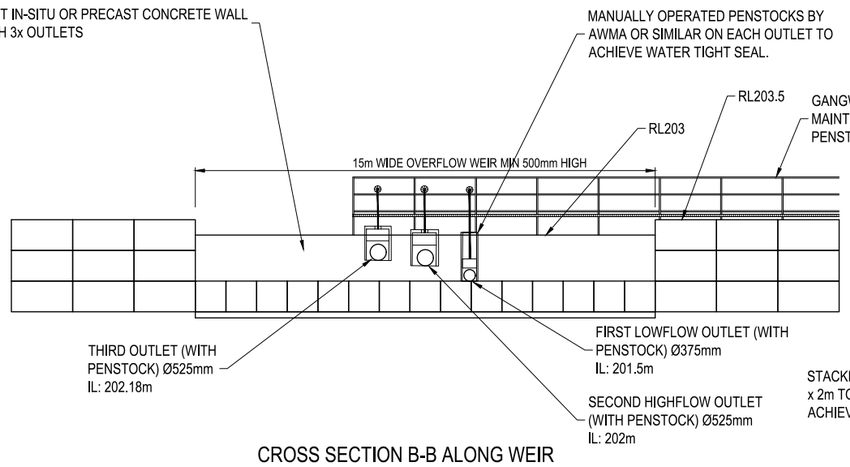
CROSS SECTION D-D THROUGH POND (NOT AT WEIR)

SCALE: NTS



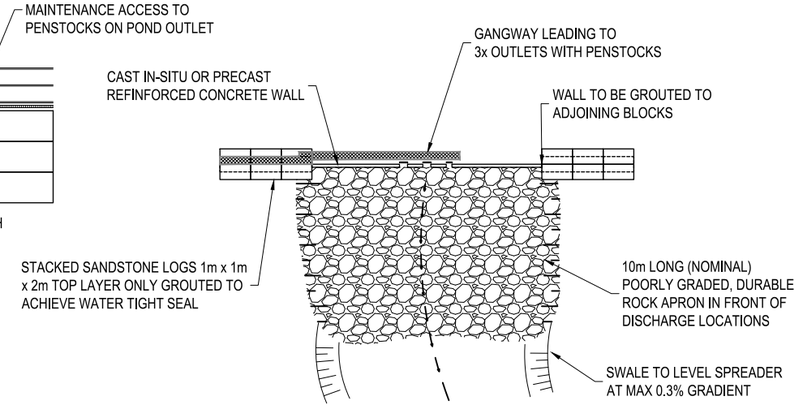
CROSS SECTION C-C THROUGH BIOSWALE

SCALE: NTS



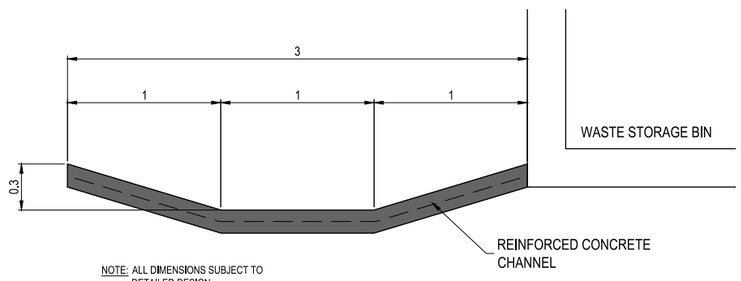
CROSS SECTION B-B ALONG WEIR

SCALE: NTS



WEIR PLAN DETAIL

SCALE: NTS



NOTE: ALL DIMENSIONS SUBJECT TO DETAILED DESIGN

CROSS SECTION E-E THROUGH CONCRETE DISH DRAIN

SCALE: NTS

NOTES:

1. WATERTIGHT PENSTOCKS TO BE FITTED TO EACH OUTLET
2. REFER TO OUTLET PLAN VIEW FOR MORE INFORMATION

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REV	DATE	DESCRIPTION	BY	CKD
4	07/04/2020	REVISED FOR DA	AB	ML
3	27/03/2020	REVISED FOR DA	AB	ML
2	20/01/2020	REVISED FOR DA	GA	ML
1	16/12/2019	FOR DA	GA	ML

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PROJECT: PROPOSED KARIONG SAND & SOIL SUPPLIES FACILITY - SSD8660
STORMWATER SECTIONS & DETAILS

CLIENT: KARIONG SAND & SOIL SUPPLIES
JOB REF No: 197

DESIGNED: G. ABDULAHED
DRAWN: G. ABDULAHED
CHECKED: M. LIEBMAN

SHEET: 116
SHEET No: 9 OF 9
SCALE:
COORD. ORIGIN:
DATE: 07/04/2020
SIZE: A1
DATUM: AHD