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Soil and Water Management Plan

for

21D & 21F Schools Drive, Tomago

for Jackson Environment and Planning Pty Ltd

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1. Introduction

Northrop Consulting Engineers have been engaged by Jackson Environment and Planning Pty Ltd to prepare a concept soil and water management plan for the redevelopment of a resource recovery facility and truck parking depot located at 21D (Lot 11 DP270328) & 21F (Lot 8 DP270328) School Drive, Tomago including a small portion of Lot 301 DP634536.

The purpose of this report is to summarise the proposed design solutions for the stormwater management as part of the Environmental Impact Statement for a development application submission to Department of Planning, Industry and Environment. We note the information contained in this report is not intended to present detailed design solutions, but rather provide solutions commensurate with a conceptual design suitable for Development Application Assessment. A summary of the SEARs requirements and the reference for where each item has been addressed can be found in Appendix C.

This report is to be read in conjunction with the Concept Engineering drawings NL201175_C1.1 to C5.1 prepared by Northrop Consulting Engineers.

1.1 Site Description

The site is located within the suburb of Tomago and is bound by an internal access road to the south, undeveloped land to the north and industrial development to the east and west. Figure 1 presents the subject site in its current state.

Figure 1 – Existing Site (Aerial image source https://maps.six.nsw.gov.au/)

Lot 11 (DP270328) is currently fully developed, with two large existing industrial buildings, concrete hardstand areas and carparking facility whilst Lot 8 DP270328 is currently undeveloped.

2. Proposed Stormwater Management Strategy

The proposed development will incorporate a number of devices and measures aimed at provided adequate and responsible management of stormwater runoff.

In accordance with Section B4 of PSC DCP 2014 the stormwater management strategy has considered the following items which will be discussed in the following sections of this report:

- Onsite Detention;
- Water Quality;
- Stormwater Harvesting;
- Drinking Water Catchment;
- Riparian Corridors;
- Sediment and Erosion Control.

Two different development scenarios were assessed when considering the detention and water quality reduction targets for the proposed development on 21F School Drive. The intent of development scenario 2 is to outline the stormwater detention and water quality treatment requirements to facilitate future expansion of the truck depot and hardstand areas.

- Development Scenario 1 – This scenario is representative of the current Development Application including a proposed hardstand area of approximately 3,100m^2 as shown in the concept civil engineering plans.
- Development Scenario 2 – Additional hardstand area of approximately 12,240m^2 (95% of site area).

The proposed stormwater system consists of a pit and pipe network with the hardstand area graded to fall towards surface inlet pits. The pits will be fitted with filter inserts to capture and remove gross pollutants, preventing them from entering the stormwater system. An oil absorbent pillow is also provided to capture and remove small amounts of oil or hydrocarbons that may be present in the runoff.

The stormwater is conveyed to the stormwater treatment chamber via a low flow bypass diversion pit which contain filter cartridges to remove fine sediment and nutrients including phosphorous and nitrogen. The high flow bypass will enable the system to provide the required treatment for minor storm events without affecting the hydraulic performance for the more extreme rainfall events.

The stormwater is conveyed to a below ground infiltration tank utilising void forming storage units (such as Atlantis Flo-cell or similar) wrapped in permeable geotextile allowing infiltration of stormwater into the natural soils at the base of the tank. The tank provides the required detention storage by utilising the volume of the storage tank and infiltration to limit site runoff to less than the pre-developed site.

During extreme rainfall events where the runoff exceeds the infiltration capacity of the tank, the stormwater will surcharge from the control pit and pond at the surface of the below ground tank. A 100mm high level spreader mound is proposed to enable the excess runoff to flow into the adjacent lot as sheet flow to mimic the natural flow regime of the pre-developed site.

The hardstand pavement is lined with an impermeable liner to prevent polluted stormwater or oil spills from infiltrating into the natural soils. The impermeable liner will fall towards the stormwater pits allowing for stormwater runoff to drain to the stormwater system for suitable water quality treatment via collection of subsoil lines around the perimeter of the stormwater pits.

2.1 Onsite Detention

2.1.1 Existing Development (21D School Drive, Tomago)

The existing facility located on 21D School Drive was previously used for wire and cable manufacturing. The site consists of an existing stormwater drainage network including detention and infiltration tanks and water quality treatment devices. Detailed design drawings and Stormwater Design Report were previously prepared by GHD in 2012. The report outlined that detention was provided by the below ground infiltration tanks to limit post-development peak flow to equivalent or less than the pre-developed peak flow for all storm events up to the 1% Annual Exceedance Probability (AEP).

As there are generally no changes proposed to the site on 21D the existing stormwater infrastructure was assessed to ensure the existing system complies with the current DCP requirements utilising new ARR2016 rainfall data and procedures. For the purpose of this assessment the access road and road drainage constructed as part of the original development have been excluded, as it is located outside of the lot boundary.

In accordance with Section B4.B of the PSC DCP 2014, onsite detention will be required to limit the post development flows from the proposed development to less than or equal to the pre-development flows for all storm events up to and including the 1% AEP storm event. Runoff from the existing development was modelled using the runoff routing software DRAINS incorporating the existing stormwater network and detention facilities from Works-As-Executed plans prepared by Bolte Civil (Dated 10/02/14).

An ILSAX hydrological model was developed in drains to generate runoff hydrographs for the predeveloped (greenfield) and post-developed site. ARR 2016 rainfall data obtained from the Bureau of Meteorology (BOM) was used to generate the design storms for all storm durations ranging from 5 to 270 minutes.

A summary of the parameters used for the model are shown below:

Impervious depression storage	= 1 mm
Pervious depression storage	= 5 mm
Soil type	= 1.5
Antecedent Moisture Condition	= 3

The time of concentration for the pre-developed site was calculated utilising the kinematic wave equation with the following parameters:

Flow path length	= 20 m
Flow path slope	= 0.01
Retardance coefficient (n*)	= 0.012 (bare sand)
Additional flow time	= 8.0 (mins)

The existing detention facilities utilised infiltration, however, no infiltration testing information is currently available for the site. Based on previous geotechnical investigations performed for nearby development, a high infiltration rate is anticipated for the soil profile. An infiltration rate of 100mm/hr was adopted for the purposes of the design; however, this will need to be confirmed via geotechnical testing prior to construction.

For the purpose of the assessment of the existing detention system a conservative infiltration rate of 25mm/hr was adopted, indicative of Soil Group A as outlined in the Soil Infiltration - Technical Information Sheet (Port Stephens Council, 2019).

A comparison between the pre-developed and post-development flows from the site for the critical storm duration for each of the design storm events, up to and including the 1% AEP is presented below in Table 1.

Table 1: Comparison of Pre-developed and Post-Developed Peak Flow Rates (21D School Dr)

AEP	Pre-Developed Peak Flow (m^3/s)	Post-Developed Peak Flow with 25mm/hr Infiltration (m^3/s)	Post-Developed Peak Flow with 100mm/hr Infiltration (m^3/s)
1%	1.37	1.44	1.35
2%	1.07	1.10	0.966
5%	0.746	0.616	0.540
10%	0.489	0.394	0.322
0.2EY*	0.223	0.231	0.205

*Note: 0.2EY is equivalent to the 5-year average recurrence interval.

The onsite detention modelled reduces the peak post-developed flow to predeveloped levels or less for the 10% and 5% AEP storm events, however, this criteria is not met for the 1%, 2% and 0.2EY events. This is likely a result of adopting a low infiltration rate for the detention tanks (25mm/hr) as well as for a soil type of 1.5 in the hydraulic modelling.

It is expected that the infiltration rate onsite will be higher than the 25mm/hr adopted for the purposes of the assessment. As such, a sensitivity analysis was performed with a higher infiltration rate of 100mm/hr. The results have been included in Table 1. It is observed that with an infiltration rate of 100mm/hr, the post-developed peak flows are reduced to less than the pre-developed peak flows for all storm events.

Infiltration testing will be required for the proposed development on site 21F, in accordance with Port Stephens Council specifications post approval.

If subsequent infiltration testing does not achieve the required 100mm/hr, then the adopted soil type (type 1.5) for the hydrological model is also not reflective of the site conditions and should be revised to better reflect the existing site conditions. A soil with an infiltration rate of less than 100mm/hr is more indicative of soil type 2.0. Table 2 presents a comparison of the peak flows for an infiltration rate of 25mm/hr and soil type 2.0.

Table 2: Comparison of Pre-developed and Post-Developed Peak Flow Rates with revised hydrologic parameters (21D School Dr)

AEP	Pre-Developed Peak Flow[1] (m^3/s)	Post-Developed Peak Flow with 25mm/hr Infiltration (m^3/s)
1%	1.45	1.44
2%	1.15	1.10
5%	0.824	0.616
10%	0.586	0.394
0.2EY*	0.327	0.231

1 – Pre-developed peak flow calculated with Soil Type 2

*Note: 0.2EY is equivalent to the 5-year average recurrence interval.

As shown by Table 2, the provided detention under this scenario will reduce the peak flows for the post-developed site to predeveloped levels for all storm events and durations modelled.

Based on the above analysis and modelling, adequate detention is provided by the existing below ground infiltration tanks in both scenarios considered in line with Council guidelines. Infiltration testing will be required post approval to confirm the final site specific conditions.

All DRAINS models used as part of the above analysis can be provided upon request.

2.1.2 New Development (21F School Drive, Tomago)

The proposed development (development scenario 1) for the adjacent site on 21F School Drive includes a new truck parking depot with approximately 3,150m^2 of hardstand concrete pavement.

An ILSAX hydrological model was developed in drains to generate runoff hydrographs similar to the process outlined in Section 2.1.1. The time of concentration for the pre-developed site was calculated utilising the kinematic wave equation with the following parameters:

Flow path length	= 50 m
Flow path slope	= 0.01
Retardance coefficient (n*)	= 0.012 (bare sand)
Additional flow time	= 2.0 (mins)

It is proposed that detention is provided by a below ground infiltration tank with a total volume of 100m^3 similar to the existing systems utilised on the adjacent site. Infiltration was included in the hydraulic analysis, with an assumed infiltration rate of 100mm/hr provided over a surface area of 120m^2.

A comparison between the pre-developed and post-development flows from the site for the critical storm duration for each of the design storm events, up to and including the 1% AEP is presented below in Table 3.

Table 3: Comparison of Pre-Developed and Post-Developed Peak Flow Rates (21F School Dr) Development Scenario 1

AEP	Pre-Developed Peak Flow (m^3/s)	Post-Developed Peak Flow (m^3/s)
1%	0.750	0.632
2%	0.589	0.504
5%	0.433	0.327
10%	0.296	0.223
0.2EY*	0.168	0.135

*Note: 0.2EY is equivalent to the 5-year average recurrence interval.

Development scenario 2 was also assessed, which included a below ground infiltration tank with a total volume of 385m^3 and an infiltration surface area of 450m^2. A comparison between the pre-developed and post-development flows from the site for the critical storm duration for each of the design storm events, up to and including the 1% AEP is presented below in Table 4.

Table 4: Comparison of Pre-Developed and Post-Developed Peak Flow Rates (21F School Dr) Development Scenario 2

AEP	Pre-Developed Peak Flow (m^3/s)	Post-Developed Peak Flow (m^3/s)
1%	0.750	0.549
2%	0.589	0.405
5%	0.433	0.332
10%	0.296	0.210
0.2EY*	0.168	0.136

*Note: 0.2EY is equivalent to the 5-year average recurrence interval.

It can be observed from Tables 3 and 4 that the proposed combined infiltration and detention tank will limit the post-developed peak flow to less than or equal to the pre-developed peak flow for all storm events. The assumed infiltration rate of 100mm/hr will be confirmed prior to construction.

The DRAINS model can be provided upon request.

2.2 Water Quality

In order to minimise any adverse impacts upon the ecology of downstream watercourses, stormwater treatment devices have been incorporated into the design of the redevelopment. The adopted nutrient and pollution targets were taken from Port Stephens Council DCP guidelines Schedule E1 and are presented in Table 5.

Table 5: Required Water Nutrient and Pollution Reductions

Pollutant Criteria	Required Reduction Target (%)
Total Suspended Solids (TSS)	90
Total Phosphorous (TP)	60
Total Nitrogen (TN)	45
Gross Pollutants	90

2.2.1 Existing Development (21D School Drive, Tomago)

The existing stormwater treatment system constructed on 21D School Drive consists of rainwater tanks, below ground infiltration tanks and secondary and tertiary proprietary treatment devices. Two separate water quality treatment trains have been provided, which both containing the following:

- **Humeceptor STC-5** – This system utilises hydrodynamic and gravitational separation to effectively remove total suspended solids and entrained hydrocarbons from runoff.
- **Humes Jellyfish HF-1800** – This system utilises filtration membrane to remove floatables, litter, oil, debris, total suspended solids, silt sized particles and a high percentage of particulate-bound pollutants including phosphorous, nitrogen, metals and hydrocarbon.

The performance of the existing treatment train on site was assessed against the reduction targets using the conceptual design software MUSIC (Version 6). The MUSIC model was developed using parameters recommended in the document “NSW MUSIC Modelling Guidelines” (WBM, 2015) and the Port Stephens Council MUSIC Link (Default Catchment Sandy Soils).

A schematic of the MUSIC model is provided in Figure 2.

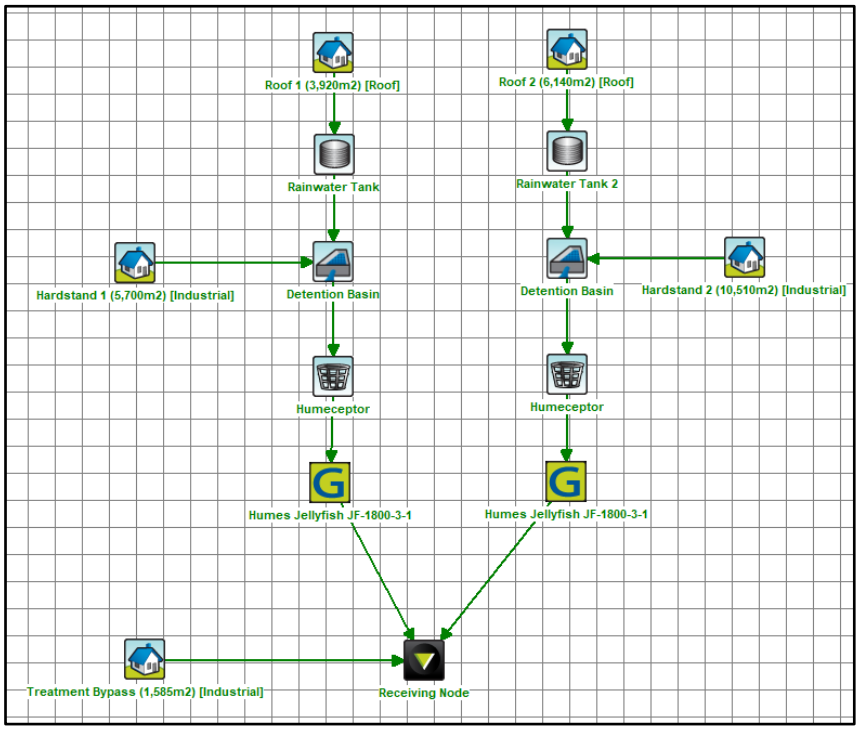


Figure 2 – MUSIC Model Schematic (Existing Development, 21D School Dr)

Source nodes have been adopted from the NSW MUSIC Modelling Guideline (BMT, WBM, 2015). Proprietary treatment nodes have been adopted from Ocean Protect. The MUSIC modelling results for the above-mentioned treatment strategy are shown in Table 5.

The existing development and treatment train was analysed and the results are shown in Tables 6.

Table 6: MUSIC Modelling Results – Existing Development (21D School Drive)

Pollutant Criteria	Reduction Target (%)	Sources (kg/yr)	Residual Load (kg/yr)	Achieved Reduction (%)
Total Suspended Solids (TSS)	90	3340	301	91.0
Total Phosphorous (TP)	60	6.5	1.12	82.7
Total Nitrogen (TN)	45	58.8	16.4	72.1
Gross Pollutants	90	695	38.1	94.5

Note: The MUSIC model can be provided to Council upon request.

Table 6 shows that the proposed stormwater quality management strategy will achieve the required load reduction targets. The Music Link Report can be found in Appendix B.

A maintenance and operation plan will be implemented to ensure the ongoing performance of the system and existing treatment devices are maintained.

A proprietary blind bunding will be installed around the proposed refuelling location, with a canopy to protect the area from stormwater runoff. Emergency procedures will be developed as part of the operation plan for the development that will adequately address the required containment and rectification procedures in the event of a spill occurring.

2.2.2 New Development (21F School Drive, Tomago)

The truck parking depot is intended only for temporary or long-term parking for trucks used in the waste recovery processes. The waste recovery operations and waste storage areas are located inside the existing buildings located on 21D School Drive. No waste materials or waste storage is proposed for the truck depot area.

The expected pollution generation will be that of an unsealed road as outlined in the MUSIC Modelling guidelines and generally include;

- Suspended solids;
- Small amounts of phosphorous
- Small amounts of nitrogen
- Gross pollutants
- Trace amounts of oil and hydrocarbons.

The performance of the proposed stormwater management strategy for the new development was assessed against the reduction targets using the conceptual design software MUSIC (Version 6). The MUSIC model was developed using parameters recommended in the document “NSW MUSIC Modelling Guidelines” (WBM, 2015) and the Port Stephens Council MUSIC Link (Default Catchment Sandy Soils).

A schematic of the MUSIC model is provided in Figure 3 and presents both development scenarios in the one model.

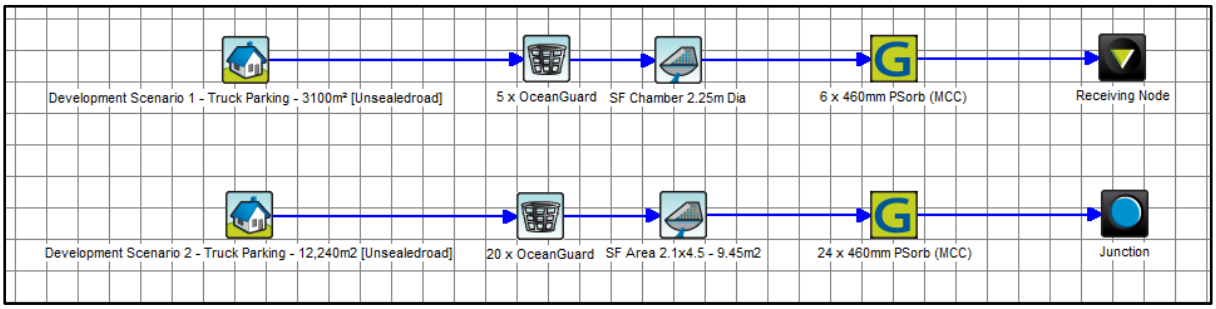


Figure 3 – MUSIC Model Schematic (Proposed Development, 21F School Dr)

A number of factors were identified in order to select the most appropriate stormwater quality improvement devices (SQIDs). In addition to the practical constraints, maintenance, operability and aesthetics were considered.

The proposed treatment train incorporates:

- Primary treatment via proprietary pit filter inserts, (OceanGuard or approved equivalent) with additional oil absorbent pillows.
- Secondary & tertiary treatment via proprietary filter cartridges (Ocean Protect Psorb filter or approved equivalent).

The following is a summary of the water quality treatment devices that have been utilised in the proposed treatment train.

- **OceanGuard Pit Filter Insert** – Runoff captured by the concrete hardstand will pass through a filter insert that will aid in the capture of gross pollutants, sediment, litter and oils. An oil absorbent pillow will also be installed as part of the filter insert, which will assist in the capture of small amounts of hydrocarbons or oils that would otherwise enter the stormwater system.
- **Ocean Protect Psorb Filter Cartridges** – Proprietary filter cartridges will filter stormwater runoff capturing and removing fine sediment, as well as nutrients including phosphorous and nitrogen.

The proposed pavement design will utilise a bound granular road base material (or recycled cementitious aggregate) which will be overlaid on a layer of compacted granular subbase material. A layer of impermeable geotextile will be installed between the sub-base and compacted subgrade material to prevent the infiltration of stormwater prior to treatment.

In the event of a significant leak or oil spill, the kerb will act as bunding, with an emergency isolation valve installed as part of the stormwater system to prevent ingress into the infiltration system. The impermeable membrane will provide protection to the groundwater, allowing the affected pavement area to be locally remediated as required.

Source nodes have been adopted from the NSW MUSIC Modelling Guideline (BMT, WBM, 2015). Proprietary treatment nodes have been adopted from Ocean Protect. The MUSIC modelling results for the above-mentioned treatment strategy are shown in Table 5.

Both development scenarios were analysed with the proposed treatment train strategy and the results are shown in Tables 7 and 8.

Table 7: MUSIC Modelling Results – Development Scenario 1

Pollutant Criteria	Reduction Target (%)	Sources (kg/yr)	Residual Load (kg/yr)	Achieved Reduction (%)
Total Suspended Solids (TSS)	90	4120	297	92.8
Total Phosphorous (TP)	60	1.87	0.65	65.2
Total Nitrogen (TN)	45	7.58	4.05	46.5
Gross Pollutants	90	4.76	0	100

Note: The MUSIC model can be provided to Council upon request.

Table 8: MUSIC Modelling Results – Development Scenario 2

Pollutant Criteria	Reduction Target (%)	Sources (kg/yr)	Residual Load (kg/yr)	Achieved Reduction (%)
Total Suspended Solids (TSS)	90	16200	1210	92.5
Total Phosphorous (TP)	60	7.32	2.63	64.1
Total Nitrogen (TN)	45	30.1	16.4	45.6
Gross Pollutants	90	326	0	100

Note: The MUSIC model can be provided to Council upon request.

Tables 7 and 8 shows that the proposed stormwater quality management strategy will achieve the required load reduction targets. The Music Link Report can be found in Appendix B.

2.3 Stormwater Harvesting & Site Water Balance

The existing development contains two 100kL rainwater reuse tanks which are fed by the roofs of the two main buildings. The catchment area for the roof draining to each rainwater tank was estimated using the design drawings prepared by GHD dated (13/07/12).

A water balance assessment was performed utilising a MUSIC model with the Port Stephens Council MUSIC link rainfall data. A range of daily reuse demands were input into the model to determine the percentage of reuse demand supplied by the rainwater tanks for the proposed new use of the facility. For the purposes of the water balance assessment it was assumed that Tank 1 has a contributing roof catchment of 3,365m^2 and tank 2 has a catchment area of 5,500m^2.

Table 9 presents the reuse efficiency for a range of reuse demands for each of the rainwater tanks.

Table 9: Reuse Demand Efficiency

Reuse Demand (kL per tank)	Tank 1 Percent Demand Met (%)	Tank 2 Percent Demand Met (%)
1.0	**100**	**100**
2.25	97.6	98.0
4.5	82.4	87.9
6.0	71.9	79.6
9.0	55.1	65.2
15.0	37.4	46.8
30.0	20.9	27.1

Note: The MUSIC model can be provided to Council upon request.

Processing of materials as part of the proposed development will utilise a closed loop with regard to the use, capture and potential reuse of process water. As such, it is expected that the reuse tanks are to typically supply the water demand for toilet flushing. It is assumed that the toilet flushing system is already setup and plumbed onsite.

The following presents a break down of the estimated reuse demands.

- **Toilet Flushing** = 76 (no. of employees) * 80% (onsite per day) * 30L/person/Day = 1.82kL/Day

The total reuse demand is estimated to be approximately 1.82kL/day. It is observed in Table 5 that the expected reuse demand for the site will be supplied entirely by the reuse tanks without the need for additional top-up from the potable water supply. There is potential for the captured roof water to be reused for alternative water demands including irrigation or hardstand washdown that may be considered.

The reuse demand and supply are assumed to be proportionally distributed between the two reuse tanks to ensure the efficiency of the reuse supply is maintained. An alternative would be to implement a smart reuse supply system which appropriately balances the reuse supply from both reuse tanks.

Figure 4 presents an overview of the site water balance for the proposed development. Expected potable water demands have not been provided, and as such, an estimate was adopted based on typical water demands for industrial developments with regard to bathroom and kitchenette use. An additional 2kL per day was estimated for the potable water demand, in additional to the toilet flushing supplied by the reuse.

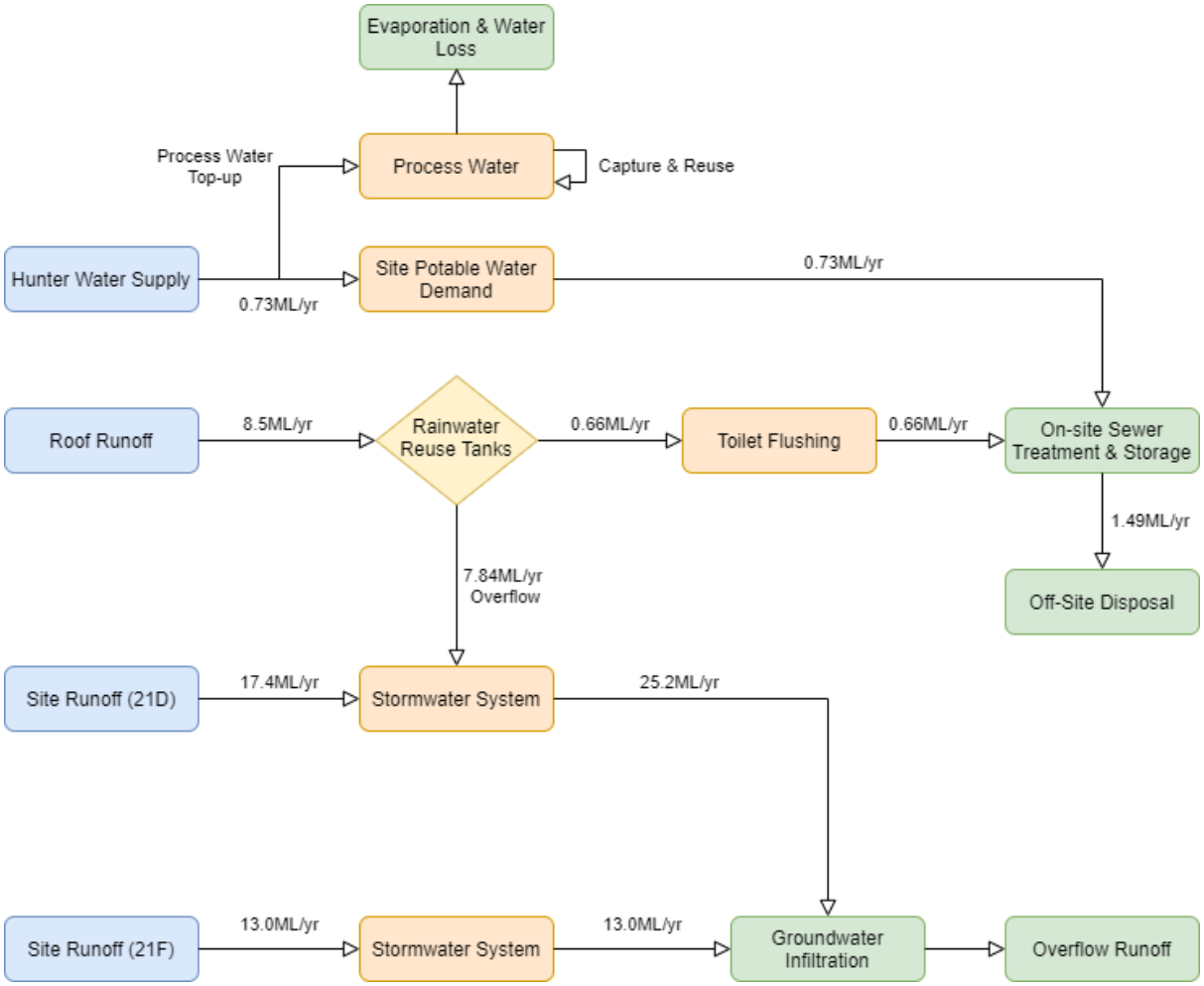


Figure 4 – Water Balance

Small amounts of potable water will be required to periodically top up the process waste recovery systems, however as these processes utilise a closed loop system for the capture, use and reuse of process water, this demand was deemed negligible.

It is anticipated that the existing 150mm Hunter Water main will provide sufficient potable water supply to meet the demands on site, including the requirement to maintain an instantaneous flow of 20L/s for fire fighting purposes. A detailed Hydraulic assessment will be provided to Hunter Water Corporation post approval.

2.4 Drinking Water Catchment

A review of Hunter Waters Guidelines has identified that the subject site is not located in a drinking water catchment. Figure 5 presents the defined catchment extents for the Tomago Sandbeds including the access restrictions as defined by Hunter Water. The subject site is not within the defined catchment extent and is located approximately 650m from the nearest border.

A number of measures have been implemented as part of the development to ensure contaminated water does not reach the groundwater catchment. The waste and recovery processing is performed indoors in a protected environment that will prevent any potential pollutants from entering the stormwater system. Other pollutants typically generated in runoff from industrial developments will be treated via proprietary water quality treatment devices prior to discharging from the site.

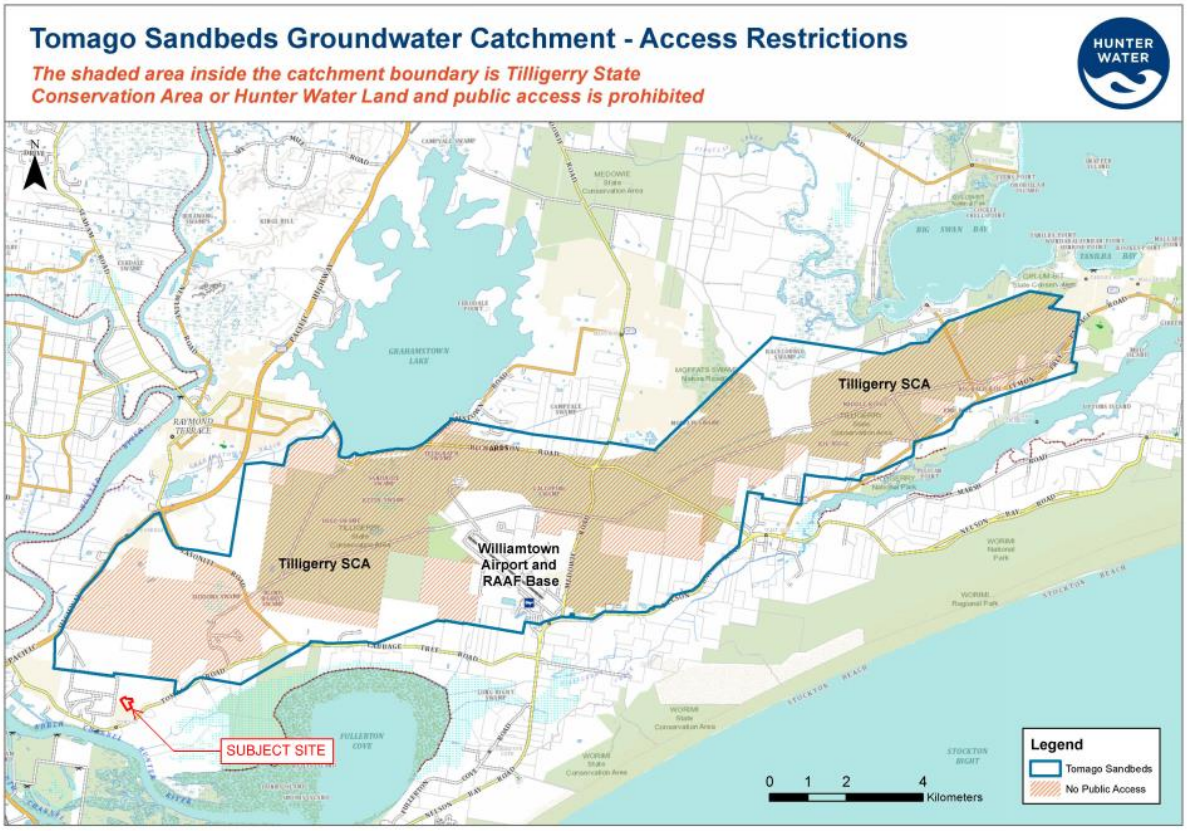


Figure 5 – Tomago Sandbeds Ground Water Catchment (https://www.hunterwater.com.au/our-water/water-supply/dams-and-catchments/public-access).

Further information on groundwater contamination is presented in Section 4.4.

2.5 Riparian Corridor

A review of information available from Council and via Six Maps indicate that the subject site is not located in the vicinity of a riparian corridor. This was confirmed via subsequent visits to site. Figure 6 presents a topographic view of the site and surrounding areas showing the proximity to the nearest riparian watercourse located in the south east on the opposite side of Tomago Road.

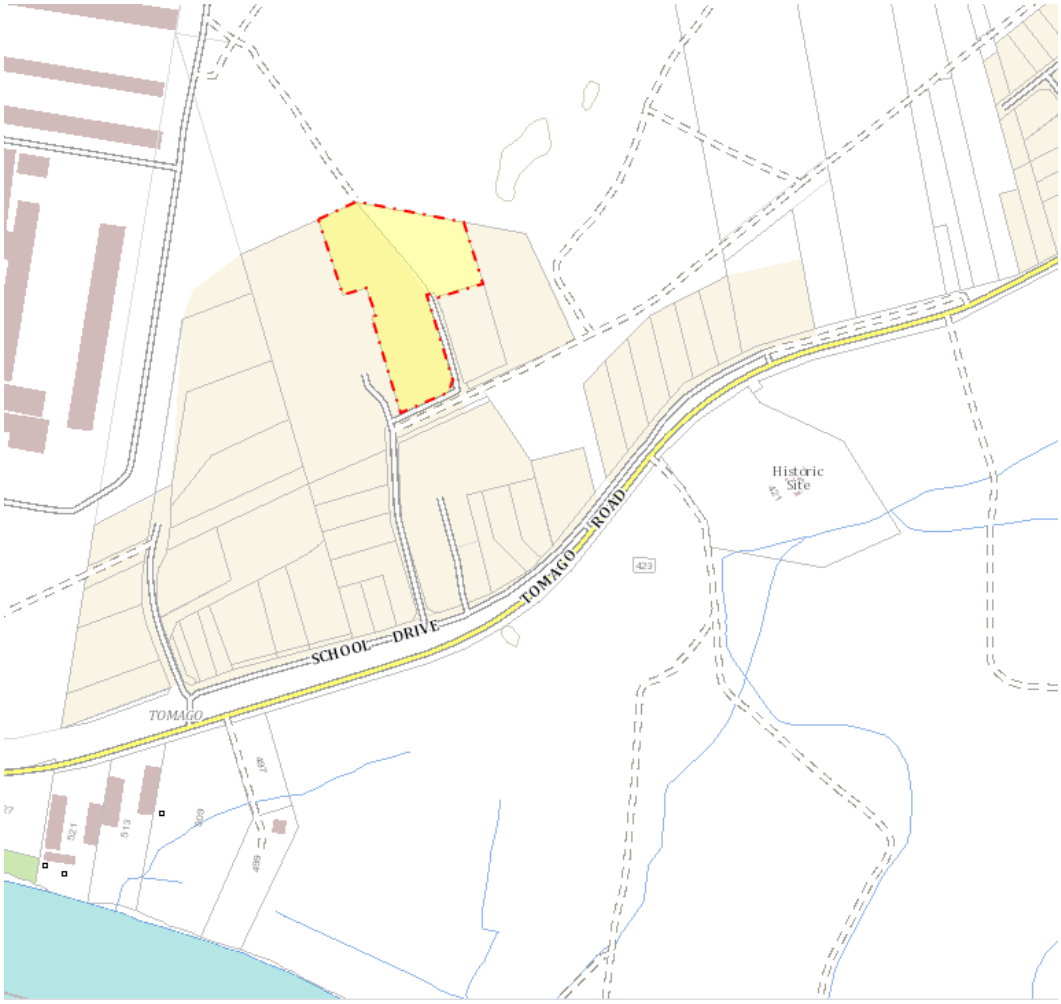


Figure 6 – NSW Maps (obtained from https://maps.six.nsw.gov.au/)

2.6 Sediment and Erosion Control

Temporary measures to minimise the soil erosion or migration of sedimentation during construction are presented in the concept sediment and erosion plan as found in Appendix A. The measures will form part of the Construction Environmental Management Plan and includes measure generally in accordance with Managing Urban Stormwater, Soil and Construction Volume 1 (Landcom, 2004); including;

- Minimisation of disturbed areas
- Temporary catch and diversion to divert upstream runoff around disturbed areas.
- Direct sediment laden runoff through sediment traps or filters to minimise discharge of pollutants downstream.
- Locate material stockpiles clear of drainage areas and install suitable erosion protection or stabilisation measures for long term stockpiles (more than 10 days).
- Place sediment fences downstream of work areas to capture sediment and minimise sediment discharge.
- Appropriate storage of construction materials on site as to prevent leaching, leaking or other transfer of material into groundwater or onto land.

3. Flooding Assessment

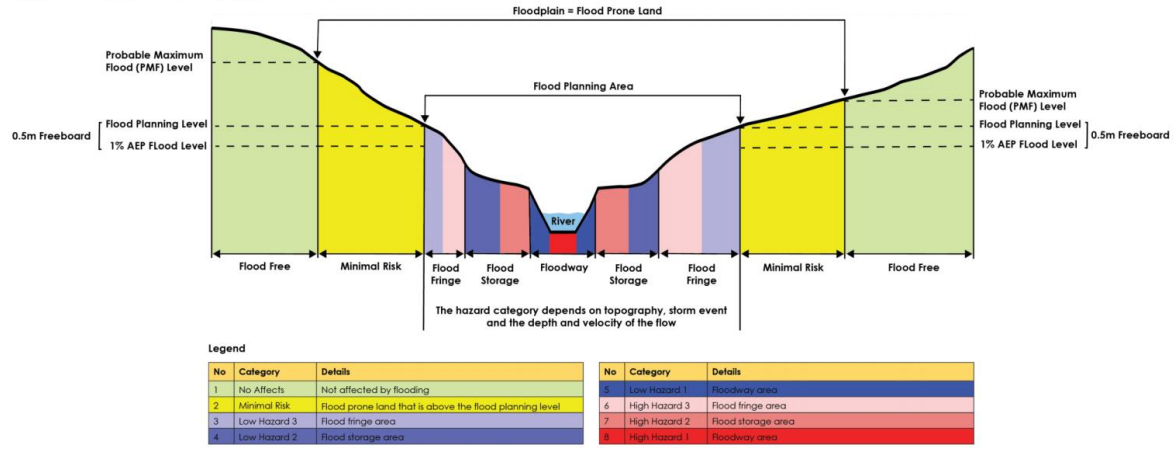
3.1 Flood Hazard Classification

In accordance with Chapter B5 of the PSC DCP, the flood hazard for a proposed development is to include consideration of the following:

- Depth of inundation
- Flow velocity
- Warning time
- Evacuation requirements
- Access restrictions during flood

The development is required to be compatible with the flood hazard categories illustrated by Figure BI in the PSC DCP, presented below in Figure 7.

Figure BI: ***Flood Hazard*** Categories, Cross-Section



No	Category	Details
1	No Affects	Not affected by flooding
2	Minimal Risk	Flood prone land that is above the flood planning level
3	Low Hazard 3	Flood fringe area
4	Low Hazard 2	Flood storage area

No	Category	Details
5	Low Hazard 1	Floodway area
6	High Hazard 3	Flood fringe area
7	High Hazard 2	Flood storage area
8	High Hazard 1	Floodway area

Note: Land but where a ***flood study*** has not been carried out to determine the ***flood hazard*** will be treated as being located within High Hazard 2 – Storage.

Figure 7 – Flood Hazard Categories (Figure BI – PSC DCP Section B)

A Flood Certificate has been obtained from Port Stephens Council for the subject site and can be found in Appendix B. The site has been identified to be located in a flood prone area, however, is not a 'flood control lot' for the purposes of the State Environmental Planning Policy 2008. A Flood Planning Level (FPL) is not applicable for the subject site with the Probable Maximum Flood (PMF) level listed as 6.3m AHD.

The highest Hazard Category has been identified as 'Minimal Risk Flood Prone Land'. The flood hazard classification for the subject lots are shown in Figure 8.

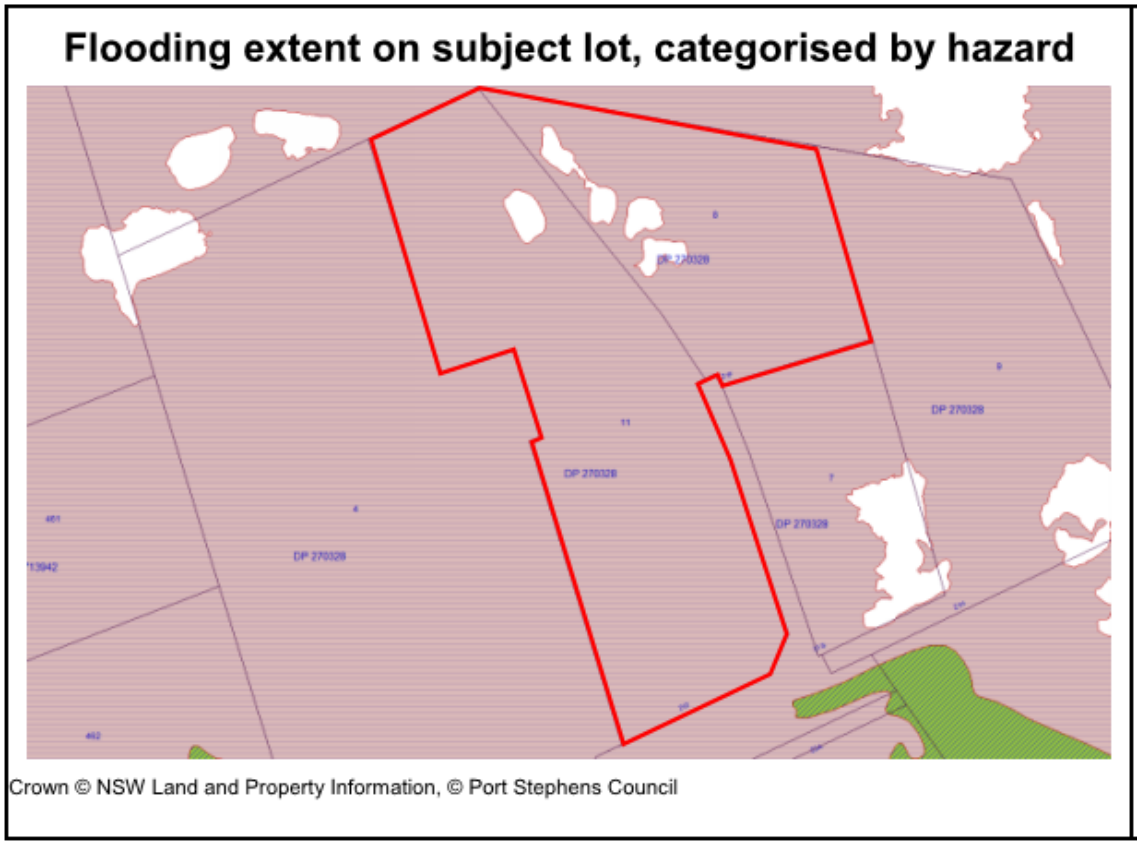


Figure 8 – Flood Hazard Category

Table 10 summarises the applicable flooding controls and requirements in accordance with Section B5 of the PSC DCP.

Table 10: DCP Flooding Requirements

DCP Requirement		Applicable to Proposed Development	Comments
B5.1	Flood Hazard	✓	Minimal Risk Flood Prone Land
B5.2	Flood Hazard Determination	✓	Refer to Flood Certificate
B5.3	All Hazard Categories	×	Non-residential development
B5.4	All Hazard Categories	×	No proposed on-going flood adaptation
B5.5	All Hazard Categories	✓	Refer to Section 3.2
B5.6	Minimal Risk	✓	Development is not emergency response and recover facility or vulnerable development
B5.7	Low Hazard 1 - Floodway	×	Not Applicable
B5.8	Low Hazard 2 - Storage	×	Not Applicable
B5.9	Low Hazard 3 - Fringe	×	Not Applicable
B5.10	High Hazard Categories	×	Not Applicable
B5.11	High Hazard 1 - Floodway	×	Not Applicable
B5.12	High Hazard 2 - Storage	×	Not Applicable
B5.13	High Hazard 3 - Fringe	×	Not Applicable

In accordance with B5.6 of the PSC DCP (2014) the development is located within the minimal risk flood hazard category, which applies to critical emergency response and recovery facilities or vulnerable development types such as aged care and childcare facilities. The subject development does not fall within these classifications.

In accordance with the DCP, a detailed flood study is not required for developments located outside the 1% AEP flood extents. As the site is only impacted by events greater than the 1% AEP, a detailed flood impact model has not been developed, however a qualitative assessment was still undertaken.

3.2 Flooding Requirements

The proposed industrial development does not include any habitable rooms, and thus is not required to meet the requirements for a habitable room as outlined in Section B5.5 of the PSC DCP. As previously identified, a Flood Planning level (FPL) is not applicable to the site development thus negating the need for electrical fixtures to be located above the FPL for non-habitable rooms.

A storage area is provided by the second storey of the existing buildings that will enable the storage of goods above the PMF flood level.

The proposed truck depot will require fill to construct the pavement to the finished design levels. This will raise the surface levels locally by approximately 100-500mm. It is our opinion that for the minor degree of filling required, the proposed development will not substantially impede the flow of floodwater and will not contribute to significant flooding or ponding of water on adjacent properties.

The 5% AEP flood level is not applicable for this site and as such the finished surface level for the truck depot has been deemed acceptable.

4. Soils and Contamination

An Environmental Assessment (GHD, 2012) has previously been prepared by GHD for the subject site, which included a geotechnical investigation. The following sections present a summary from the findings of the assessment.

4.1 Soil Landscape

The Newcastle Soil Landscape Series identifies the site to be located within disturbed terrain, surrounded by Tea Gardens landscape variant 'A', comprising Pleistocene sand sheets with wet health forest. The subject site has previously been subject to sand mining to a depth of approximately 4 to 6m. Affected areas have 1 to 2m of compacted sand fill near the surface, underlain by loose silty sand fill material.

4.2 Acid Sulphate Soils

The 1:250000 Acid Sulphate Soils (ASS) risk map for Beresfield as published by DLWC in 1997 identified the site as a low probability of occurrence of acid sulphate soil materials within the soil profile. The Acid Sulphate soil planning Map 2004 as published by Port Stephens Council identifies the site as Class 4.

4.3 Contamination

A detailed contamination assessment was performed by JM Environments (dated 10/09/20) for the existing development and the vacant lot (21D & 21F School Drive) and the findings are summarised in this section.

The site had been previously been used for sand mining and steel and aluminium manufacturing. The existing site (21D School Drive) soil material was assessed as meeting the criteria for excavated natural material, and for commercial/industrial land use. Hydrocarbon contamination was not detected in samples collected from adjacent to the hydrocarbon trench indicating that significant contamination of soils in the area had not been caused by leaks from the trench.

Elevated zinc and copper concentrations were observed in the eastern part of the site (21F School Drive). Elevated cadmium, arsenic and lead concentrations were also observed in material on the surface in the northeast corner of the site.

Based on the assessment, it was concluded that the site (21F School Drive) had been impacted by contamination comprising heavy metals at concentrations exceeding guidelines values for commercial/industrial land use. A site remediation plan has been prepared by JM Environments which details the requirements and processes to meet the environmental requirements for commercial/industrial land use.

4.4 Ground Water

A previous assessment for the groundwater was undertaken by GHD and outlined in the Site Water and Groundwater Assessment (GHD, 2012) for the existing development (21D School Drive). The report detailed investigations into the potential of groundwater contamination, groundwater characteristics for the site as well as an assessment on the potential impacts to Groundwater Dependant Ecosystems.

The GHD findings concluded that there were no significant ground water issues identified.

Additional groundwater assessment was undertaken by JM Environments as part of their Remedial Action Plan (dated 29/10/20). EHO Consulting performed an Environmental Site Assessment for lots 21F & 21G School Drive, Tomago. The objective of the assessment was to determine potential risks to sensitive receptors from the Contaminate of Concern (COCs) in groundwater.

The assessment recorded the presence of chromium, copper and zinc in concentrations exceeding the adopted site acceptance criteria and exceeding background concentrations. It concluded that given the proposed redevelopment will involve the site surface being cleared of vegetation and covered with a low-permeability cap, the risk associated with exposure to contaminated groundwater to on-site ecological receptors to be negligible, and to off-site receptors to be low.

5. Sewer

The site is currently serviced by an Envirocycle M23 on-site sewer treatment system. AWTS Maintenance Services Pty Ltd performed a condition assessment of the existing sewer and advised that the system was found to be in reasonable condition and provided recommendations to replace or repair broken or failed components.

The system has a treatment capacity of 4.5-5kL/day with a 1L/s peak treatment rate. Treated water is then stored onsite in a separate holding tank and periodically taken offsite via a pump-out truck. No onsite disposal methods are currently utilised for the existing development, and there are no proposals to utilise onsite disposal for the proposed development.

The proposed development is anticipated to employ a total of 76 employees. The expected sewer demands for the development are estimated to be less than or equivalent to the previous site use, which employed a total of 119 employees. The existing sewer system is deemed to have sufficient capacity for the expected sewer loads for the proposed development.

Should it be observed that the system is undersized, there are a number of options to augment the existing system. This can be achieved by providing additional onsite storage tanks for the temporary storage of pre and post treatment water, or by increasing the frequency of which the treated sewage is removed from site.

6. Conclusion

The proposed stormwater management design presented has been prepared to comply with Port Stephens Council's DCP (2014) as well as industry best practice. The design philosophy is based on the principle of at source treatment, to reduce conveyance infrastructure to manage water quantity and quality aspects.

The outcomes of the preliminary stormwater management strategy indicate that detention measures can be adopted to attenuate post developed flows to pre-developed rates. In addition to this, through the adoption of WSUD principals, the water quality reduction targets can be achieved.

Based on the above, our investigation and concept design indicate the proposed development can adequately manage and address all items surrounding stormwater runoff, and soil and water management. Should you have any queries, please feel free to contact the undersigned.

Prepared:

Robert Suckling
Civil Engineer
BE Civil (Hons 1), MIE Aust

Reviewed:

Ben Clark
Principal | Civil Engineer
BEng (Civil), MIE Aust, CPEng, NER, RPEQ

7. References

Tomago Rod and Conductor Manufacturing Project - Site Water and Groundwater Assessment. GHD (Februrary 2012).

Tomago Aluminium Rod and Conductor Manufacturing Facility – Environmental Assessment – Volume 1. GHD (February 2012).

Tomago Road Wire and Conductor Facility – Stormwater Design Report. GHD (November, 2012).

Tomago Rod and Conductor Facility – Drainage Detail Plan (Ref No: 22-15280). GHD (13.07.12)

Port Stephens Development Control Plan 2014 (DCP) – Port Stephens Council

Soil Infiltration – Technical Information Sheet – Port Stephens Council (2019)

New South Wales MUSIC Modelling Guidelines, August BMT WBM Pty Ltd, (2015)

Managing Urban Stormwater, Soils and Construction - Volume 1 Landcom 4th Edition 2004.

Detailed Contamination Assessment – 21D and 21F School Drive, Tomago JM Environments (September 2020).

Remedial Action Plan – 21D and 21F School Drive, Tomago JME Environments (October, 2020).

Appendix A – Concept Engineering Plans

TRANSMITTAL

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Job No:	Job Name:	Pages:
NL201175	21D & 21F School Drive, Tomago	1 of 1

From	Ben Clark

Description	Date			
INTERNAL CIVIL WORKS	Day	07	28	10
REMONDIS RESOURCE RECOVERY FACILITY & TRUCK DEPOT	Month	08	08	11
21D & 21F SCHOOL DRIVE, TOMAGO	Year	20	20	20

Doc No.	Document Title	Current Revision	Revision		
C1.1	COVER SHEET	A	1	A	A
C1.3	SITE PLAN	B		A	B
C2.1	CONCEPT SEDIMENT & EROSION CONTROL PLAN	B	1	A	B
C2.2	CONCEPT SEDIMENT & EROSION CONTROL DETAILS	A	1	A	A
C2.3	CONCEPT BULK EARTHWORKS PLAN	A		A	A
C2.4	CONCEPT LONG SECTIONS	A		A	A
C3.1	CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN – SHEET 1	B	1	A	B
C3.2	CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN – SHEET 2	B		A	B
C3.3	CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN – SHEET 3	B		A	B
C5.1	CONCEPT CIVIL DETAILS – SHEET 1	A	1	A	A

Distribution	Number of copies		
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REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT

LOT 8 & 11 DP270328, 21D & 21F SCHOOL DRIVE TOMAGO
INTERNAL CIVIL WORKS

LOCALITY PLAN

NORTHROP

DRAWING SCHEDULE

DWG No.	DRAWING TITLE
C1.1	COVER SHEET
C1.3	SITE PLAN
C2.1	CONCEPT SEDIMENT & EROSION CONTROL PLAN
C2.2	CONCEPT SEDIMENT & EROSION CONTROL DETAILS
C2.3	CONCEPT BULK EARTHWORKS PLAN
C2.4	CONCEPT LONG SECTIONS
C3.1	CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN - SHEET 1
C3.2	CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN - SHEET 2
C3.3	CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN - SHEET 3
C5.1	CONCEPT CIVIL DETAILS - SHEET 1

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A	DEVELOPMENT APPLICATION	KT			28.08.20

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PROJECT: REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT 21D & 21F SCHOOL DRIVE, TOMAGO

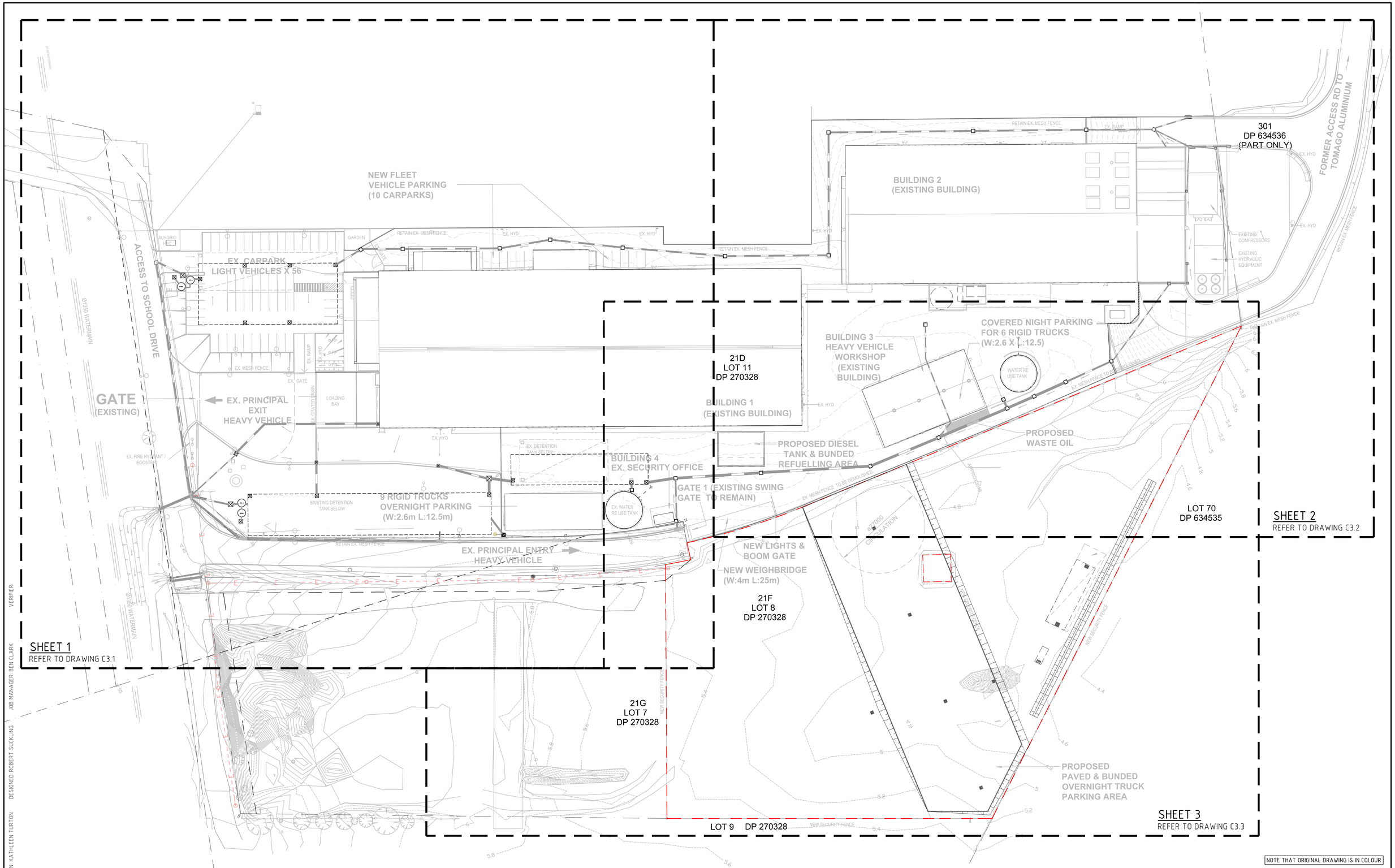
DRAWING TITLE: INTERNAL CIVIL WORKS COVER SHEET

JOB NUMBER: NL201175

DRAWING NUMBER: C1.1

REVISION: A

DRAWING SHEET SIZE = A1



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21D & 21F SCHOOL DRIVE, TOMAGO

DRAWING TITLE
INTERNAL CIVIL WORKS CONCEPT SITE PLAN

JOB NUMBER NL201175
DRAWING NUMBER C1.3
REVISION B
DRAWING SHEET SIZE = A1

LEGEND

- DENOTES SITE BOUNDARY LINE
- DENOTES EXISTING TO BE DEMOLISHED
- DENOTES COMBINED SITE/SILT FENCE 'SILTMASTER' OR SIMILAR, INSTALLED IN ACCORDANCE WITH DETAIL SD6-8 OF THE BLUEBOOK.
- DENOTES TEMPORARY CONTRACTORS VEHICULAR ACCESS POINT. CONSTRUCT A STABILISED SITE ACCESS IN ACCORDANCE WITH DETAIL SD6-14 OF THE BLUE BOOK OR PROVIDE A SHAKEDOWN CATTLE GRID AT ENTRANCE POINT TO REDUCE LIKELIHOOD OF SEDIMENT BEING TRAFFICKED OFF-SITE
- DENOTES GEOTEXTILE INLET FILTER INSTALLED IN ACCORDANCE WITH DETAIL SD6-12 OF THE BLUE BOOK
- INDICATES MESH & GRAVEL INLET FILTER INSTALLED IN ACCORDANCE WITH DETAILS SD6-11 OF THE BLUE BOOK
- DENOTES INDICATIVE LOCATION OF STOCKPILE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH DETAIL SD4-1 OF THE BLUE BOOK

SEDIMENT & EROSION CONTROL NOTES

1. ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH RELEVANT ORDINANCES AND REGULATIONS; NOTE IN PARTICULAR THE REQUIREMENTS OF LANDCOMS MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION' (THE 'BLUE BOOK').
2. INSTALL SEDIMENT PROTECTION FILTERS ON ALL NEW AND EXISTING STORMWATER INLET PITS IN ACCORDANCE WITH EITHER THE MESH AND GRAVEL INLET FILTER DETAIL SD6-11 OR THE GEOTEXTILE INLET FILTER DETAIL SD6-12 OF THE 'BLUE BOOK'.
3. ESTABLISH ALL REQUIRED SEDIMENT FENCES IN ACCORDANCE WITH DETAIL SD6-8 OF THE 'BLUE BOOK'.
4. INSTALL SEDIMENT FENCING AROUND INDIVIDUAL BUILDING ZONES/AREAS AS REQUIRED AND AS DIRECTED BY THE SUPERINTENDENT.
5. ALL TRENCHES INCLUDING ALL SERVICE TRENCHES AND SWALE EXCAVATION SHALL BE SIDE-CAST TO THE HIGH SIDE AND CLOSED AT THE END OF EACH DAYS WORK.
6. THE CONTRACTOR SHALL ENSURE THAT ALL VEGETATION (TREE, SHRUB & GROUND COVER) WHICH IS TO BE RETAINED SHALL BE PROTECTED DURING THE DURATION OF CONSTRUCTION. REFER ARCHITECTS PLANS FOR TREES TO BE KEPT.
7. ALL VEGETATION TO BE REMOVED SHALL BE MULCHED ONSITE AND SPREAD/STOCKPILED AS DIRECTED BY THE SUPERINTENDENT.
8. STRIP TOPSOIL IN AREAS DESIGNATED FOR STRIPPING AND STOCKPILE FOR RE-USE AS REQUIRED. ANY SURPLUS MATERIAL SHALL BE REMOVED FROM SITE AND DISPOSED OF IN ACCORDANCE WITH EPA GUIDELINES.
9. CONSTRUCT AND MAINTAIN ALL MATERIAL STOCKPILES IN ACCORDANCE WITH DETAIL SD4-1 OF THE 'BLUE BOOK' (INCLUDING CUT-OFF SWALES TO THE HIGH SIDE AND SEDIMENT FENCES TO THE LOW SIDE).
10. ENSURE STOCKPILES DO NOT EXCEED 2.0m HIGH. PROVIDE WIND AND RAIN EROSION PROTECTION AS REQUIRED IN ACCORDANCE WITH THE 'BLUE BOOK'.
11. PROVIDE WATER TRUCKS OR SPRINKLER DEVICES DURING CONSTRUCTION AS REQUIRED TO SUPPRESS DUST.
12. ONCE CUT/FILL OPERATIONS HAVE BEEN FINALIZED ALL DISTURBED AREAS THAT ARE NOT BEING WORKED ON SHALL BE RE-VEGETATED AS SOON AS IS PRACTICAL.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING A DETAILED WRITTEN RECORD OF ALL EROSION & SEDIMENT CONTROLS ON-SITE DURING THE CONSTRUCTION PERIOD. THIS RECORD SHALL BE UPDATED ON A DAILY BASIS & SHALL CONTAIN DETAILS ON THE CONDITION OF CONTROLS AND ANY/ ALL MAINTENANCE, CLEANING & BREACHES. THIS RECORD SHALL BE KEPT ON-SITE AT ALL TIMES AND SHALL BE MADE AVAILABLE FOR INSPECTION BY THE PRINCIPAL CERTIFYING AUTHORITY AND THE SUPERINTENDENT DURING NORMAL WORKING HOURS.

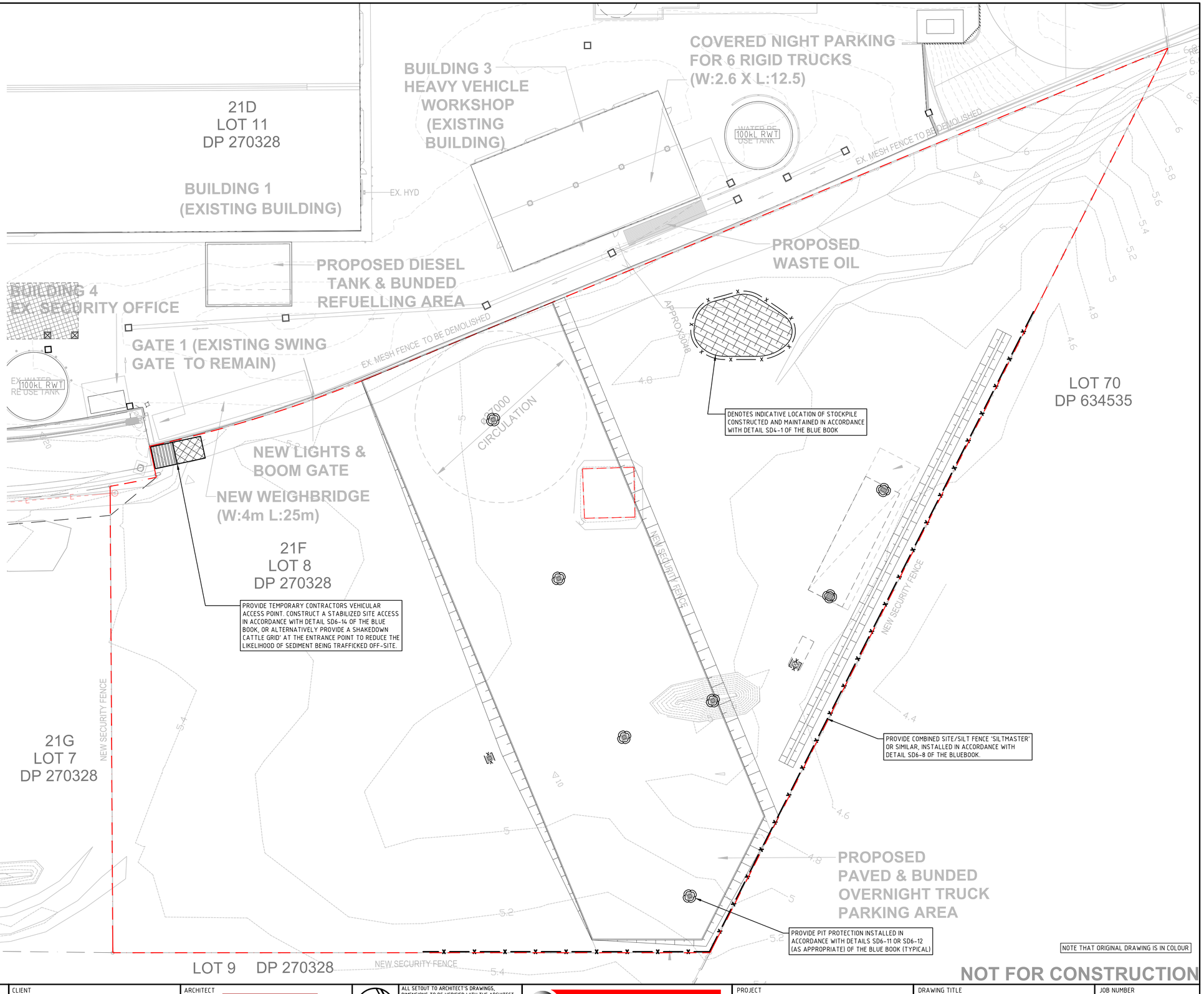
THE CONTRACTOR SHALL ENSURE COUNCIL ASSETS AND THE UTILITIES ARE PROTECTED AT ALL TIMES. ANY AND ALL DAMAGES TO COUNCIL ASSETS AND/OR UTILITIES SHALL BE REPAIRED BY THE CONTRACTOR TO THE SPECIFICATION OF COUNCIL AND THE UTILITIES AUTHORITY AND AT NO COST TO THE PRINCIPAL OR NORTHROP CONSULTING ENGINEERS.

SEDIMENT BASIN SIZING CALCULATION

THE SITE IS LOCATED WITHIN THE TEA GARDENS SOIL LANDSCAPE AND PRIMARILY CONSISTS OF SILTY SANDS AND SANDS, WHICH HAS THE FOLLOWING PROPERTIES (IN ACCORDANCE WITH TABLE C13 OF THE 'BLUE BOOK'.

SITE PARAMETERS

CONSTRAINT	VALUE
SEDIMENT TYPE	C
SOIL HYDROLOGY GROUP	A
K = SOIL ERODIBILITY (K-FACTOR)	0.016
R = RAINFALL EROSIVITY (R-FACTOR)	2411
S = 2 YEAR, 6 HOUR STORM INTENSITY	10.5mm/hr (TOMAGO)
LS = SLOPE LENGTH/GRADIENT	0.19 (80m SLOPE @ 1% GRADE)
P = EROSION CONTROL PRACTICE (P-FACTOR)	1.3 (TYPICAL)
C = GROUND COVER (C-FACTOR)	1.0 (TYPICAL FOR STRIPPED SITES)
SOIL LOSS (RUSLE METHOD) (tonnes/ha/yr)	9.5m^3/Ha/Yr
EROSION HAZARD (TABLE 4.2 BLUE BOOK)	VERY LOW SOIL CLASS 1
TOTAL SITE RUN-OFF IS LESS THAN 150m^3/Yr. BASIN/TANKS NOT REQUIRED.	



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21D & 21F SCHOOL DRIVE, TOMAGO

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REVISION B
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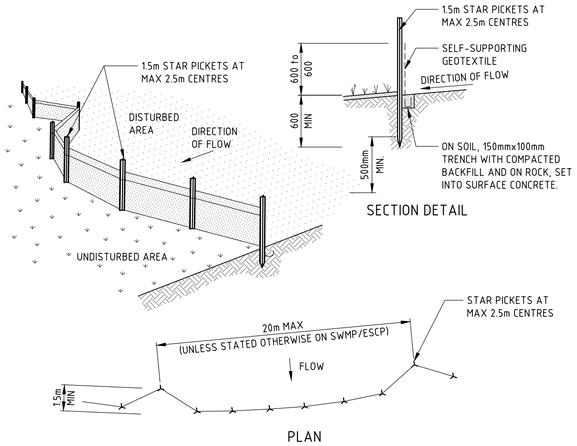
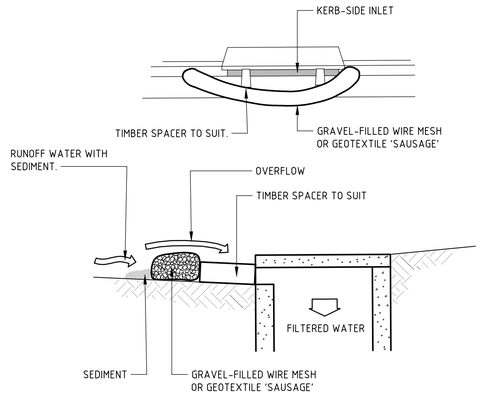


CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

SEDIMENT FENCE (SD 6-8)

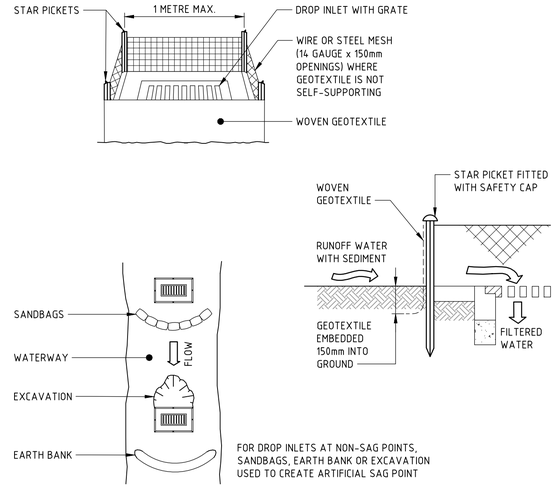


NOTE:THIS PRACTICE ONLY TO BE USED WHERE SPECIFIED IN APPROVED SWMP/ESCP.

CONSTRUCTION NOTES

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

MESH AND GRAVEL INLET FILTER (SD 6-11)

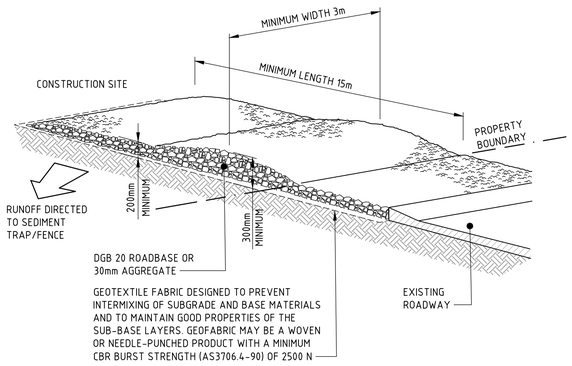


FOR DROP INLETS AT NON-SAG POINTS, SANDBAGS, EARTH BANK OR EXCAVATION USED TO CREATE ARTIFICIAL SAG POINT

CONSTRUCTION NOTES

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

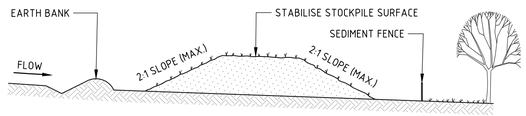
GEOTEXTILE INLET FILTER (SD 6-12)



CONSTRUCTION NOTES

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

STABILISED SITE ACCESS (SD 6-14)



CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)

DRAWN KATHLEEN TURTON DESIGNED ROBERT SUCKLING JOB MANAGER BEN CLARK VERIFIER

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	PRELIMINARY	KT			07.08.20
A	DEVELOPMENT APPLICATION	KT			28.08.20

CLIENT: REMONDIS WORKING FOR THE FUTURE

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PROJECT: REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT 21D & 21F SCHOOL DRIVE, TOMAGO

DRAWING TITLE: INTERNAL CIVIL WORKS CONCEPT SEDIMENT & EROSION CONTROL DETAILS

JOB NUMBER: NL201175

DRAWING NUMBER: C2.2

REVISION: A

DRAWING SHEET SIZE = A1

BULK EARTHWORKS PLAN

LEGEND

24.8 — DENOTES EXISTING CONTOUR LINES

24.8 — DENOTES BULK EARTHWORKS CONTOUR LINES

4.29 — DENOTES DEPTH OF PROPOSED CUT (-VE) OR FILL (+VE)

BULK EARTHWORKS NOTES

1. WHERE NOT NOMINATED ON PLAN, BULK EARTHWORKS LEVELS HAVE BEEN DETERMINED BY LOWERING THE FINISHED SURFACE LEVELS BASED ON THE FOLLOWING THICKNESSES AND ALLOWANCES
   - TRAFFICABLE CONCRETE PAVEMENT 300mm
   - LANDSCAPE & MISC. AREAS 150mm
2. THE EXISTING GROUND SURFACE WAS LOWERED BY 150mm UNIFORMLY TO ACCOUNT FOR THE REMOVAL OF VEGETATION, AND TOP SOILS.
   - THIS VOLUME IS ESTIMATED (BASED ON THE DEVELOPMENT AREA OF 3790m²) TO BE APPROXIMATELY 568m³ (TOPSOIL - CUT).
3. BULKING FACTORS OF 1.0 WAS USED FOR BOTH CUT AND FILL MATERIAL.
4. THE APPROXIMATE SITE EARTHWORKS VOLUMES BASED ON THE NOTED PAVEMENT THICKNESSES ARE OUTLINED BELOW:
   - CUT: 321 m³
   - FILL: 553 m³
   - NET: 232m³ (FILL) + 568m³ (TOPSOIL - CUT)
5. THE ABOVE VOLUMES ARE TO BE ASSESS NOTING THE FOLLOWING:
   - NO ALLOWANCE HAS BEEN MADE FOR THE REMOVAL OR OVER EXCAVATION OF UNSUITABLE OR CONTAMINATED MATERIAL.
   - NO ALLOWANCE HAS BEEN MADE FOR DETAILED EXCAVATIONS SUCH AS, SERVICES TRENCHING, SEDIMENT BASIN ETC.
   - NO ALLOWANCE HAS BEEN MADE FOR TEMPORARY CONSTRUCTION PLATFORMS.
6. THIS PLAN HAS BEEN PREPARED FOR INFORMATION PURPOSES ONLY AND IS INDICATIVE IN NATURE. THE EARTHWORKS CONTRACTOR IS TO VERIFY ALL LEVELS AND QUANTITIES AND PERFORM THEIR OWN BULK EARTHWORKS ASSESSMENT.

Surface Analysis: Elevation Ranges				
Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m3)
1		-2.000	-1.500	7
2		-1.500	-1.000	74
3		-1.000	-0.500	94
4		-0.500	0.000	146
5		0.000	0.500	552
6		0.500	1.000	2

21D
LOT 11
DP 270328

BUILDING 1
(EXISTING BUILDING)

EX. HYD

BUILDING 3
HEAVY VEHICLE
WORKSHOP
(EXISTING
BUILDING)

COVERED NIGHT PARKING
FOR 6 RIGID TRUCKS
(W:2.6 X L:12.5)

WATER RE
USE TANK

EX. MESH FENCE TO BE DEMOLISHED

PROPOSED
WASTE OIL

PROPOSED DIESEL
TANK & BUNDED
REFUELLING AREA

BUILDING 4
EX. SECURITY OFFICE

GATE 1 (EXISTING SWING
GATE TO REMAIN)

EX. WATER
RE USE TANK

NEW LIGHTS &
BOOM GATE

NEW WEIGHBRIDGE
(W:4m L:25m)

21F
LOT 8
DP 270328

LOT 70
DP 634535

DENOTES TEMPORARY BATTER TO
GEOTECHNICAL ENGINEERS SPECIFICATION
TO ALLOW FOR EXCAVATION

ALIGNMENT 3

ALIGNMENT 2

ALIGNMENT 1

DENOTES 1V:4H PERMANENT
LANDSCAPED BATTER TO EXISTING

21G
LOT 7
DP 270328

NEW SECURITY FENCE

PROPOSED
PAVED & BUNDED
OVERNIGHT TRUCK
PARKING AREA

LOT 9 DP 270328

NEW SECURITY FENCE

VERIFIER:
JOB MANAGER: BEN CLARK
DESIGNED: ROBERT SUCKLING
DRAWN: KATHLEEN TURTON

NOTE THAT ORIGINAL DRAWING IS IN COLOUR

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PROJECT
REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT 21D & 21F SCHOOL DRIVE, TOMAGO

DRAWING TITLE
INTERNAL CIVIL WORKS CONCEPT BULK EARTHWORKS PLAN

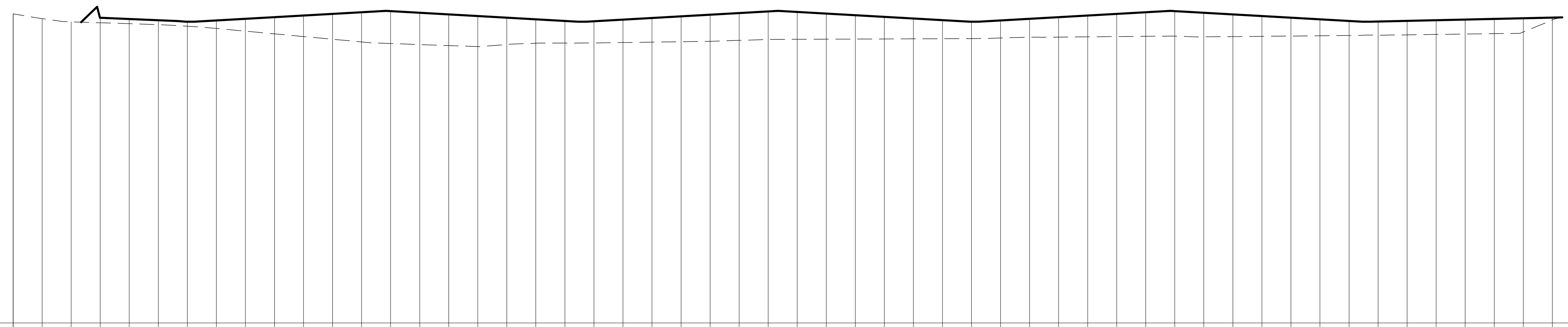
JOB NUMBER NL201175

DRAWING NUMBER C2.3

REVISION A

DRAWING SHEET SIZE = A1

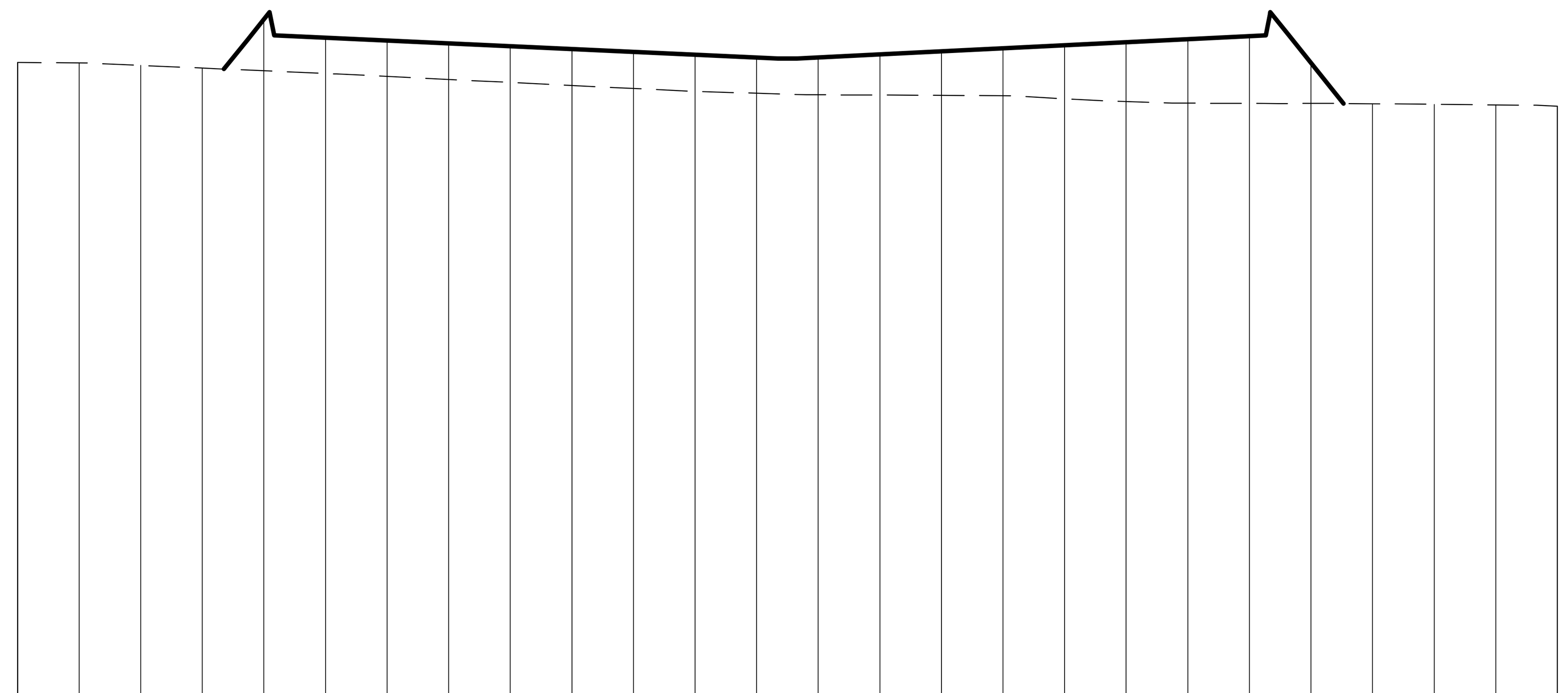
VERTICAL 1:40
HORIZONTAL 1:200
Datum 1.000



CHAINAGE	DESIGN SURFACE	EXISTING SURFACE	DEPTH
0.000		5.258	
2.000		5.192	
4.000		5.149	
6.000	5.205	5.136	0.069
8.000	5.188	5.123	0.065
10.000	5.170	5.110	0.060
12.000	5.150	5.088	0.062
14.000	5.167	5.057	0.110
16.000	5.190	5.020	0.170
18.000	5.213	4.983	0.230
20.000	5.235	4.946	0.290
22.000	5.258	4.909	0.350
24.000	5.281	4.872	0.409
26.000	5.296	4.849	0.447
28.000	5.274	4.835	0.438
30.000	5.251	4.822	0.429
32.000	5.228	4.808	0.420
34.000	5.206	4.836	0.369
36.000	5.183	4.854	0.329
38.000	5.160	4.856	0.304
40.000	5.156	4.858	0.298
42.000	5.179	4.863	0.315
44.000	5.201	4.869	0.333
46.000	5.224	4.874	0.350
48.000	5.247	4.880	0.367
50.000	5.269	4.893	0.377
52.000	5.292	4.906	0.386
54.000	5.285	4.908	0.377
56.000	5.262	4.909	0.353
58.000	5.240	4.911	0.329
60.000	5.217	4.912	0.305
62.000	5.194	4.914	0.280
64.000	5.171	4.916	0.256
66.000	5.150	4.917	0.233
68.000	5.167	4.926	0.242
70.000	5.190	4.937	0.252
72.000	5.213	4.938	0.275
74.000	5.235	4.941	0.294
76.000	5.258	4.945	0.313
78.000	5.281	4.949	0.332
80.000	5.296	4.951	0.345
82.000	5.274	4.941	0.333
84.000	5.251	4.945	0.306
86.000	5.228	4.949	0.280
88.000	5.206	4.952	0.253
90.000	5.183	4.956	0.227
92.000	5.160	4.960	0.200
94.000	5.152	4.963	0.189
96.000	5.161	4.969	0.192
98.000	5.171	4.975	0.196
100.000	5.180	4.980	0.200
102.000	5.189	4.985	0.203
104.000	5.198	5.008	0.189
106.000	5.207	5.174	0.033
108.000			
110.000			

ALIGNMENT 1 LONG SECTION

VERTICAL 1:40
HORIZONTAL 1:200
Datum 1.000



CHAINAGE	DESIGN SURFACE	EXISTING SURFACE	DEPTH
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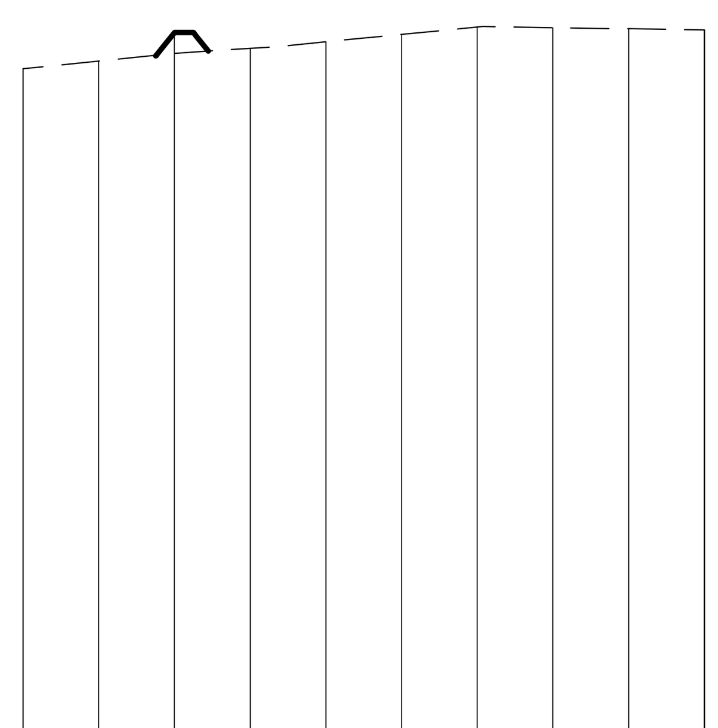
2.000		5.121	
4.000		5.105	
6.000		5.087	
8.000	5.405	5.070	0.335
10.000	5.285	5.052	0.233
12.000	5.266	5.033	0.234
14.000	5.248	5.013	0.235
16.000	5.230	4.994	0.236
18.000	5.211	4.974	0.237
20.000	5.193	4.954	0.239
22.000	5.175	4.936	0.239
24.000	5.156	4.924	0.233
26.000	5.157	4.914	0.243
28.000	5.177	4.912	0.265
30.000	5.196	4.910	0.287
32.000	5.216	4.908	0.308
34.000	5.236	4.888	0.348
36.000	5.255	4.870	0.386
38.000	5.275	4.859	0.416
40.000	5.295	4.857	0.437
42.000	5.120	4.858	0.263
44.000		4.855	
46.000		4.852	
48.000		4.848	
50.000		4.839	

ALIGNMENT 2 LONG SECTION

VERTICAL 1:40
HORIZONTAL 1:200
Datum 1.000



CHAINAGE	DESIGN SURFACE	EXISTING SURFACE	DEPTH
0.000		4.509	
2.000		4.550	
4.000	4.699	4.590	0.109
6.000		4.616	
8.000		4.651	
10.000		4.690	
12.000		4.729	
14.000		4.726	
16.000		4.720	
18.000		4.713	

ALIGNMENT 3 LONG SECTION

DRAWN KATHLEEN TURTON
DESIGNED ROBERT SUCKLING
JOB MANAGER BEN CLARK
VERIFIER

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PROJECT
REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT
21D & 21F SCHOOL DRIVE, TOMAGO

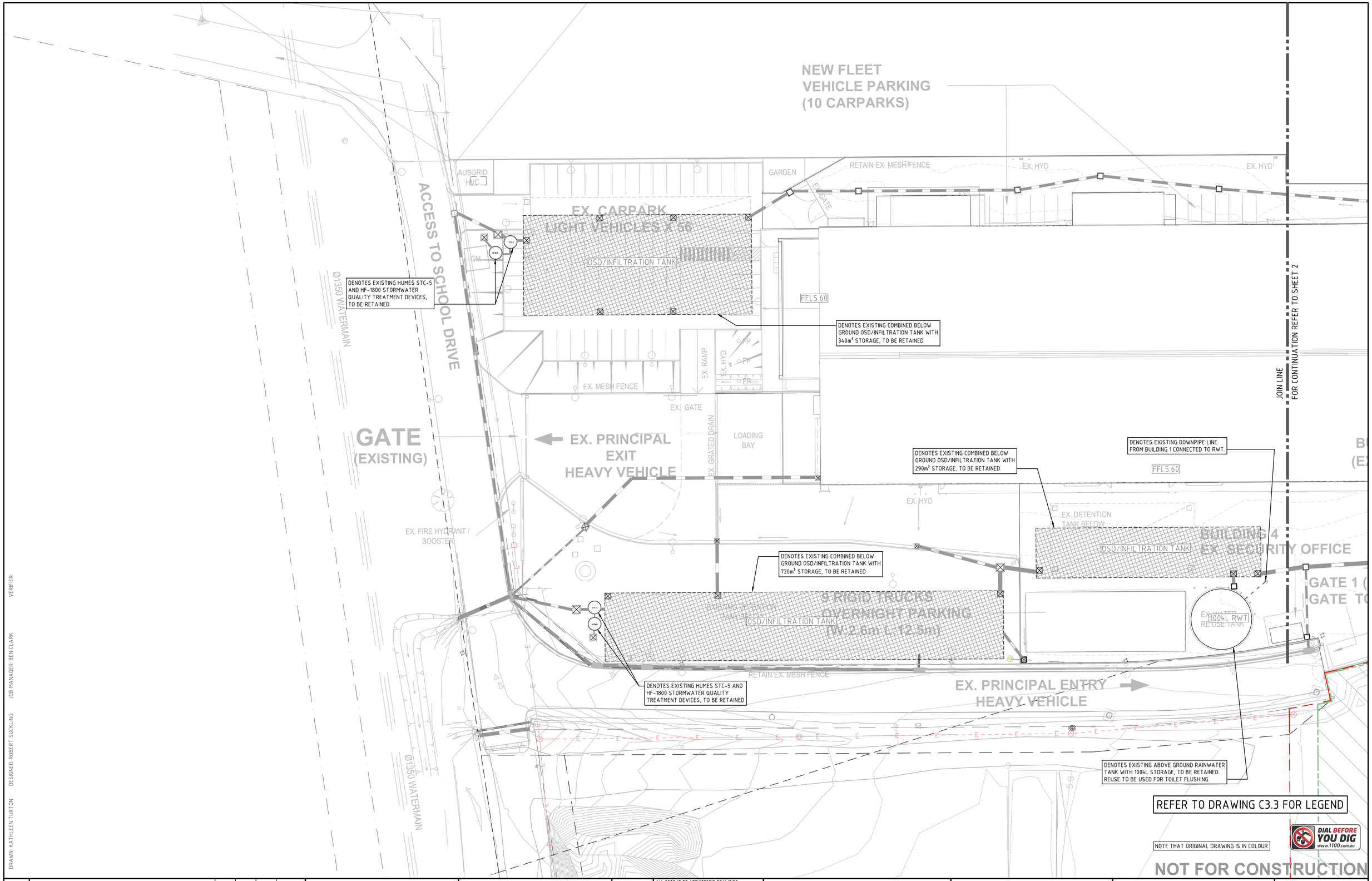
DRAWING TITLE
INTERNAL CIVIL WORKS
CONCEPT LONG SECTIONS

JOB NUMBER
NL201175

DRAWING NUMBER
C2.4

REVISION
A

DRAWING SHEET SIZE = A1



DRAWN: KATHLEEN TURTON DESIGNED: ROBERT SUCKLING JOB MANAGER: BEN CLARK VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
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A	DEVELOPMENT APPLICATION	KT			28.08.20
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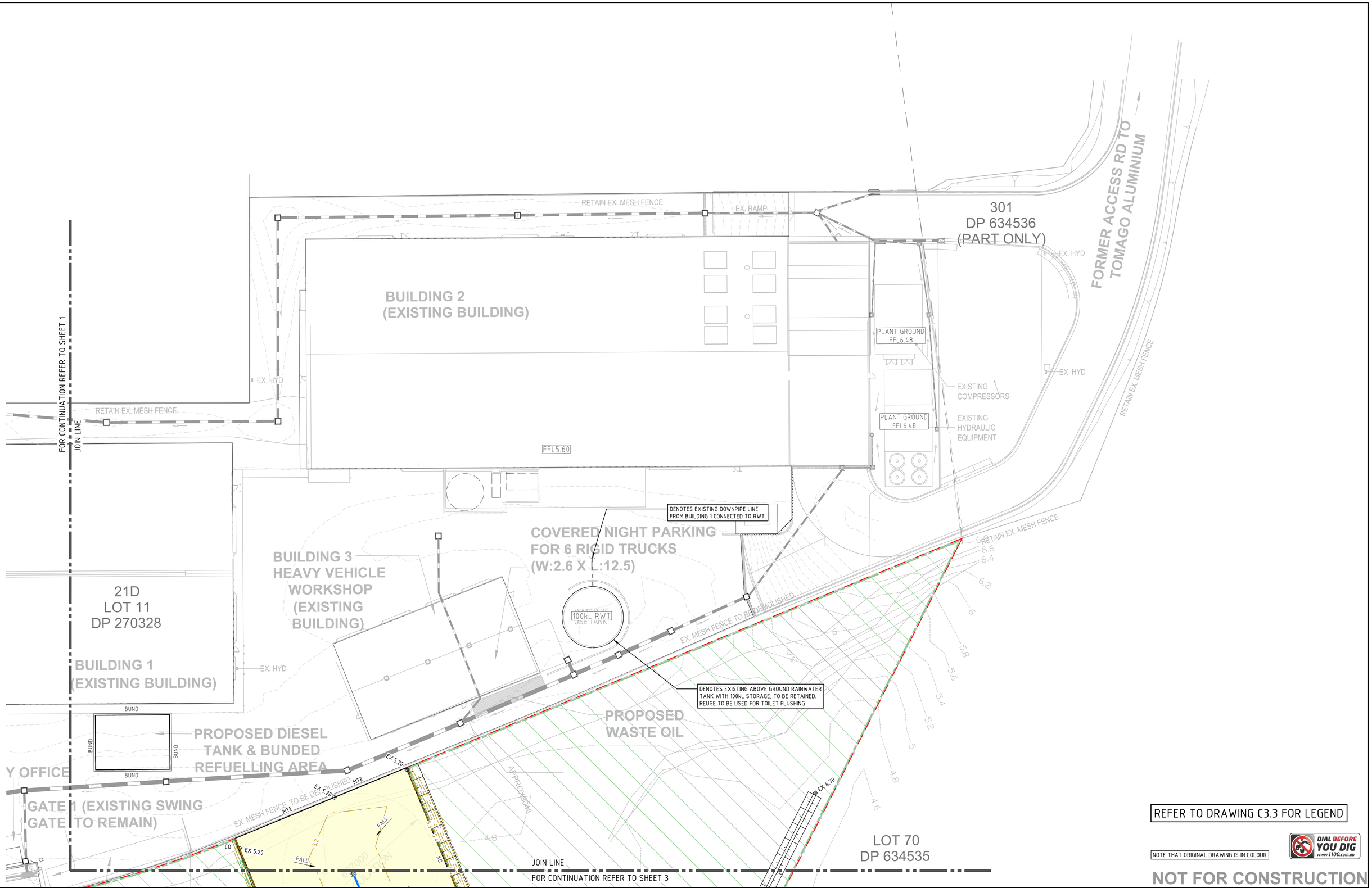
PROJECT
REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT 21D & 21F SCHOOL DRIVE, TOMAGO

DRAWING TITLE
INTERNAL CIVIL WORKS CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN SHEET 1

JOB NUMBER **NL201175**

DRAWING NUMBER **C3.1** REVISION **B**

DRAWING SHEET SIZE = A1



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PROJECT
REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT 21D & 21F SCHOOL DRIVE, TOMAGO

DRAWING TITLE
INTERNAL CIVIL WORKS CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN SHEET 2

JOB NUMBER **NL201175**
DRAWING NUMBER **C3.2**
REVISION **B**
DRAWING SHEET SIZE = A1

LEGEND

- DENOTES SITE BOUNDARY LINE
- DENOTES EXISTING TO BE DEMOLISHED
- DENOTES TRAFFICABLE PAVEMENT, REFER TO DETAIL
- DENOTES EXTENTS OF FUTURE HARDSTAND PAVEMENT (DEVELOPMENT SCENARIO 2)
- BUND — DENOTES PROPOSED BUND AROUND PERIMETER OF DIESEL TANK & REFUELLING AREA
- KO — DENOTES KERB ONLY
- PL 5.30 — DENOTES PROPOSED FINISHED SURFACE LEVEL
- EX 4.60 — DENOTES EXISTING SURFACE LEVEL
- MTE — DENOTES MATCH TO EXISTING LEVELS
- 44 — DENOTES EXISTING CONTOURS
- DENOTES APPROXIMATE BATTER EXTENT
- FALL — DIRECTION OF FALL IN FINISHED SURFACE
- DENOTES STORMWATER PIT (NEW / EXISTING)
- # — DENOTES STORMWATER PIT TO BE FITTED WITH 200um OCEAN PROTECT PIT FILTER INSERT WITH HYDROCARBON ABSORBENT PILLOW/OIL SOCK
- OSD — DENOTES BELOW GROUND ON-SITE DETENTION AND INFILTRATION SYSTEM
- Ø225 — DENOTES STORMWATER LINE & SIZE
- DENOTES EXISTING STORMWATER LINE
- SSD — DENOTES Ø100 SUBSOIL DRAINAGE LINE WITH NON-WOVEN GEOTEXTILE FILTER SOCK SURROUND LAID AT MIN 1% LONGITUDINAL GRADE & CONNECTED TO NEAREST STORMWATER PIT
- CO — DENOTES SUBSOIL DRAINAGE CLEAROUT
- DENOTES OVERLAND FLOW PATH
- E — DENOTES APPROXIMATE LOCATION OF EXISTING ELECTRICITY LINE

LOCATIONS OF EXISTING SERVICES ARE APPROXIMATE ONLY & MAY NOT BE COMPLETE. THE BUILDER IS RESPONSIBLE FOR LOCATING EXISTING INFRASTRUCTURE (CULVERTS, PITS, PIPES, SERVICES, INVERT & COVER LEVELS ETC) PRIOR TO COMMENCING CONSTRUCTION.

THE BUILDER SHALL ALLOW TO MODIFY ALL EXISTING SERVICE COVERS TO MATCH THE NEW PAVEMENTS, IN ACCORDANCE WITH THE RELEVANT AUTHORITIES REQUIREMENTS.

PROVIDE TEMPORARY TRAFFIC CONTROL IN ACCORDANCE WITH STATE & FEDERAL STATUTORY REQUIREMENTS AND LOCAL COUNCIL SPECIFICATIONS/REQUIREMENTS

NOTE: EXISTING STORMWATER DRAINAGE, RAINWATER TANKS AND INFILTRATION/DETENTION TANKS FOR 21D LOT11 TO BE RETAINED

NOTE: DRAWINGS TO BE READ IN CONJUNCTION WITH SOIL & WATER MANAGEMENT REPORT

STORMWATER MANAGEMENT SUMMARY

	DEVELOPMENT SCENARIO 1	DEVELOPMENT SCENARIO 2
DETENTION VOLUME	100m³	385m³
	120m² INFILTRATION AREA	450m² INFILTRATION AREA
WATER QUALITY	(x5) PIT FILTER INSERTS	(x20) PIT FILTER INSERTS
	(x6) FILTER CARTRIDGES	(x24) FILTER CARTRIDGES

FOR CONTINUATION REFER TO SHEET 2

JOIN LINE

FOR CONTINUATION REFER TO SHEET 1

JOIN LINE

21D
LOT 11
DP 270328

BUILDING 3
HEAVY VEHICLE
WORKSHOP
(EXISTING
BUILDING)

COVERED NIGHT PARKING
FOR 6 RIGID TRUCKS
(W:2.6 X L:12.5)

BUILDING 1
(EXISTING BUILDING)

EX. HYD

DENOTES EXISTING DOWNPIPE LINE FROM BUILDING 1 CONNECTED TO RWT.

DENOTES BUND AROUND PERIMETER OF DIESEL TANK

BUND

PROPOSED DIESEL TANK & BUNDED REFUELLING AREA

DENOTES EXISTING DOWNPIPE LINE FROM BUILDING 1 CONNECTED TO RWT.

BUILDING 4
EX. SECURITY OFFICE

GATE 1 (EXISTING SWING GATE TO REMAIN)

EX. MESH FENCE TO BE DEMOLISHED

WATER RE-USE TANK
100kL RWT

DENOTES EXISTING ABOVE GROUND RAINWATER TANK WITH 100kL STORAGE, TO BE RETAINED. REUSE TO BE USED FOR TOILET FLUSHING.

DENOTES EXISTING ABOVE GROUND RAINWATER TANK WITH 100kL STORAGE, TO BE RETAINED. REUSE TO BE USED FOR TOILET FLUSHING.

PROPOSED WASTE OIL

PROVIDE SUBSOIL DRAINAGE LINE AROUND STORMWATER PITS WITHIN PAVEMENT. IMPERMEABLE GEOTEXTILE MEMBRANE TO EXTEND BELOW SUBSOIL DRAINAGE LINE (TYPICAL). REFER TO DETAIL

DENOTES 1V:4H BATTER IN EXISTING

EXISTING CONCRETE SLAB TO BE DEMOLISHED & DISPOSED OFF SITE

LOT 70
DP 634535

#PIT
CL5.15
IL4.50

NEW LIGHTS & BOOM GATE

NEW WEIGHBRIDGE
(W:4m L:25m)

21F
LOT 8
DP 270328

DENOTES 1V:4H BATTER IN EXISTING

#PIT
CL5.15
IL4.21

LOCALLY GRADE SURROUNDING LANDSCAPE TO FALL TOWARDS STORMWATER PIT. STORMWATER LINE TO BYPASS TREATMENT DEVICE

PIT
CL4.95
IL3.47

#PIT
CL5.15
IL3.92

#PIT
CL5.15
IL4.50

21G
LOT 7
DP 270328

NEW SECURITY FENCE

LOT 9 DP 270328

DENOTES LEVEL SPREADER MOUND 500mm WIDE TO DISPERSE OVERFLOW AS SHEET FLOW TO MIMIC NATURAL FLOW REGIME ON SITE

DENOTES BELOW GROUND COMBINED OSD (100m³ STORAGE) AND INFILTRATION SYSTEM (120m² AREA). ASSUMED INFILTRATION RATE OF 100mm/hr T.B.C. PRIOR TO CONSTRUCTION

IL3.17

IL3.48

IL3.37

DENOTES (x6) 460PSORB OCEAN PROTECT FILTER CARTRIDGES IN PRECAST PROPRIETARY HOUSING

EXISTING MATERIAL STOCKPILE TO BE RELOCATED ON SITE

#PIT
CL5.30
IL3.75
NOTE: INSTALL SHUT-OFF VALVE IN PIT TO OUTLET IN THE EVENT OF SPILLAGE OCCURRING. INSTALL LOW-FLOW DIVERSION WEIR

PROPOSED PAVED & BUNDED OVERNIGHT TRUCK PARKING AREA

NOTE THAT ORIGINAL DRAWING IS IN COLOUR

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NOT FOR CONSTRUCTION

VERIFIER:
JOB MANAGER BEN CLARK
DESIGNED ROBERT SUCKLING
DRAWN KATHLEEN TURTON

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	DEVELOPMENT APPLICATION	KT			28.08.20
B	DEVELOPMENT APPLICATION	KT			10.11.20

CLIENT: REMONDIS — WORKING FOR THE FUTURE

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ARCHITECT: EJE architecture

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Ph (02) 4365 1668 Fax (02) 4367 6555
Email centralcoast@northrop.com.au ABN 81 094 433 100

PROJECT: REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT 21D & 21F SCHOOL DRIVE, TOMAGO

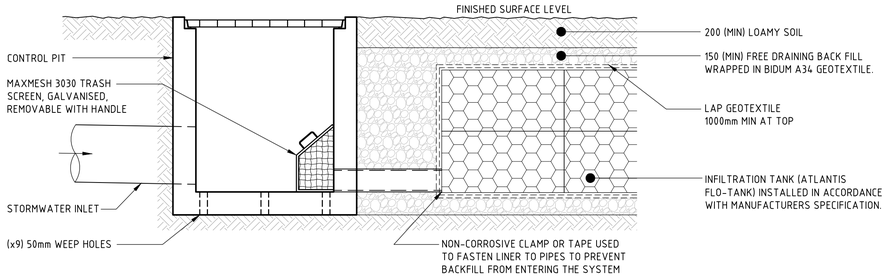
DRAWING TITLE: INTERNAL CIVIL WORKS CONCEPT STORMWATER MANAGEMENT & LEVELS PLAN SHEET 3

JOB NUMBER: NL201175

DRAWING NUMBER: C3.3

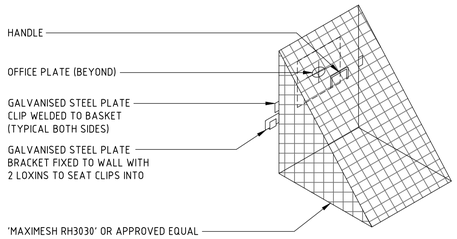
REVISION: B

DRAWING SHEET SIZE = A1

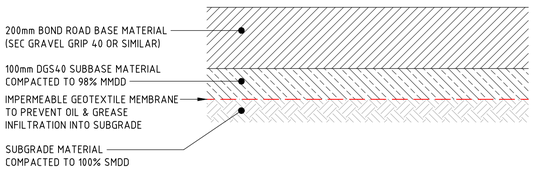


TYPICAL SECTION OSD / INFILTRATION SYSTEM

NOTE: ASSUMED INFILTRATION RATE OF 100mm PER HOUR. INFILTRATION RATE TO BE CONFIRMED ONSITE VIA A DOUBLE RING INFILTROMETER TEST METHOD (ASTM D3385-18). CONTACT NORTHROP ONCE TEST RESULTS ARE AVAILABLE AS THIS MAY IMPACT THE SIZE OF THE INFILTRATION SYSTEM.

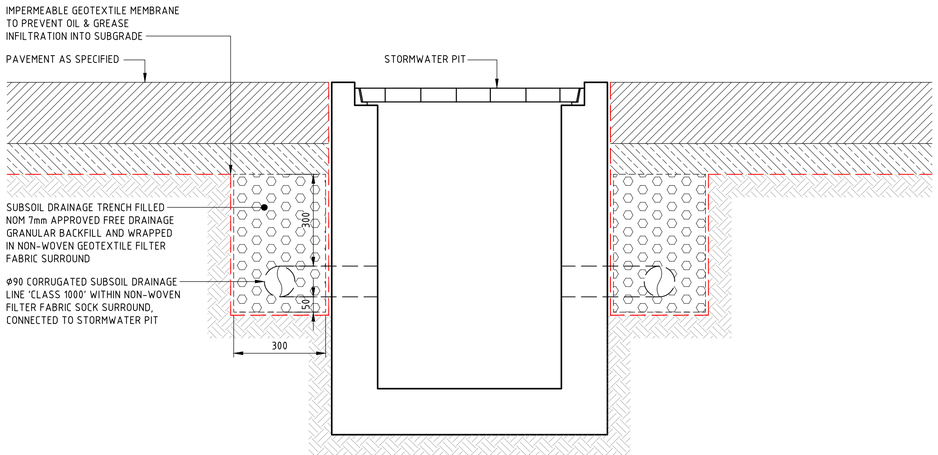


TRASH SCREEN DETAIL



INDICATIVE TRAFFICABLE PAVEMENT DETAIL

NOTE: PAVEMENT DESIGN TO BE CONFIRMED BY SUITABLY QUALIFIED GEOTECHNICAL ENGINEER FOLLOWING DETAILED GEOTECHNICAL INVESTIGATION DURING DETAILED DESIGN



PAVEMENT SUBSOIL DETAIL AT STORMWATER PITS

VERIFIER:
JOB MANAGER: BEN CLARK
DESIGNED: ROBERT SUCKLING
DRAWN: KATHLEEN TURTON

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	PRELIMINARY	KT			07.08.20
A	DEVELOPMENT APPLICATION	KT			28.08.20

CLIENT
REMONDIS
WORKING FOR THE FUTURE

DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT
EJE architecture

ALL SETOUT TO ARCHITECT'S DRAWINGS, DIMENSIONS TO BE VERIFIED WITH THE ARCHITECT AND ON SITE BEFORE MAKING SHOP DRAWINGS OR COMMENCING WORK.
NORTHROP ACCEPTS NO RESPONSIBILITY FOR THE USABILITY, COMPLETENESS OR SCALE OF DRAWINGS TRANSFERRED ELECTRONICALLY.

DETAILS 1:20@A1 0 200 400 600 800 1000
DETAILS 1:10@A1 0 100 200 300 400 500

NORTHROP
Central Coast
Suite 4, 257-259 Central Coast Hwy, Erina NSW 2250
Ph (02) 4365 1668 Fax (02) 4367 6555
Email centralcoast@northrop.com.au ABN 81 094 433 100

PROJECT
REMONDIS RESOURCE RECOVERY FACILITY & TRUCK PARKING DEPOT 21D & 21F SCHOOL DRIVE, TOMAGO

DRAWING TITLE
INTERNAL CIVIL WORKS CONCEPT CIVIL DETAILS SHEET 1

JOB NUMBER **NL201175**
DRAWING NUMBER **C5.1**
REVISION **A**
DRAWING SHEET SIZE = A1

Appendix B – Supplementary Information

- MUSIC Link Report
- Flood Certificate

MUSIC-*link* Report

Project Details		Company Details	
Project:	NL201175 21D School Drive Existing Site	**Company:**	Northrop Consulting Engineers
Report Export Date:	9/11/2020	**Contact:**	Robert Suckling
Catchment Name:	Remondis Resource Recovery Facility	**Address:**	Suite 4, 257-259 Central Coast Highway, Erina 2250
Catchment Area:	2.785ha	**Phone:**	(02) 4365 1668
Impervious Area*:	96.40%	**Email:**	rsuckling@northrop.com.au
Rainfall Station:	WILLIAMTOWN RAAF - Station 061078 - Zone B		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1998 - 31/12/2007 11:54:00 PM		
Mean Annual Rainfall:	1125mm		
Evapotranspiration:	1394mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.33		
Study Area:	Williamtown		
Scenario:	Sensitive Catchment - Sandy soils		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	42.9%	Rain Water Tank Node	2	Urban Source Node	5
TSS	91%	Detention Basin Node	2		
TP	82.7%	GPT Node	2		
TN	72.1%	Generic Node	2		
GP	94.5%				

Comments

Detention basins modelled as below ground infiltration tanks. Conservative estimate for infiltration rate =25mm/hr and no evaporation is expected.

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Detention	Detention Basin	% Reuse Demand Met	None	None	0
Detention	Detention Basin	% Reuse Demand Met	None	None	0
Rain	Rainwater Tank	% Reuse Demand Met	None	None	100
Rain	Rainwater Tank 2	% Reuse Demand Met	None	None	100
Receiving	Receiving Node	% Load Reduction	None	None	42.9
Receiving	Receiving Node	GP % Load Reduction	90	None	94.5
Receiving	Receiving Node	TN % Load Reduction	45	None	72.1
Receiving	Receiving Node	TP % Load Reduction	60	None	82.7
Receiving	Receiving Node	TSS % Load Reduction	90	None	91
Urban	Hardstand 1 (5_700m2)	Area Impervious (ha)	None	None	0.540
Urban	Hardstand 1 (5_700m2)	Area Pervious (ha)	None	None	0.029
Urban	Hardstand 1 (5_700m2)	Total Area (ha)	None	None	0.57
Urban	Hardstand 2 (10_510m2)	Area Impervious (ha)	None	None	0.996
Urban	Hardstand 2 (10_510m2)	Area Pervious (ha)	None	None	0.054
Urban	Hardstand 2 (10_510m2)	Total Area (ha)	None	None	1.051
Urban	Roof 1 (3_920m2)	Area Impervious (ha)	None	None	0.392
Urban	Roof 1 (3_920m2)	Area Pervious (ha)	None	None	0
Urban	Roof 1 (3_920m2)	Total Area (ha)	None	None	0.392
Urban	Roof 2 (6_140m2)	Area Impervious (ha)	None	None	0.614
Urban	Roof 2 (6_140m2)	Area Pervious (ha)	None	None	0
Urban	Roof 2 (6_140m2)	Total Area (ha)	None	None	0.614
Urban	Treatment Bypass (1_585m2)	Area Impervious (ha)	None	None	0.141
Urban	Treatment Bypass (1_585m2)	Area Pervious (ha)	None	None	0.016
Urban	Treatment Bypass (1_585m2)	Total Area (ha)	None	None	0.158

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Detention	Detention Basin	Evaporative Loss as % of PET	100	100	0
Detention	Detention Basin	Evaporative Loss as % of PET	100	100	0
Detention	Detention Basin	Exfiltration Rate (mm/hr)	0	0	25
Detention	Detention Basin	Exfiltration Rate (mm/hr)	0	0	25
GPT	Humeceptor	Hi-flow bypass rate (cum/sec)	None	99	100
GPT	Humeceptor	Hi-flow bypass rate (cum/sec)	None	99	100

Only certain parameters are reported when they pass validation

MUSIC-*link* Report

Project Details		Company Details	
Project:	Resource Recovery Facility, Tomago (Remondis)	**Company:**	Northrop Consulting Engineers
Report Export Date:	26/08/2020	**Contact:**	Robert Suckling
Catchment Name:	Remondis Resource Recovery Facility	**Address:**	Suite 4, 257-259 Central Coast Highway, Erina NSW 2250
Catchment Area:	0.31ha	**Phone:**	02 4365 1668
Impervious Area*:	100%	**Email:**	rsuckling@northrop.com.au
Rainfall Station:	WILLIAMTOWN RAAF - Station 061078 - Zone B		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1998 - 31/12/2007 11:54:00 PM		
Mean Annual Rainfall:	1125mm		
Evapotranspiration:	1394mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.33		
Study Area:	Williamtown		
Scenario:	Sensitive Catchment - Sandy soils		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness

Node: Receiving Node	Reduction
Flow	0.000473%
TSS	92.8%
TP	65.2%
TN	46.6%
GP	100%

Treatment Nodes

Node Type	Number
Sedimentation Basin Node	2
GPT Node	2
Generic Node	2

Source Nodes

Node Type	Number
Urban Source Node	2

Comments

- The 'SF Chamer' node has been modified to represent the below ground infiltration chamber. Default 'K' values have been manually adjusted to 1 in order to eliminate any performance from the actual tank, which would already be accounted for in the filter generic node target elements. Not doing this would represent a duplication of the chamber attenuation effect. (For any questions, please Contact Ocean Protect on 1300 354 722).

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	20 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.4
GPT	5 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.1
Receiving	Receiving Node	% Load Reduction	None	None	0.000473
Receiving	Receiving Node	GP % Load Reduction	90	None	100
Receiving	Receiving Node	TN % Load Reduction	45	None	46.6
Receiving	Receiving Node	TP % Load Reduction	60	None	65.2
Receiving	Receiving Node	TSS % Load Reduction	90	None	92.8
Sedimentation	SF Area 2.1x4.5 - 9.45m2	% Reuse Demand Met	None	None	0
Sedimentation	SF Area 2.1x4.5 - 9.45m2	High Flow Bypass Out (ML/yr)	None	None	0
Sedimentation	SF Chamber 2.25m Dia	% Reuse Demand Met	None	None	0
Sedimentation	SF Chamber 2.25m Dia	High Flow Bypass Out (ML/yr)	None	None	0
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Area Impervious (ha)	None	None	0.31
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Area Pervious (ha)	None	None	0
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Total Area (ha)	None	None	0.31
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Area Impervious (ha)	None	None	1.224
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Area Pervious (ha)	None	None	0
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Total Area (ha)	None	None	1.224

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Notional Detention Time (hrs)	8	12	0.0508
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Suspended Solids - k (m/yr)	8000	8000	1
Sedimentation	SF Chamber 2.25m Dia	Notional Detention Time (hrs)	8	12	0.0949
Sedimentation	SF Chamber 2.25m Dia	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber 2.25m Dia	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber 2.25m Dia	Total Suspended Solids - k (m/yr)	8000	8000	1
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Field Capacity (mm)	40	40	80
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Groundwater Daily Recharge Rate (%)	90	90	25
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Pervious Area Infiltration Capacity coefficient - a	150	150	200
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Pervious Area Infiltration Capacity exponent - b	3.5	3.5	1
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Field Capacity (mm)	40	40	80
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Groundwater Daily Recharge Rate (%)	90	90	25
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Pervious Area Infiltration Capacity coefficient - a	150	150	200
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Pervious Area Infiltration Capacity exponent - b	3.5	3.5	1
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25

Only certain parameters are reported when they pass validation

MUSIC-*link* Report

Project Details		Company Details	
Project:	Resource Recovery Facility, Tomago (Remondis)	**Company:**	Northrop Consulting Engineers
Report Export Date:	26/08/2020	**Contact:**	Robert Suckling
Catchment Name:	Remondis Resource Recovery Facility	**Address:**	Suite 4, 257-259 Central Coast Highway, Erina NSW 2250
Catchment Area:	1.224ha	**Phone:**	02 4365 1668
Impervious Area*:	100%	**Email:**	rsuckling@northrop.com.au
Rainfall Station:	WILLIAMTOWN RAAF - Station 061078 - Zone B		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1998 - 31/12/2007 11:54:00 PM		
Mean Annual Rainfall:	1125mm		
Evapotranspiration:	1394mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.33		
Study Area:	Williamtown		
Scenario:	Sensitive Catchment - Sandy soils		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness

Node: Junction	Reduction
Flow	0.000575%
TSS	92.5%
TP	64.1%
TN	45.6%
GP	100%

Treatment Nodes

Node Type	Number
Sedimentation Basin Node	2
GPT Node	2
Generic Node	2

Source Nodes

Node Type	Number
Urban Source Node	2

Comments

- The 'SF Chamer' node has been modified to represent the below ground infiltration chamber. Default 'K' values have been manually adjusted to 1 in order to eliminate any performance from the actual tank, which would already be accounted for in the filter generic node target elements. Not doing this would represent a duplication of the chamber attenuation effect. (For any questions, please Contact Ocean Protect on 1300 354 722).

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	20 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.4
GPT	5 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.1
Receiving	Receiving Node	% Load Reduction	None	None	0.000473
Receiving	Receiving Node	GP % Load Reduction	90	None	100
Receiving	Receiving Node	TN % Load Reduction	45	None	46.6
Receiving	Receiving Node	TP % Load Reduction	60	None	65.2
Receiving	Receiving Node	TSS % Load Reduction	90	None	92.8
Sedimentation	SF Area 2.1x4.5 - 9.45m2	% Reuse Demand Met	None	None	0
Sedimentation	SF Area 2.1x4.5 - 9.45m2	High Flow Bypass Out (ML/yr)	None	None	0
Sedimentation	SF Chamber 2.25m Dia	% Reuse Demand Met	None	None	0
Sedimentation	SF Chamber 2.25m Dia	High Flow Bypass Out (ML/yr)	None	None	0
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Area Impervious (ha)	None	None	0.31
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Area Pervious (ha)	None	None	0
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Total Area (ha)	None	None	0.31
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Area Impervious (ha)	None	None	1.224
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Area Pervious (ha)	None	None	0
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Total Area (ha)	None	None	1.224

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Notional Detention Time (hrs)	8	12	0.0508
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Suspended Solids - k (m/yr)	8000	8000	1
Sedimentation	SF Chamber 2.25m Dia	Notional Detention Time (hrs)	8	12	0.0949
Sedimentation	SF Chamber 2.25m Dia	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber 2.25m Dia	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber 2.25m Dia	Total Suspended Solids - k (m/yr)	8000	8000	1
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Field Capacity (mm)	40	40	80
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Groundwater Daily Recharge Rate (%)	90	90	25
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Pervious Area Infiltration Capacity coefficient - a	150	150	200
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Pervious Area Infiltration Capacity exponent - b	3.5	3.5	1
Urban	Development Scenario 1 - Truck Parking - 3100m&#65533;	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Field Capacity (mm)	40	40	80
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Groundwater Daily Recharge Rate (%)	90	90	25
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Pervious Area Infiltration Capacity coefficient - a	150	150	200
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Pervious Area Infiltration Capacity exponent - b	3.5	3.5	1
Urban	Development Scenario 2 - Truck Parking - 12_240m2	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25

Only certain parameters are reported when they pass validation

FLOOD CERTIFICATE

File No: PSC2013-05401
Issue date: 4-Nov-19
Property ID: 45464

Rylan Loemker
65 Merrick Circuit
Kiama NSW 2533

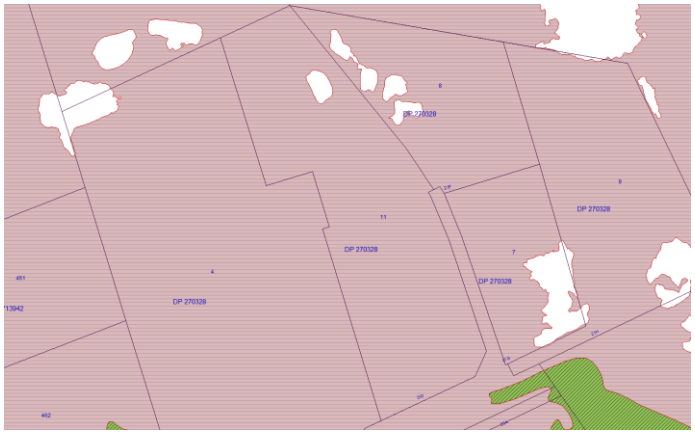
Certificate number: 83-2019-445-1

Property details: 21D School Drive TOMAGO LOT: 11 DP: 270328

Thank you for your recent flood enquiry regarding the above property. This certificate confirms that this property **is** located in a **flood prone** area. This **is not** a "flood control lot" for the purposes of the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.

Flood Planning Level	**N/A**	(This level defines the minimum floor level for habitable rooms and land that is subject to flood-related development controls (refer to Port Stephens LEP Section 7.3, Port Stephens DCP Section B5).
Highest Hazard Category	**Minimal Risk Flood Prone Land**	
Flood levels that may be useful are:		
Probable maximum flood level	6.3 metres AHD	(The highest flood level that could conceivably occur at this location. If required, onsite flood refuges are built at or above this level, refer to the Port Stephens Development Control Plan B5.2)

Flooding extent on subject lot, categorised by hazard



Crown © NSW Land and Property Information, © Port Stephens Council

Flood Hazard Categories

- Flood Prone Land
- Flood Planning Level
- Low Hazard Flood Fringe area
- Low Hazard Flood Storage area
- Low Hazard Overland Flow Path area
- Low Hazard Floodway area
- High Hazard Flood Fringe area
- High Hazard Flood Storage area
- High Hazard Overland Flow Path area
- High Hazard Floodway area
- Flood Prone Land subject to further investigation

Information derived from Port Stephens Council 2017, *Williamtown / Salt Ash Floodplain Risk Management Study & Plan*, BMT WBM, Newcastle

PORT STEPHENS COUNCIL
116 Adelaide Street
Raymond Terrace NSW 2324
PO Box 42
Raymond Terrace NSW 2324
Phone: 02 4980 0255
Email: council@portstephens.nsw.gov.au
www.portstephens.nsw.gov.au
ABN 16 744 377 876

IMPORTANT INFORMATION

This Certificate is provided in good faith and in accordance with the provisions of section 733 of the Local Government Act 1993. This certificate provides an estimate of real flood characteristics. Any particular flood may be different to the conditions that were assumed to determine the information shown in this certificate.

The provided flood information has been compiled from information provided by external consultants and flood studies completed by Council in accordance with the NSW Floodplain Development Manual. The information has not been independently verified or checked beyond the agreed scope of work and Council does not accept liability in connection with unverified information.

Council acknowledges that its flood information may be incomplete and varying in accuracy, however it is the best information available to Council at the time of issue.

The information is provided to give the applicant an understanding as to the extent of flooding affecting the property as well as assist in the preparation of a Floodplain Risk Management Report. The information is subject to change if more accurate data becomes available to Council. Accordingly the information in this certificate is not warranted after the day of issue.

Council is not responsible for updating flood data when site conditions have change from the time of the original flood study and does not accept responsibility arising from any change in site conditions.

Where the relevant information is available, Council's Flood Planning Levels include the estimated impact of climate change.

Council recommends that the information contained in this Certificate be interpreted by a suitably qualified professional. It is the responsibility of the applicant to obtain survey level data (in metres AHD) for the site.

Council disclaims responsibilities to any other person other than the person nominated on the Flood Certificate arising from or in connection with the information provided.

The floor level survey for the property (if available) is based on the conditions on the date of the survey. Any changes to buildings since the survey may alter the appropriate floor level. Refer to the Port Stephens LEP 2013 Section 7.3 and Port Stephens Development Control Plan Section B5 for details on development controls on flood prone land.

For information, the insurance industry uses its own estimates of flood risk and its own definitions for flooding, which may differ when compared with Council's information and the NSW Floodplain Development Manual. You should contact your insurance company to find out if a flood certificate may influence your insurance premium.

The information provided may contain personal information as defined under the Privacy and Personal Information Protection Act 1998. The purpose of collecting this information is to enable Council to consider matters under related legislation, issue related documentation where required and other associated matters as provided by law and will be utilised by Council officers in assessing the proposal and other associated activities. The information may also be made available to other persons in accordance with the relevant Acts and regulations, such as the Government Information (Public Access) Act 2009 and will be stored in Council's record system.

DEFINITIONS

"Flood Planning Level" defines the area of land below the 1% AEP flood event in the year 2100 plus freeboard and is the area of land subject to flood-related development controls (refer to Port Stephens LEP Section 7.3, Port Stephens Development Control Plan Section B5). The Flood Planning Level defines the minimum floor level for habitable rooms.

"Freeboard" is a safety margin applied to the estimation of flood levels to compensate for uncertainties due to factors such as wave action, localised hydraulic behaviour (eg flow path blockages caused by natural and urban debris such as trees, 'wheelie' bins, cars, containers) and changes in rainfall patterns and ocean water levels as a result of the changing climate (refer Flood Manual Section 4).

"Habitable room" in a residential situation is a living or working area, such as a lounge room, dining room, rumpus room, kitchen, bedroom or workroom; in an industrial or commercial situation is an area used for offices or to store valuable possessions susceptible to flood damage (refer Flood Manual Section 4).

"Adaptable minimum floor level" is the reduced flood planning level allowed in Council's Development Control Plan where the proposed development facilitates ongoing flood adaptation (for example, where the design facilitates building raising in the future, such as a pier and beam housing design).

"Probable maximum flood level" is the flood level that arises from the largest flood that could conceivably occur at a particular location (the "PMF" or extreme design event). This level does not include any freeboard and provides an upper limit of flooding and associated consequences for the problem being investigated. It is used for emergency response planning purposes to address the safety of people and defines the floodplain and identifies "Flood Prone" land.

"AEP" (Annual Exceedance Probability) is the chance of a flood of a given or larger size occurring in any one year (for example, the 1% AEP event has a 1% chance of occurring every year; the 5% AEP event has a 5% chance of occurring every year).

"Surveyed floor level" is the surveyed level at the entrance to the residence, usually measured as part of the floodplain risk management plan undertaken for the area.

"AHD" (Australian Height Datum) a common national survey level datum, approximately corresponding to mean sea level set in the mid to late 1960s.

Hazard Categories

"High hazard" flood area is the area of flood which poses a possible danger to personal safety, where the evacuation of trucks would be difficult, where able-bodied adults would have difficulty wading to safety or where there is a potential for significant damage to buildings (refer Flood Manual Appendix L).

"Low hazard" flood area is the area of flood where, should it be necessary, a truck could evacuate people and their possessions or an able-bodied adult would have little difficulty in wading to safety (refer Flood Manual Appendix L).

Hydraulic Categories

"Floodways" are those areas where a significant volume of water flows during floods and are often aligned with obvious natural channels. They are areas that, even if only partially blocked, would cause a significant increase in flood levels and/or a significant redistribution of flood flow, which may in turn adversely affect other areas (refer Flood Manual Section 4).

"Overland flow path" is land inundated by local runoff on its way to a waterway, rather than overbank flow from a stream, river, estuary, lake or dam (refer Flood Manual Section 4).

"Flood Storage" areas are those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The loss of storage areas may increase the severity of flood impacts by reducing natural flood attenuation (refer Flood Manual Section 4).

"Flood Fringe" is the remaining land in the Flood Planning Area after the Floodway area and Flood Storage area have been defined (refer Flood Manual Section 4).

"Flood Prone Land subject to further investigation" refers to the area of land susceptible to flooding where a comprehensive technical investigation of flood behaviour (to define the variation over time of flood levels, extent, velocity, flood hazard and the Flood Planning Level up to and including the probable maximum flood) has not yet been carried out (refer Flood Manual Appendix F).

"Minimal Risk Flood Prone Land" is land on the floodplain that is above the Flood Planning Level. This means that there are no flood-related development controls that apply to residential development, but critical emergency response and recovery facilities, such as evacuation centres and vulnerable development types, such as aged care and child care facilities, may not be appropriate in this location.

Appendix C – SEAR'S REQUIREMENT SUMMARY

Agency	Requirement / comment	Response / where addressed.
SEARs – General requirements	an assessment of potential impacts to soil and water resources, topography, hydrology, groundwater, drainage lines, watercourses and riparian lands on or nearby to the site, including mapping and description of existing background conditions and cumulative impacts	Soil & Water Management Plan
	a detailed site water balance including identification of water requirements for the life of the project, measures that would be implemented to ensure an adequate and secure water supply is available for the proposal and a detailed description of the measures to minimise the water use at the site	Stormwater re-use addressed in Section 2.3 Chapter 2 Soil & Water Management Plan
	characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from the waste into the wastewater and proposed mitigation measures to manage any impacts to receiving waters)	Chapter 2 Soil & Water Management Plan
	details of stormwater/wastewater/leachate management systems including the capacity of onsite detention system/s, onsite sewage management and measures to treat, reuse or dispose of water	Chapter 2 Soil & Water Management Plan
	detailed flooding assessment	Chapter 3 Soil & Water Management Plan
	a description of erosion and sediment controls	Chapter 2 Soil & Water Management Plan
	consideration of salinity and acid sulphate soil impacts	Chapter 4 Soil & Water Management Plan Contaminated Site Assessment Report
	characterisation of the nature and extent of contamination on the site and a description of proposed management measures.	Chapter 4 Soil & Water Management Plan Contaminated Site Assessment Report
Port Stephens Council	The site is located within class 4 Acid Sulphate Soils. As such, consideration of clause 7.1 of the Port Stephens Local Environmental Plan 2013 will be required. Any works more than 2 meters below ground level will require an Acid Sulphate Soils Management Plan (ASSMP). The need for this plan may be mitigated if a preliminary geotechnical investigation is provided identifying that it is unlikely that Acid Sulphate Soils will be disturbed.	Chapter 4 Soil & Water Management Plan Contaminated Site Assessment Report
	Flooding The site is listed as flood prone, it is recommended that further information be sought from Council to obtain the relevant flood levels for	Chapter 3 Soil & Water Management Plan

Agency	Requirement / comment	Response / where addressed.
	the site. This information will need to be considered within the proposal, and any relevant requirements within Chapter B5 of the PSDCP. A flood study is required to be submitted as part of the EIS, and include a survey of the floor levels	
	Stormwater Drainage and Water Quality In accordance with Section B4 Drainage and Water Quality of the PSDCP, a Stormwater Drainage Plan may be required if there is an increase in impervious surfaces or drains to the public drainage system. The proposal will also need to demonstrate that compliance with the Water Quality targets can be met. Any existing water quality measures currently in place on the site will also need to be addressed.	Chapter 2 Soil & Water Management Plan
NSW EPA	Provide details of the project that are essential for predicting and assessing impacts to waters including: a) the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http://www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from *the Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, ANZECC 2000) b) the management of discharges with potential for water impacts c) drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal. • Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts e.g. effluent ponds) and showing potential areas of modification of contours, drainage etc. •	Chapter 2 Soil & Water Management Plan Not Applicable
	Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.	Stormwater re-use addressed in Section 2.3 Chapter 2 Soil & Water Management Plan Sewer volumes addressed in Chapter 5 Soil & Water Management Plan

Agency	Requirement / comment	Response / where addressed.
	Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: http://www.environment.nsw.gov.au/ieo/index.htm should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.	Section 2.4 & 2.5 Chapter 2 Soil & Water Management Plan
	The environmental outcome for the project should ensure: • polluted water (including process waters, wash down waters, polluted stormwater or sewage) is captured on the site and directed to reticulated sewer where available or else collected, treated and beneficially reused, where this is safe and practicable to do so. • Promote integrated water cycle management that optimises opportunities for sustainable water supply, wastewater and stormwater management and reuse initiatives where it is safe and practicable to do so. • Appropriate stormwater management during construction and operation • bunding is designed in accordance with the EPA's *Bunding and Spill Management* guidelines.	Section 2.6 Chapter 2 Soil & Water Management Plan
	The EIS should also demonstrate how the stormwater management system will satisfy relevant contemporary guidelines such as *Managing Urban Stormwater - Soils and Construction - Volume 2E Mines and Quarries* (DECC June 2008).	Section 2.6 Chapter 2 Soil & Water Management Plan
	Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts). Note: Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004) or be approved and analyses undertaken by accredited laboratories).	Groundwater addressed in Section 4.4. Current stormwater run-off has not been sampled.
	Provide site drainage details and surface runoff yield.	Chapter 2 Soil & Water Management Plan
	Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?).	Chapter 2 Soil & Water Management Plan

Agency	Requirement / comment	Response / where addressed.
	No proposal should breach section 120 of the Protection of the Environment Operations Act 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations).	Chapter 2 Soil & Water Management Plan
	Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented.	Chapter 2 Soil & Water Management Plan
	Identify any potential impacts on quality or quantity of groundwater describing their source.	Chapter 2 Soil & Water Management Plan
	Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.	Chapter 3 Soil & Water Plan
	Identify impacts associated with the disturbance of acid sulphate soils and potential acid sulphate soils.	Chapter 4 Soil & Water Management Plan
	Containment of spills and leaks shall be in accordance with EPA's guidelines section 'Bunding and Spill Management' at http://www.epa.nsw.gov.au/mao/bundingspill.htm and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge.	To be addressed in PIRMP
	Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact.	Not applicable
	Assess impacts for the construction and operational phases of the proposal	Construction addressed in Appendix A Operational addressed in Chapter 2 Soil & Water Management Plan
	Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls.	Chapter 2 Soil & Water Management Plan
	Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies.	Appendix A Soil & Water Management Plan

Agency	Requirement / comment	Response / where addressed.
	Describe wastewater treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water.	Sewer addressed in Chapter 4 Soil & Water Management Plan
	Outline pollution control measures relating to storage of materials, possibility of accidental spills (e.g. preparation of contingency plans), appropriate disposal methods, and generation of leachate.	To be addressed in PIRMP
	Any proposed monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004).	To be addressed in EIS.
DPIE – Biodiversity & Conservation Division	The EIS must map the following features relevant to water and soils including: a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map). b. Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method). c. Wetlands as described in s4.2 of the Biodiversity Assessment Method. d. Groundwater. e. Groundwater dependent ecosystems. f. Proposed intake and discharge locations.	Soil & Water Management Plan
	The EIS must describe background conditions for any water resource likely to be affected by the development, including: a. Existing surface and groundwater. b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations. c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters. d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.	N/A Soil & Water Management Plan
	The EIS must assess the impacts of the development on water quality, including: a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the	Chapter 2 Soil & Water Management Plan

Agency	Requirement / comment	Response / where addressed.
	Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction. b. Identification of proposed monitoring of water quality.	
	The EIS must assess the impact of the development on hydrology, including: a. Water balance including quantity, quality and source. b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas. c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems. d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches). e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water. f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and reuse options. g. Identification of proposed monitoring of hydrological attributes.	Soil & Water Management Plan
	The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including: a. Flood prone land. b. Flood planning area, the area below the flood planning level. c. Hydraulic categorisation (floodways and flood storage areas).	Chapter 3 Soil & Water Management Plan
	The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.	Chapter 3 Soil & Water Management Plan

Agency	Requirement / comment	Response / where addressed.
	The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios: a. Current flood behaviour for a range of design events as identified in 11 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.	Chapter 3 Soil & Water Management Plan Not Applicable
	Modelling in the EIS must consider and document: a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood. b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories. c. Relevant provisions of the NSW Floodplain Development Manual 2005.	Chapter 2 & 3 Soil & Water Management Plan Not Applicable
	The EIS must assess the impacts on the proposed development on flood behaviour, including: a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure. b. Consistency with Council floodplain risk management plans. c. Compatibility with the flood hazard of the land. d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land. e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site. f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses. g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council. h. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council. i. Emergency management, evacuation and access, and contingency measures for the development	Chapter 2 & 3 Soil & Water Management Plan Emergency evacuation to be dealt with in Emergency Plan

Agency	Requirement / comment	Response / where addressed.
	considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES. j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.	
	The [EIS/EA] must describe the potential effects of coastal processes and hazards (within the meaning of the Coastal Management Act 2016), including sea level rise and climate change: a. On the proposed development b. Arising from the proposed development.	Not applicable.
	The [EIS/EA] must consider have regard to any certified Coastal Management Program (or Coastal Zone Management Plan) and be consistent with the management objectives described in the Coastal Management Act 2016 and development controls for coastal management areas mapped under the State Environmental Planning Policy (Coastal Management) 2018.	Not applicable.
DPIE - Water – Strategic Relations	The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.	Section 2.3 Soil & Water Management Plan
	A detailed and consolidated site water balance.	Section 2.3 Soil & Water Management Plan
	Proposed surface and groundwater monitoring activities and methodologies.	Addressed separately in EIS
	Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans (available at https://www.industry.nsw.gov.au/water).	Not applicable.