Integrated Water Management Strategy

Sludge Dewatering Plant: 7 Long Steet, Smithfield, NSW

Final Report

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1 Introduction

1.1 Overview

Martens & Associates Pty Ltd (**MA**) have prepared this Integrated Water Management Strategy (**IWMS**) on behalf of Element Environmental to support an Environmental Impact Statement (**EIS**) proposing to increase the processing limit of an existing Sludge Dewatering Plant (**SDP**) at 7 Long Street, Smithfield, NSW (the **Site**), owned and operated by Demast Pty Ltd (**Demast**). The processing limit would increase from 46,720 to 300,000 tonnes per annum (**tpa**) of liquid waste, comprising 200,000 tpa of sludge and groundwater and 100,000 tpa of general solid waste (**GSW**) (non putrescible) soils, virgin excavated natural material (**VENM**) and excavated natural material (**ENM**).

1.2 Proposed Development

MA understands that the proposed development subject of this State Significant Development (**SSD**) application is to:

1. Receive and process up to 300,000 tpa of waste.
2. Expand the waste streams processed at the SDP to include groundwater, GSW soils, VENM and ENM.
3. Surrender all previous development consents for the Site, with the Site to operate under a single development consent (this SSD consent).

1.3 Scope

This IWMS has been prepared to:

1. Present the results of the site water balance assessment.
2. Document water quality and quantity assessment findings.
3. Identify potential risks posed by the proposed development to surface and groundwater receptors.
4. Outline mitigation measures, management practices and monitoring methodologies for effective surface and groundwater management.

1.4 Secretary's Environmental Assessment Requirements

Table 1 provides a summary response to the water management requirements of the Planning Secretary's Environmental Assessment Requirements (**SEARS**) and relevant sections of this IWMS.

Table 1: Response to SEARs.

SEARs Water management requirement	Summary Response	Section(s) of IWMS
Water Management *– an integrated water management strategy, including:*		
A description of the water demands, supply, and measures to minimise water use.	Site water demands include non potable and potable uses. Non potable demands include: water retained in solids that leave the site and water lost due to evaporation from hardstand washdown. Potable demands are water required for staff amenities. Water is supplied from three sources: stormwater runoff from roofs and hardstand areas, water brought to site as a component of incoming wastes and town water (used for staff amenities). Water is recycled and reused on site for aggregate washing, truck washing, dust suppression and hardstand washdown, with any excess discharged to sewer in accordance with a Sydney Water Trade Waste Agreement. Site town water demand is minimised by using other recycled and reused waters for all non potable uses. Only the most sensitive water demand (staff amenities) is supplied by town water.	1.7, 2.3 and 2.4.
An assessment of potential surface and groundwater impacts (both quality and quantity) associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and groundwater-dependent communities nearby, in accordance with relevant water quality guidelines and the Department of Climate Change, Energy, the Environment and Water - Water Group (DCCEEW-Water) Groundwater Toolkit.	There will be no surface or groundwater impacts over and above those resulting from the existing site development as: 1. In respect of surface water, there is: a. No change in the Site's land use – therefore there shall be no increase in the generation rate of pollutants from existing areas. b. No increase in the Site's impervious area - therefore there shall be no increase in the rate of flow of stormwater from the site. 2. In respect of groundwater: a. The Site is currently characterised as being predominantly sealed with all areas used for waste storage and processing sealed with concrete hardstand or concrete shed floor	3.2.4, 3.3.4 and 4.

SEARs Water management requirement	Summary Response	Section(s) of IWMS
	slabs. These impervious surfaces effectively restrict water infiltration and prevent interaction with the underlying groundwater system. b. The proposed development does not involve changes to the existing, sealed surface conditions. c. The proposed development will not create any pathways for water, or pollutants, from the surface to interact with, or affect, underlying groundwater. This ensures there is no impact on groundwater quality or quantity.	
Details of the existing stormwater/wastewater drainage system and any proposed changes or augmentation, including the capacity of onsite detention system(s), onsite sewage management, and measures to treat, reuse, or dispose of water.	The existing stormwater management system consists of overland flow paths, pit and pipe infrastructure and a first flush capture system which retains the first 10 mm of rainfall runoff. Areas used for material handling are directed to the first flush system for treatment, while other site areas (roofs and road side parking) drain directly to the Cumberland City Council (**Council**) stormwater network. No significant changes are proposed to the existing stormwater drainage system. Assessment of the proposed development against the requirements of *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (NSW) (**SEPP BC**) demonstrates that the site development shall not result in detrimental impacts on water quality or quantity in the receiving environment. The site is serviced by sewer (for staff office sewage and trade waste disposal) and no works are proposed to the current site sewer system. In respect of treatment, reuse and/or disposal of water, potentially contaminated first flush runoff from all areas used for material handling are directed to the first flush system for treatment. Runoff from other site areas (roofs and road side parking) drain directly to the Council stormwater network. Water received in waste streams is treated through a site water treatment system using flocculation, sedimentation and filter presses to separate water from other included wastes.	1.7 and 3.1.

SEARs Water management requirement	Summary Response	Section(s) of IWMS
	Treated water is recycled and reused on site for aggregate washing, truck washing, dust suppression and hardstand washdown. Water surplus to site demands is discharged to sewer in accordance with a Sydney Water Trade Waste Agreement.	
Details of any surface or groundwater mitigation, management, and monitoring activities and methodologies.	Existing site stormwater quality systems include: a. Covered waste processing areas to prevent wash off of waste to stormwater. b. Sealed hardstand areas for trucks and waste handling to prevent infiltration of water and potential contaminants to groundwater. c. Hardstand management processes with regular wash down of sediments etc to the site wastewater management system. d. First flush stormwater capture system to capture potentially contaminated hardstand storm flows. Existing site mitigation, monitoring or management measures are considered adequate as no change to the site hardstand or to the nature of the site activities are proposed.	4

1.5 Relevant Guidelines

This IWMS has been prepared in accordance with the following standards / guidelines:

1. Cumberland City Council (2021), *Development Control Plan* (**DCP**).
2. NSW Health (2012), *Septic Tank and Collection Well Accreditation Guideline*.
3. SEPP BC.

1.6 Site Details

A description of the Site is provided in Table 2.

Table 2: Site description summary.

Item	Description
Site	7 Long Street, Smithfield, NSW
Legal identifier	Lot 1 DP 1273012

Item	Description
Site area	0.46 ha
Local Government Area (**LGA**)	Cumberland City Council
Land zoning	E4 General Industrial
Neighbouring environment	The Site is bound by Tait Street and industrial properties to the north, industrial properties and Tait Street Park to the east, Long Street, industrial properties and Prospect Creek to the south and industrial properties, vacant land and Britton Street to the west.

1.7 Site Process Overview

The Site operates as a liquid waste treatment facility, processing and recovering resources from various liquid waste streams through dewatering, separation and recycling techniques. The facility handles a diverse range of liquid waste streams, including:

1. Non Destructive Digging (**NDD**) waste: Also known as hydro excavation waste, this material typically consists of water mixed with soil, rocks, clay and other natural substances.
2. Stormwater: Contaminated stormwater containing gross pollutants and suspended solids.
3. Concrete Slurry: Residual washout and concrete waste from concrete agitator trucks, often with high water content.

The moisture content of each waste type received on Site varies. Demast has provided an annual average percentage breakdown of the different waste types received, along with the estimated moisture content for each (summarised in Table 3).

Table 3: Breakdown of waste types and estimated moisture content.

Waste Type	Percentage of Received Waste (%)	Moisture Content (%)
NDD	84	45
Stormwater	14	100
Concrete Washout/Slurry	2	20
Average Moisture Content		52

The received waste undergoes initial screening to separate larger materials, which are washed and sorted into stockpiles. Finer materials are processed through screens and pumps to separate sand, water and clay fines. The water and clay fines are mixed in a tank, treated with flocculants to aid in separation and directed to a thickener. The resulting sludge is directed to a filter press or centrifuge, where excess water is extracted, producing a drier clay product.

The end products from this process are water, sand, aggregate and clay. Water is recycled and reused on Site for aggregate washing, truck washing, dust suppression and hardstand washdown, with any excess discharged to sewer in accordance with a Sydney Water Trade Waste Agreement, while the solid products are transported off Site. Demast provided percentage breakdown of each solid product generated from the received waste, along with their estimated moisture content (Table 4).

Table 4: Breakdown of produced solids and estimated moisture content.

Solids	Percentage of Solid products (%)	Moisture content (%)
Sand	36	12
Aggregate	18	5
Clay	46	25

2 Water Balance

2.1 Overview

The water balance assessment for the proposed development used data provided by Demast (discussed in Section 1.7) to estimate the projected water supply and demand following the proposed site capacity increase. It includes calculation of water supply from site surface runoff and losses due to evaporation, using data sourced from the Bureau of Meteorology (**BOM**).

2.2 Method

The water balance considers the following key components:

1. Site Water Supply: Assessment of available water sources, including town water, stormwater runoff from roofs and hardstand areas and recycled wastewater.
2. Site Water Demand: Estimated average annual water requirements for the proposed development.
3. Site Water Balance: Evaluation of supply versus demand, based on Demast's data, to determine if additional water supply is needed or if excess water will be discharged to sewer.

2.3 Site Water Supply

The Site has three water supply sources:

1. Stormwater runoff from roofs and hardstand areas.
2. Water brought to site as component of incoming wastes.
3. Town water used for staff amenities.

Water used on site is recycled through the Site's 'close loop' drainage system.

2.3.1 Stormwater Runoff

Stormwater runoff, primarily generated by roofs and sealed driveways / hardstands, is captured by the first flush system and was considered as part of this assessment. The catchment sizes draining to the first flush system are summarised in Table 5, with the corresponding catchment plan shown in Figure 1.

Rainfall climate data was sourced from the BOM weather station located at Prospect Reservoir (Station No. 67019). For the purpose of this assessment, the highest recorded annual rainfall of 1,900 mm from the year 1950 was used to assess site performance in an 'extreme wet' year. The first flush system on the Site's hardstand and some roofs captures only the first 10 mm of runoff with runoff in addition to that discharged via the Council stormwater system. For the design / impact assessment it is assume that 100% of rainfall runoff flowing to the first flush system is captured. As the Site is assessed as

having an excess volume of water (due to the high water content of imported wastes) this results in a conservative design / impact assessment as the approach overestimates runoff and water supply thus creating a larger than anticipated site water surplus.

Table 5: Summary of Site surface runoff calculation.

Catchment Surface	Area (m^2)	Rainfall (mm/annum)	Volume (ML/annum)
Hardstand	2056	1900	3.9
Roof	306	1900	0.6

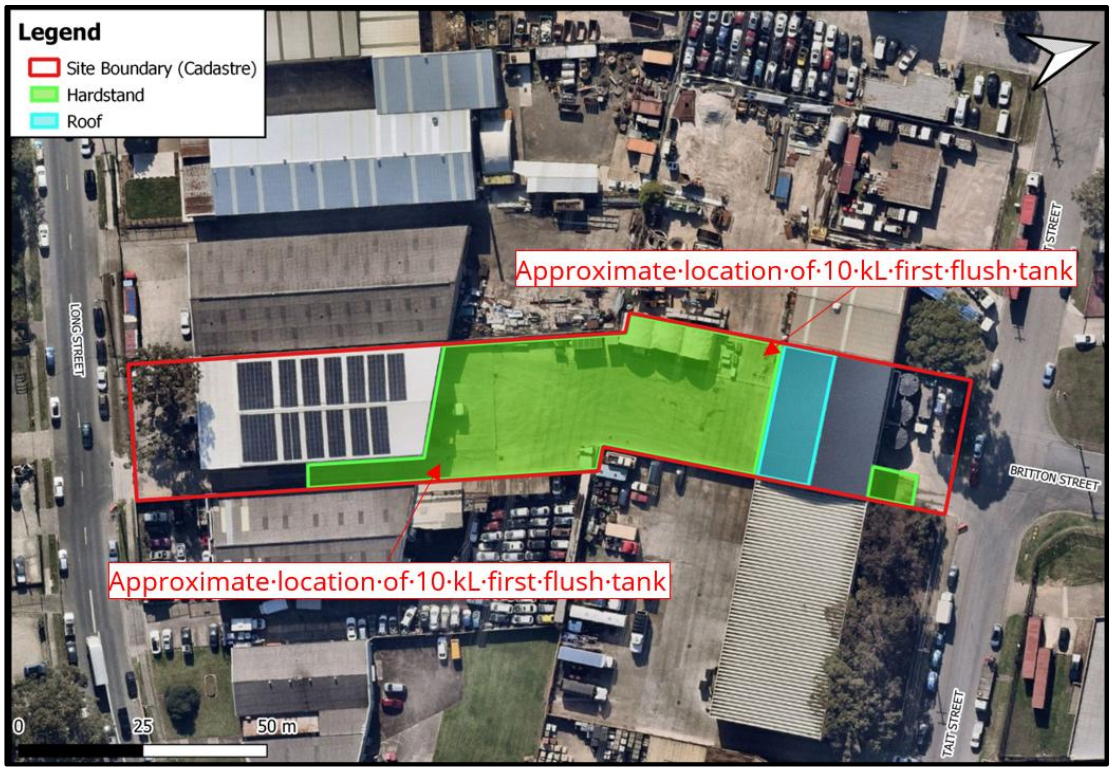

Figure 1: First flush system catchment plan.

2.3.2 Water in Imported Waste

Waste received to Site contains a significant water, which is separated from incoming solids through site processes. The generated water is then used for the processes of waste processing on the Site. Estimated total water 'supplied' in waste to the Site is calculated from incoming material moisture content provided by Demast (Table 3) and an assumed 5% moisture content for incoming GSW, VENM and ENM.

The estimated water supply from the waste streams received to Site is summarised in Table 6.

Table 6: Summary of water supply from proposed waste streams.

Waste Type	Proposed Volume (tpa)	Average Moisture Content (%)	Moisture Content (tpa)	Supply (ML/annum)
Liquid	200,000	52	103,575	103.6
Solid	100,000	5	5,000	5.0

2.3.3 Town Water Supply

The Site is serviced with town water supply from Sydney Water. The use of town water is minimised through the recycling of water from other sources for all demands able to be satisfied by lower quality water. Only the staff amenities is supplied by town water this minimising the site town water demands.

2.4 Site Water Demand

Site water demand is divided into two main categories:

1. Non potable water demand:
    a) Water retained in solid (sand, aggregate and clay) that leave the Site.
    b) Water lost due to evaporation from the hardstand washdown.
2. Potable water demand:
    a) Water required for staff amenities.

2.4.1 Solid Products

Solids produced from the processing operations contain moisture, which is carried off site, effectively using water from the Site. This moisture content in the solids adds to the overall water demand for the Site. Table 7 summarises the estimated amount of solids produced from recycling of the proposed new volume of liquid and solid waste.

Table 7: Summary of solids produced from each waste type recycled.

Waste Type	Proposed Volume (tpa)	Moisture Content (tpa)	Solids Produced (tpa)
Liquid	200,000	103,575	96,425
Solid	100,000	5,000	95,000
Total			**191,425**

The total solid product estimated to be produced on Site is further divided into sand, aggregate and clay based on the percentage breakdown provided by Demast (Section 1.7). Table 8 provides a detailed breakdown of these materials and associated moisture content.

Table 8: Solid product breakdown.

Material	Percentage of Total Solids (%)	Solids Produced (tpa)	Moisture Content (%)	Demand (ML/annum)
Sand	36	68274	12	8.2
Aggregate	18	34941	5	1.7
Clay	46	88210	25	22.1

2.4.2 Evaporative Loss

The Site recycles water by collecting and treating it for various forms of site reuse including the recycling process, truck wash, dust suppression and hardstand washdown. Generally, this reuse does not result in water losses other than through evaporation, which, for the purposes of this assessment, is considered a water demand.

The annual evaporated volume was calculated based on the hardstand area washed down using recycled water. Evaporation was estimated using the BOM average annual pan evaporation map, which indicates a value of 1,600 mm per annum. A reduction factor of 0.25 was applied to account for the intermittent wetting of the hardstand area with volume calculation detailed in Table 9.

Table 9: Summary of evaporation estimates.

Evaporation (mm/ annum)	Actual Evaporation (mm/annum)	Hardstand Area (m^2)	Evaporation Volume (ML/annum)
1600	400	2056	0.8

2.4.3 Potable Water demand

The site potable water demand is limited to the amenities demands for staff and is estimated based on 27 L/person/day (based on NSW Health (2012) guidelines for industrial use). Demast advised that up to 12 employees will be onsite on weekdays and 2 on weekends. The water demand for weekday and weekend days is summarised in Table 10.

Table 10: Potable water demand.

Period	Number of Staff	Demand (L/person/day)	Demand (ML/annum)
Weekdays	12	27	0.084
Weekend	2	27	0.006
Total			**0.090**

2.5 Site Water Balance Results

The site water balance is summarised in Table 11 below.

Table 11: Summary of Site water balance.

Supply	ML/annum	Demand	ML/annum
Non Potable			
Runoff from roof	0.6	Sand	8.2
Runoff from hardstand	3.9	Aggregate	1.7
Liquid waste	103.6	Clay	22.1
Solid waste	5.0	Evaporation	0.8
Total supply	113.1	Total demand	32.8
Non potable balance			80.3
Potable			
Town water	0.09	Staff amenities	0.09
Potable balance			0

The assessment indicates that a total of 113.1 ML/annum is estimated to be supplied from recycled wastewater and stormwater runoff. The total site demand is estimated to be 32.8 ML/annum, leaving a surplus of approximately 80.3 ML/annum, which is to 220 kL/day.

Surplus water, together with amenities sewage (0.09 ML/year) will be discharged to the Sydney Water sewer network under an Industrial Trade Waste Agreement with Sydney Water. Demast has an existing agreement which permits the discharge of up to 420 kL/day of industrial wastewater from the Site.

The calculated site water balance excess requiring disposal to sewer is considerably less than the maximum allowable discharge under the agreement. Review of the water balance shows that the site water balance excess is well in excess of the volume of water generated by the stormwater runoff. Therefore, it is confirmed that, regardless of rainfall conditions, the Site shall be able to operate as planned.

The potable water demand for the Site is estimated at 0.09 ML/annum, which will be fulfilled primarily by the Site's town water supply. The nature of the proposed development is such that it shall minimise the use of town water.

3 Stormwater Management

3.1 Existing Stormwater Management

The Site drains to two discharge points: Long Street and Tait Street, using a combination of overland flow, pit and pipe infrastructure and a first flush capture system which retains the first 10 mm of rainfall runoff. Areas used for material handling are directed to the first flush system for treatment, while other site areas (roofs and road side parking) drain directly to the Council stormwater network.

Stormwater runoff from the area between the Long Street shed and Long Street flows overland directly to Long Street, while runoff from the area between the Tait Street shed and Tait Street is conveyed via pit and pipe infrastructure to the public drainage system on Tait Street. Surface runoff between the sheds is collected in pits and directed to the first flush system. A portion of the Tait Street facing roof drains into the first flush system with the remainder discharging to the Tait Street stormwater system. The Long Street facing shed drains directly to the public drainage system on Long Street.

The proposed development does not include any significant changes to the current site drainage configuration as the proposed change in operating volumes does not alter the need for site stormwater management systems.

3.2 Stormwater Quantity

3.2.1 Overview

Water quantity controls from both Council DCP and from SEPP BC apply to the proposed development.

3.2.2 SEPP Objectives

SEPP BC specifies water quantity requirements in Chapter 6, Section 6.6 as follows:

> *(2) Development consent must not be granted to development on land in a regulated catchment unless the consent authority is satisfied the development ensures—*
>
> > *(b) the impact on water flow in a natural waterbody will be minimised.*

The above requirement has been interpreted as ensuring that post development flows are equal to or less than pre development flows.

3.2.3 Council Objectives

Based on DCP Part G4, Section 2.4, Subsection Onsite Detention, the proposed development is exempt from the requirement for On Site detention (**OSD**) as it falls under the following control:

> *C1. On-site detention shall be required for all proposed development, re-development or new land subdivisions, except where:*

- *The proposal is a one-off extension up to 150m^2 impervious area for industrial or commercial development. Subsequent extensions require on-site detention facility.*

Since the proposed development does not result in an increase in impervious area, it qualifies for the exemption and does not require OSD.

3.2.4 Assessment

OSD systems are typically required where development shall result in increased stormwater flows. The Council DCP anticipates this and does not require OSD where increases in impervious area as a result of a development is minor (Part G4, Section 2.4). There is no increase in impervious area and therefore no OSD is required in accordance with the DCP.

The proposed development shall not alter the effect of the site stormwater system on the receiving environment. No change to imperviousness (which could lead to increased flows) and no change to the site stormwater capture (which could lead to reduced flows) shall occur. Therefore, the SEPP BC objectives are achieved.

Therefore, the proposed development complies with both SEPP BC and Council requirements for stormwater flows and no OSD system is required.

3.3 Stormwater Quality

3.3.1 Overview

Water quality controls from both the Council DCP and from SEPP BC apply to the proposed development.

3.3.2 SEPP Objectives

SEPP BC specifies water quality requirements in Chapter 6, Section 6.6 as follows:

> *(2) Development consent must not be granted to development on land in a regulated catchment unless the consent authority is satisfied the development ensures—*
>
> > *(a) the effect on the quality of water entering a natural waterbody will be as close as possible to neutral or beneficial, and*

To address the above requirement, we have considered a Neutral or Beneficial Effect (**NorBE**) assessment. The 'test' to be satisfied in the NorBE assessment is that the proposed development results in a 'neutral or beneficial effect' on water quality. That is, irrespective of the development's current effects on water quality, NorBE is achieved if the post development pollutant loads are equal to (i.e. neutral), or less than (i.e. beneficial) the pre development pollutant loads.

3.3.3 Council Objectives

The following stormwater treatment targets are defined by Council in Part G4, Section 2.5, Subsection Water Quality of the Council DCP. The targets applicable to the proposed development are:

1. 85% reduction in total suspended solids.
2. 60% reduction in total phosphorus.
3. 60% reduction in total nitrogen.
4. 90% reduction in gross pollutants.

3.3.4 Assessment

The proposed development does not involve an increase in impervious area or a change in land use. The NorBE assessment, as required by SEPP BC, uses the existing Site condition as the base case for assessment. As there is no change in imperviousness and no change in landuse (and therefore pollutant generation), the proposed development will achieve a neutral effect on stormwater quality. It is therefore concluded that the proposal satisfies the requires of SEPP BC for water quality management.

Typically, Councils only require the implementation of water quality upgrades where there are changes to the surfaces on which rain would fall. Since there will be no change in the external activities and final finished surfaces and material storage patterns etc, no upgrades to the water quality infrastructure are proposed. Therefore, implementation of DCP water quality controls is not considered necessary on the Site.

4 Impact Assessment

There will be no surface or groundwater impacts, over and above those resulting from the existing development, because:

1. In respect of surface water, there is:
    a. No change in the Site's land use – therefore there shall be no increase in the generation rate of pollutants from existing areas.
    b. No increase in the Site's impervious area – therefore there shall be no increase in the rate of flow of stormwater from the Site.
2. In respect of groundwater:
    a. The Site is currently characterised as being predominantly sealed with all areas used for waste storage and processing sealed with concrete hardstand or concrete shed floor slabs. These impervious surfaces effectively restrict water infiltration and prevent interaction with the underlying groundwater system.
    b. The proposed development does not involve changes to the existing, sealed surface conditions.
    c. The proposed development will not create any pathways for water, or pollutants, from the surface to interact with, or affect, underlying groundwater. This ensures there is no impact on groundwater quality or quantity.

Additionally, no mitigation, monitoring or management of surface or groundwater is considered required as the nature of the proposed development is unlikely to result in any additional groundwater or surface water impacts.

5 Conclusion

In summary:

1. The proposed development, the subject of this SSD application, is to increase the processing limit of the existing SDP on the site and expand the waste streams to include groundwater, GSW soils including VENM and ENM.

2. Water is brought to site in waste received and is used and reused on site in the waste processing system. Where an excess of water occurs that excess water is discharged to sewer under an existing Sydney Water trade waste agreement.

3. The existing stormwater management system comprises overland flow paths, pit and pipe infrastructure with a first flush capture system which transfers the initial, potentially contaminated site runoff to the site's waste processing system. Considering that the proposed development does not change the extent of hardstand, nor the nature of the activities undertaken on the existing hardstand, we conclude the existing stormwater system does not require augmentation from a stormwater quantity or quality management perspective.

4. The completed water balance assessment concludes that the Site shall be able to operate as planned with water received to the Site in waste, plus water captured in the first flush system, being adequate to supply all site demands. Excess water received and / or generated by the Site is able to be disposed to sewer within the existing trade waste approval limits.

5. As the proposed development is only to expand the processing limits and waste streams of the current facility, with no physical works proposed which would including impervious area or change the nature of the use of any existing hardstand areas, there are unlikely to be any impacts to surface water systems which would affect the water quality or quantity leaving the Site. In this way the requirements of SEPP BC and the objectives of the Council DCP are satisfied.

6. The existing site hardstand and structures prevent any potential impacts on the underlying groundwater systems. As no change to this sealed surface is proposed there is no risk of any increased groundwater impacts as a result of the proposed development.

7. Given it is unlikely that the proposed development will result in additional impacts to surface and groundwater, no mitigation, monitoring or management measures are considered necessary.

6 References

Cumberland City Council (2021) *Development Control Plan.*

NSW Health (2012), *Septic Tank and Collection Well Accreditation Guideline*.

State Environmental Planning Policy Biodiversity Conservation (2021) (NSW).