



REPORT

VOLUME 5

Environmental Impact Statement

Prestons Waste Treatment Facility

Submitted to:

NSW Department of Planning, Industry and Environment

Submitted by:

Hi Quality Waste Treatment Services Pty Ltd

Golder Associates Pty Ltd

Level 8, 40 Mount Street, North Sydney, New South Wales 2060, Australia

20142192-052-R-Rev0 - Appendices H - M

August 2021



APPENDIX H

**Flooding and Stormwater
Management Study**



REPORT

Prestons Waste Treatment Facility

Flooding and Stormwater Management Study

Submitted to:

Hi Quality Group

Submitted by:

Golder Associates Pty Ltd

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20142192-039-R-Rev0

19 August 2021



Distribution List

Hi Quality Group

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1.0 INTRODUCTION

Hi-Quality Waste Treatment Services Pty Ltd (Hi-Quality) commissioned Golder Associates (Golder) to undertake a flooding and stormwater management study (the Study) for 9-13 Whyalla Place, Prestons NSW 2170 (the Site). The Study supports the Environmental Impact Statement (EIS) for the Site based on the Department of Planning, Industry and Environment (DPIE) Secretary's Environmental Assessment Requirements (SEARs) for construction and operation of a waste treatment facility with the capacity to process up to 270,000 tonnes of contaminated soil, contaminated sludges and liquid waste (SD 9346594).

This report summarises the background, data review, methodology and results of the flooding and stormwater management assessment.

2.0 STUDY SCOPE

The following summary provides scope of the Study:

- Background review and data processing: review the project background, existing stormwater management at the Site, hydrology, regional flood studies, guidelines and SEARs for the development
- Surface and groundwater impact assessment: Assess potential surface and groundwater impacts associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and nearby groundwater-dependent communities.
- Detailed flood assessment: Develop a flood model to compare baseline and post-development flood conditions, thus assess the potential flood impact by the development for selected design storm events recommended in SEARs for the development
- Detailed stormwater management plan (SWMP): Provide a stormwater management strategy and a plan.
- Wastewater and sewage management: Provide details of wastewater management system including the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse or dispose of water.
- Detailed site water balance assessment: Assess site water balance including a description of the water demands and breakdown of water supplies, and any water licensing requirements. This also includes a description of the measures to minimise water use.
- Erosion and sediment control: Provide a description of the proposed erosion and sediment controls during construction.
- Water quality assessment: 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 and monitoring activities and methodologies).

3.0 BACKGROUND AND DATA REVIEW

3.1 The Site

The Site is located within the Liverpool Local Government Area (LGA), approximately 5 km west of Liverpool Central Business District and is within the established industrial area of the suburb of Prestons. Whyalla Place adjoins the Site along the western boundary of the Site. The Site is located approximately 500 m to the north of the M7 and approximately 500 m south of the nearest residents across Hoxton Park Road. The majority of land located between Hoxton Park Road to the north and the M7 to the east, south and west has been developed for commercial/industrial uses. A recreational oval and sporting facility, identified as Liverpool

Catholic Club and the Mercure Hotel, are located over 350 m to the west of Site. Figure 1 shows a general layout of the Site.

The Site is at an elevation of approximately 23.5 mAHD, with the area gently sloping to the north east and east. The existing warehouse finished floor level (FFL) is at 23.6 mAHD. The Site is an existing industrial facility with a warehouse, office, carpark and some other infrastructure resulting majority of the landuse being paved (impervious), except the small garden area in the front of the facility.

Maxwells Creek, the nearest watercourse to the Site flows in a northerly direction approximately 300 m east of the Site before confluences with Cabramatta Creek approximately 2.2 km northeast of the Site. Cabramatta Creek, being the largest watercourse at the vicinity of the Site, flows in an easterly direction approximately 680 m north of the Site and confluences with Georges River at Warwick Farm.

The existing stormwater drainage network at the Site connects to the Council drainage network that runs along the eastern boundary of the Site (see Appendix A). Based on the Council flood mapping (LCC 2021), fluvial flooding impacts the Site only for the probable maximum flood (PMF) event. Whilst the *Liverpool Local Environment Plan 2008* mapping identifies the Site is located outside the 'flood planning area' (area below the 1% annual exceedance probability (AEP) maximum flood level plus 0.5 m freeboard), the Council flood mapping identifies part of the Site is located within the 'flood planning area'.



Figure 1: Site Layout

3.2 Proposed development

The proposed waste treatment facility would process up to 270,000 tonnes of soil and liquid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated Soils
- Contaminated Sludges
- Liquid Wastes.

Hi-Quality would utilise the existing office space within the existing building on the Site. The new ancillary infrastructure would be constructed as part of the proposed development including (see Appendix B):

- Weighbridges and weighbridge office
- Warehouse extension
- New driveway
- Parking
- Wheel wash and truck wash down bay.

3.3 Guidelines

In undertaking the Study, Golder referred to the following guidelines in general:

- Flood mitigation: Floodplain Development Manual (NSW Government 2005)
- Stormwater management:
 - Managing Urban Stormwater: Strategic Framework. Draft (Environmental Protection Authority (EPA) 1996)
 - Managing Urban Stormwater: Council Handbook. Draft (EPA 1997)
 - Managing Urban Stormwater: Treatment Techniques (Department of Environment and Conservation (DEC) 2006)
 - Managing Urban Stormwater: Source Control. Draft (EPA 1998)
 - Managing Urban Stormwater: Harvesting and Reuse (DEC 2006)
- Erosion and sediment control:
 - Managing Urban Stormwater: Soils & Construction Volume 1 (Blue Book) (Landcom 2004)
 - Managing Urban Stormwater: Soils & Construction Volume 2B Waste Landfills (Department of Environment and Climate Change (DECC) 2008).

Golder also referred the Council's stormwater management guidelines of:

- Design flood levels: Liverpool Local Environmental Plan (LEP) 2008
- On-site stormwater detention (OSD): City of Liverpool Draft On-Site Stormwater Detention Policy (LCC 2004).

In addition to above, Golder referred to the Australian Rainfall and Runoff (ARR) 2019 guidelines (Ball et al 2019) for the stormwater management assessment.

3.4 Regional flood studies

The regional flood study that is relevant to the Site is the Cabramatta Creek Floodplain Management Study & Plan prepared by Bewsher Consulting Pty Ltd in October 2004 (Bewsher 2004). The Council utilised results of Bewsher (2004) flood study for the current Council floodplain mapping (LCC 2021).

3.5 Design rainfall estimates

Golder sourced the rainfall intensity-frequency-duration (IFD) data for the Site (location 33.932 S, 150.879 E) from the Bureau of Meteorology’s (BoM) computerised design IFD rainfall system (CDIRS), which allows automatic determination of a full set of IFD curves and associated data for any location in Australia (BoM 2020). Figure 2 and Table 1 summarises the rainfall depths associated with design storms for durations up to 72 hours and AEP events down to 1% for the Site.

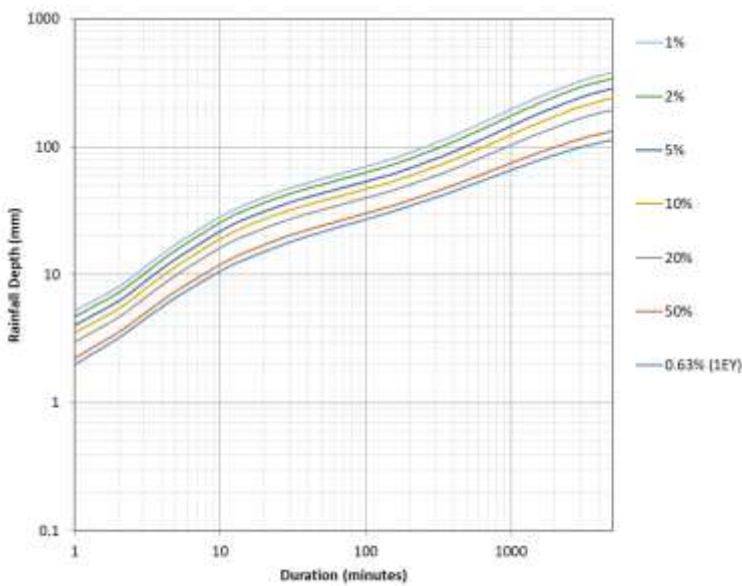


Figure 2: Rainfall depth versus rainfall duration for selected annual exceedance probabilities (AEPs)

Table 1: Rainfall depths (mm) for selected durations and annual exceedance probabilities (AEPs)

Duration (min)	0.63% (1EY*)	50%	20%	10%	5%	2%	1%
5	6.71	7.5	10	11.7	13.4	15.7	17.5
10	10.7	12	16.3	19.1	21.9	25.6	28.5
15	13.3	15	20.3	23.9	27.4	32.1	35.6
30	18	20.3	27.2	32	36.7	42.9	47.7
60	23	25.6	34.1	40	45.8	53.6	59.8
120	28.8	32	42.2	49.4	56.7	66.7	74.6
180	33.2	36.8	48.5	56.9	65.3	77.1	86.5
360	43.1	48	64	75.4	87.2	104	117
720	57.5	64.7	88.3	105	123	147	166
1440	76.6	87.5	123	149	176	211	238
2880	98.2	114	165	202	240	288	324
4320	110	128	187	231	275	328	369

Notes: * Exceedance per Year

4.0 DETAILED FLOOD ASSESSMENT

4.1 Flood modelling

To support the Study, Golder sourced the TUFLOW flood model associated with the Bewsher (2004) flood study from the Council. This Study assumes the associated input data for the model provided by the Council are accurate and represents the baseline scenario well. Golder ran the model with no changes to its structure and the existing input data to generate the baseline flood inundation maps for the AEP events of 1%, 0.5%, and 0.2% (similar to the 100-year, 200-year, and 500-year average recurrence interval (ARI) events, respectively) and the PMP event. Golder compared the modelled baseline flood inundation maps against the available Council flood mapping for the 1% AEP and the PMP events to check they are identical.

Golder utilised the same flood model only replacing the buildings within the Site based on the proposed development plan of the Site (Appendix B) and generated the post-development flood inundation maps for the above AEP storm events.

4.2 Flood inundation results

Appendix C summarises the baseline and the post-development flood inundation maps at the Site and its adjacent area for AEP events of 1%, 0.5%, and 0.2% and the PMF event. Based on the flood modelling results, the fluvial flooding only impacts the Site for the PMF event. i.e. post-development flood inundation is identical to that of baseline scenario for the rest of the storm events. Therefore, a comparison between the baseline and the post-development flooding is only provided for the PMF event.

The flood modelling results for the PMF event indicate both the baseline and post-development maximum flood level within the Site's carpark area is about 1 to 2 m. The flood modelling results for the PMF event also indicate that the increased post-development building footprint partially impedes the flood flow across the Site and causes slightly less flooding at the immediate downstream of the Site's northern boundary for the post-development scenario than the baseline scenario.

Therefore, it is anticipated the proposed development will not increase flood risks to the Site and the adjacent areas under the modelled scenarios.

4.3 Finished floor levels for planning

Based on the *Liverpool Local Environment Plan 2008*, the Site is located outside the 'flood planning area'. However, Council's flood mapping provided as part of "Liverpool Development Control Plan 2008" (see Figure 3) indicates the western portion of the site is within the 'flood planning area', and correspondence from the Council dated 14 July 2020 (City of Liverpool, 2020) advised Golder this is the mapping to be used for the Project. Nevertheless the whole site is categorised as a 'low flood risk' area.

Based on the Council's advice, the minimum finished floor level for new buildings at the site is estimated at 23.6 mAHD (i.e. the maximum 1% AEP flood level at the site of 23.1 mAHD plus 0.5 m freeboard). This level is also consistent with the existing finished floor level at the Site.

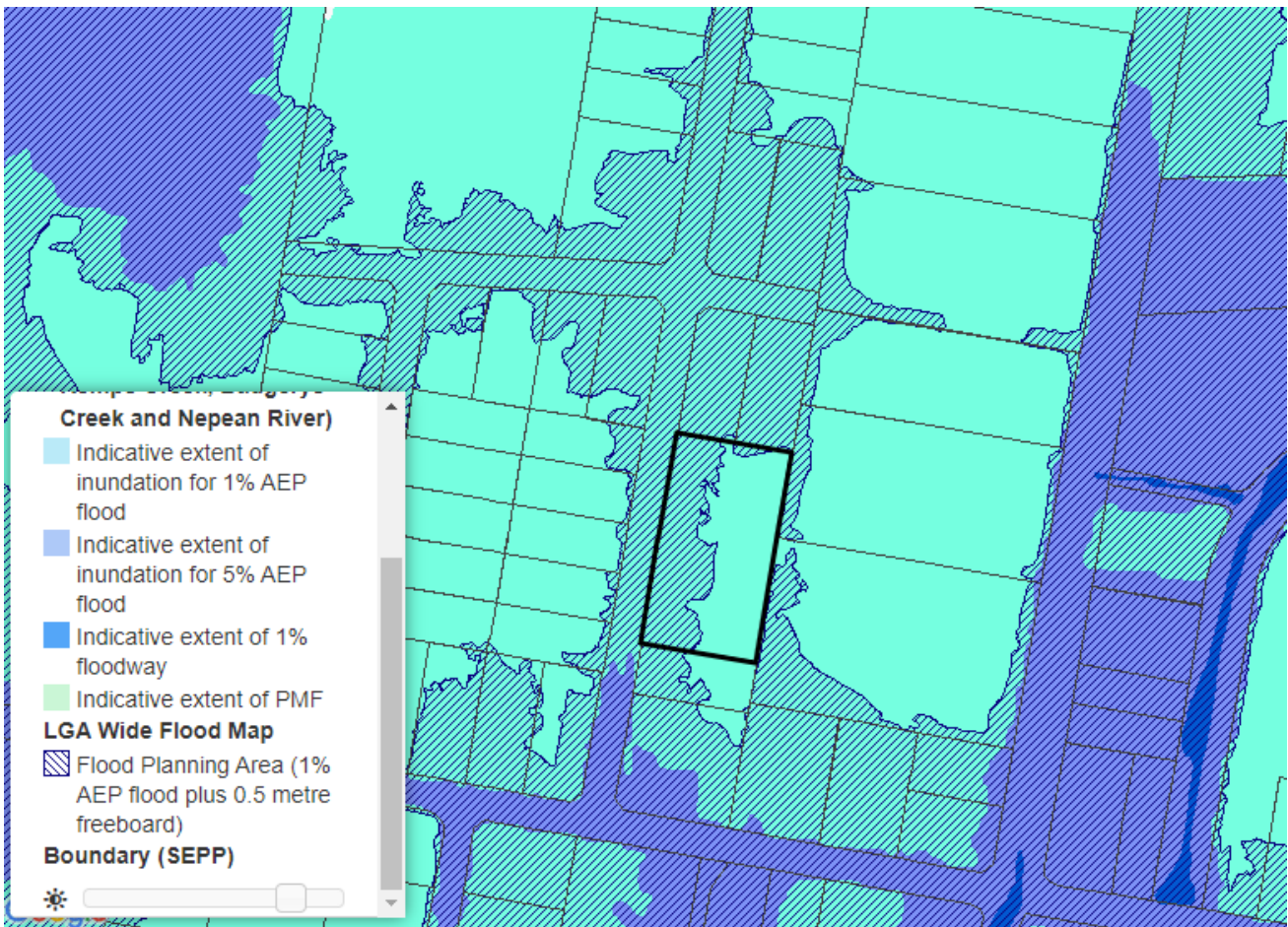


Figure 3: Site and the extent of flood planning area (Council's flood mapping)

4.4 Flood management and mitigation measures

Based on Council's advice, it is recommended that the minimum finished floor level for the proposed development at the Site should be at 23.6 mAHD, which is the maximum 1% AEP flood level at the site of 23.1 mAHD plus 0.5 m freeboard allowance.

5.0 STORMWATER MANAGEMENT

5.1 Existing stormwater management

The Site is generally flat and slightly grades towards north. Based on the topography, the Site sits around 0.25 m above Whyalla Place. The warehouse and other infrastructure seem to act as barriers to the external runoff from west and east. Therefore, it appears that the external runoff (except for the PMF event) does not flow into the Site.

The existing drainage system at the site appears to be managing runoff from the carpark and roof areas and discharges into the Council's drainage network (see Appendix A). A series of existing down pipes convey runoff from the warehouse and office roof into the existing 150 mm diameter drains. Then the existing 150 mm diameter drain conveys part of this runoff and runoff from the carpark area that is captured by the grated stormwater pits into the 375 mm diameter Council drain that appears to run along the eastern boundary of the Site. The rest of the warehouse runoff (from the eastern portion of the roof) is conveyed directly into the same Council drain. The Site's lot connection pit to the Council drain is located at the northeastern corner of the Site at invert level of 22.65 mAHD. In addition to the above, a minor portion of Site's rainfall runoff that generates

from the existing driveways (only the portion beyond the Site's front concrete wall) reports towards Whyalla Place.

Golder assumes the current stormwater quality at the Site is acceptable to the Council requirements/licencing, as there are no stormwater treatment devices at the Site.

5.2 Post-development stormwater management plan

5.2.1 Design criteria

Based on the Council's on-site stormwater detention (OSD) policy, OSD shall apply should the development (LCC, 2004):

- Where there is an existing stormwater system that is unable to cater for the increase in discharge due to development
- When the development will involve an increase in impervious area on the site
- Where it is intended to connect stormwater directly to the street kerb and gutter only and the discharge for the 10-year ARI (similar to 10% AEP) exceeds 20 L/s.

Given that there is no existing OSD at the Site, Golder assumes that the existing drainage system at the Site that connects to the Council's drainage network provides enough capacity to manage the Site's baseline runoff up to and including the 1% AEP event. Therefore, only the increased runoff due to increased impervious area (due to land use change) would be managed with OSDs sized for the 1% AEP event.

5.2.2 Landuse change

The survey plan (Appendix A) and the proposed site layout (Appendix B) show the baseline and the post-development landuse within the Site, respectively. Table 2 summarises a comparison of landuse between the baseline and the post-development scenarios.

Whilst the post-development combined roof area is increased, the combined areas of carpark and other paved are decreased. Garden areas remains as is. In summary, total impervious percentage out of total lot area remains as is.

Table 2: Baseline and post-development landuse comparison (m²)

Area	Baseline	Post-development	Change
Roof	4560	6080	1520
Carpark & Other Paved	3550	2030	-1520
Impervious (Beyond the Concrete Wall fronting Whyalla Place)	10	16	6
Total Impervious	8120	8126	6
Garden	580	580	0
Pervious (Beyond the Concrete Wall at the Front)	370	376	0
Total Pervious	950	956	0
Total Lot	9060	9066	0

5.2.3 Stormwater quantity

As noted in Section 5.2.1, Golder assumed the existing drainage network at the Site that connects to the Council's drainage network is capable of managing a runoff volume similar to the baseline scenario. Therefore, to comply with the Council OSD policy, Hi-Quality is not required to provide any OSD at the Site.

5.2.4 SWMP

Figure 4 summarises the conceptual post-development Stormwater Management Plan (SWMP). Golder developed the post-development SWMP in order that it integrates into the existing drainage system with minimal alterations where practicable. The post-development stormwater management strategy will manage runoff from different areas of the Site, up to and including the 1% AEP event, as:

- Warehouse roof: The existing and new downpipes will convey runoff from the roof, including the extension into 150 mm drains. Part of this runoff will be detained within onsite storage tank (see Section 5.6.2) to be used for the site activities and any excess during large storm events will be discharged into the existing Council's drainage network.
- Carpark and other paved areas: The existing drainage network will capture and convey this runoff plus the excess runoff from the garden area into the Council's drainage network.
- Garden area: part of runoff will infiltrate into the ground and the excess will flow into the Site's drainage network (see above dot point).
- Pervious and impervious (beyond the concrete wall at the front): There is no considerable post-development landuse change in this area except the new driveway, which will have increase of a total impervious area by approximately 6 m², thus no OSD is required. Part of this runoff will infiltrate into the ground and the excess will flow into Whyalla Place.



Figure 4: Post-development stormwater management plan (conceptual)

5.2.5 Stormwater quality

The development requires no stormwater quality treatment infrastructure given that:

- The proposed roof extension will reduce the carpark area, thus post-development runoff from carpark area would be less than that of the baseline.
- Hi-Quality will manage the process water wholly within the bunded building and separate from stormwater (as a closed system) and recycle and reuse where possible, thus the natural environment or the Council drainage network will not receive leachate/process water from the facility.
- A wheel wash is located on exit from the building.
- The storage and handling of materials undertaken inside the buildings.
- The door ways of Buildings would be bunded with drive over bunding.
- Leachate collection within the building.
- Bunding of the Wastewater Treatment Plant and chemicals and dangerous goods in accordance with Australian Standards.
- Roof runoff will be clean stormwater. Golder notes this assumption is also aligned with the current stormwater management practices at the Site.
- Baseline stormwater quality is within the level that is acceptable to Council's requirement, given that there are no existing stormwater quality treatment structures in the Site.

- The combined baseline area of carpark, other paved areas, and the garden area is less than that of the post-development.
- Post-development runoff from the existing driveways and the pervious grass area beyond the concrete fence at the front will remain almost the same except the proposed driveway where the increased impervious area that runoff could flow into Whyalla Place only is about 6 m² and is considered to have a negligible impact on stormwater quality.

5.2.6 Erosion and sediment control (construction phase)

The baseline and post-development site landuse are more than 90% impervious. Nevertheless, the pervious area is the garden with lawn or bush cover. The proposed construction at the Site is limited to installation of new buildings, modifications to the existing carpark, installation of a new driveway, modifications to the stormwater management network and installation of above-ground infrastructure. Therefore, minimal amount of erosion and sediments as a result of stormwater runoff is anticipated during construction activities.

In the construction phase, Hi-Quality will implement the erosion and sediment control plan (see Figure 5) with control measures of:

- Cover grates of all the Site's drainage pits with a geotextile cloth to remove fine sediment and debris in runoff
- Apply gravel filled bags around the Site's drainage pits to temporarily pond runoff locally and remove medium to coarse sediments from runoff
- Apply gravel filled bags across the existing and proposed entry driveway at the Site boundary to temporarily pond runoff locally and remove sediments from runoff.
- Spill kits are made available to construction vehicles.

The sediment control plan and measures were selected in accordance with the Blue Book (Landcom 2004).

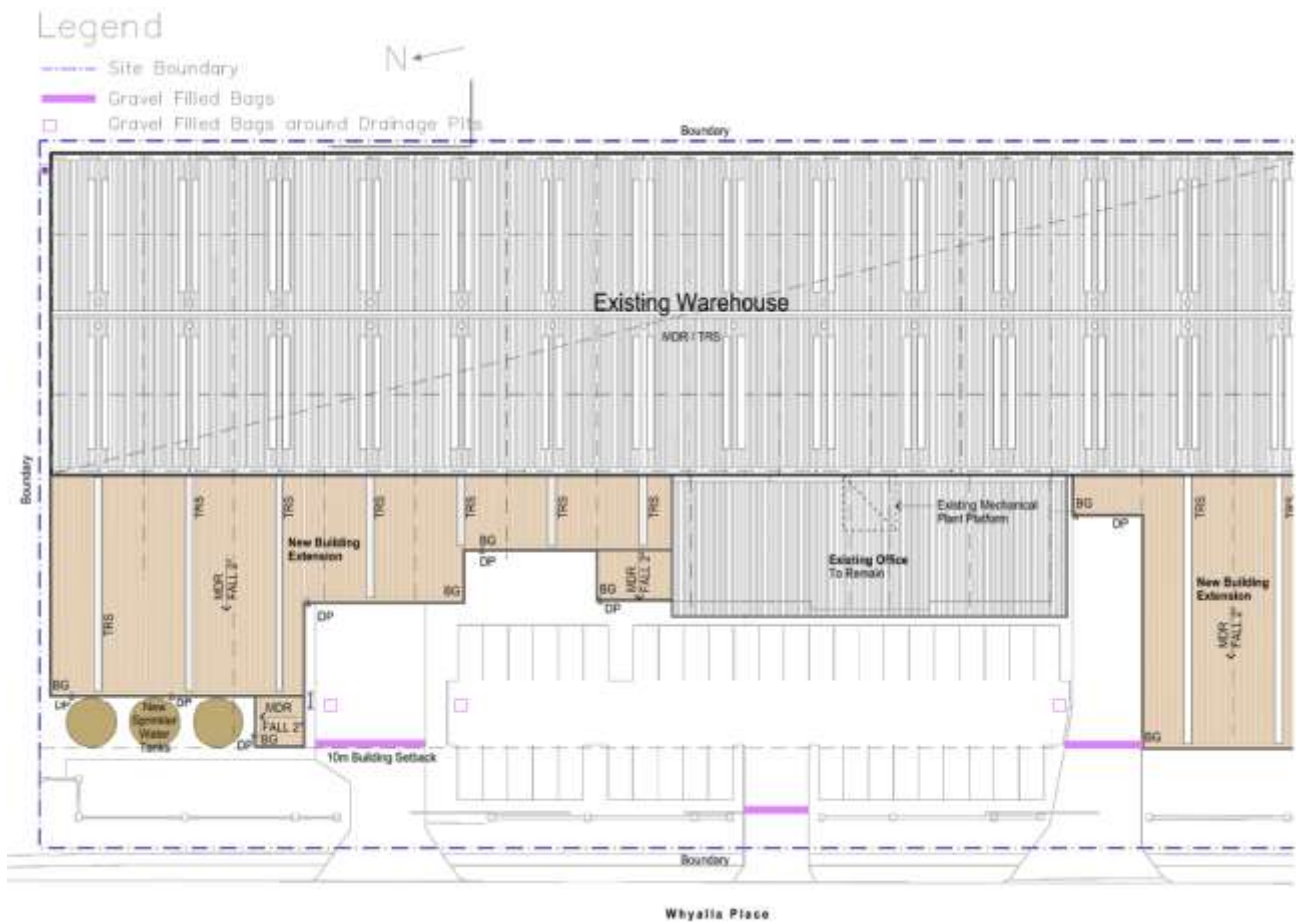


Figure 5: Erosion and sediment control plan (construction phase)

5.3 Impact on local water courses and riparian ecosystems

The baseline stormwater runoff from the Site reports into the Council's drainage system. The post-development stormwater management (see Section 5.2) is intended to either detain for use at the facility or discharge the Site's stormwater into the Council's drainage system and allowing only the exceedance runoff to be discharged into Whyalla Place. Therefore, the new development will have negligible impact to the adjacent water courses or riparian ecosystems.

5.4 Sewage management

The site's amenities will stay as is post-development. In addition, Hi-Quality will add a 'Trade Waste Discharge' point for process water under a 'Sydney Water Trade Waste Agreement'. Therefore, sewage from amenities will be managed as is and the process water will be managed through the Trade Waster Discharge point.

5.5 Groundwater

Most of the baseline and post-development Site area are covered with impervious surfaces (more than 90%) plus the Site's post-development drainage system will limit infiltration. Any post-development runoff infiltration from the garden areas will be similar to the baseline conditions. Therefore, the proposed development is not anticipated to alter the groundwater quantity or quality in the underlying aquifers/groundwater system.

5.6 Water Balance Assessment

Golder assessed the Site's post-development water balance considering the site's water usage and the long-term climate data. Appendix D provides a detailed description of the site's water balance assessment.

5.6.1 Water usage

Table 3 provides the estimated annual water usage.

Based on the proposed site's water balance, the development would reduce the potable water usage with:

- Rainwater that falls on the total warehouse area, including the extension would be collected in rainwater storage tanks and used for process applications, dust suppression. This would reduce the requirements for potable water.
- Roof water would also be available for top up of the firefighting water storage tank above minimum level per regulations. Potable water would provide the minimum level requirement.

Staff amenities would continue to be supplied by potable water.

Table 3: Water usage (kL per annum)

Source	Usage	kL/yr
Staff Amenities		
Potable Water	Toilet	63
	Urinal	5
	Wash Basins and Kitchen Sinks	49
	Dishwasher	9
	Shower	0.12
	Total Water Usage for Staff Amenities	126.12
Process Applications and Dust Suppression		
Rainwater Re-use and Potable Water	Dust Suppression and Moisture Conditioning (all activities)	1,000
	Wheel Wash and Truck Wash	2,500
	Bioremediation	500
	Total Process Applications and Dust Suppression	4,000

5.6.2 Rainwater storage tank capacity

Golder estimated the required capacity of the underground rainwater storage tank at the Site of approximately 50 kL by analysing potential rainfall runoff and required rainwater volume in daily basis for a long period of time (more than 40 years) based on the historical rainfall data and the required rainwater volume for process applications and dust suppression (see Table 3). This rate is slightly above the water requirement for process applications and dust suppression at the Site for four days (44 kL).

The rainwater storage tank would be constructed under the garden area with details to be provided in the detailed design stage.

5.6.3 Rainwater availability

Figure 6 summarises the monthly rainwater availability during an average year based on 50 kL storage tank and daily rainfall data from 1970 to date. The selected 50 kL tank capacity would allow average about 2,000 kL/annum rainwater supply. This equals to 50% of the annually required volume for process applications and dust suppression. The deficit will be supplied from the potable water. The rainwater supply during the driest months (July to September) and the wettest months (November to March) would be around 1,500 kL/annum and around 2,250 kL/annum, respectively.

Golder notes that there is a potential that Hi-Quality would consider harvesting rainwater runoff from the carpark area in the future to further reduce the potable water usage. This will be investigated, and details will be provided during the detailed design stage.

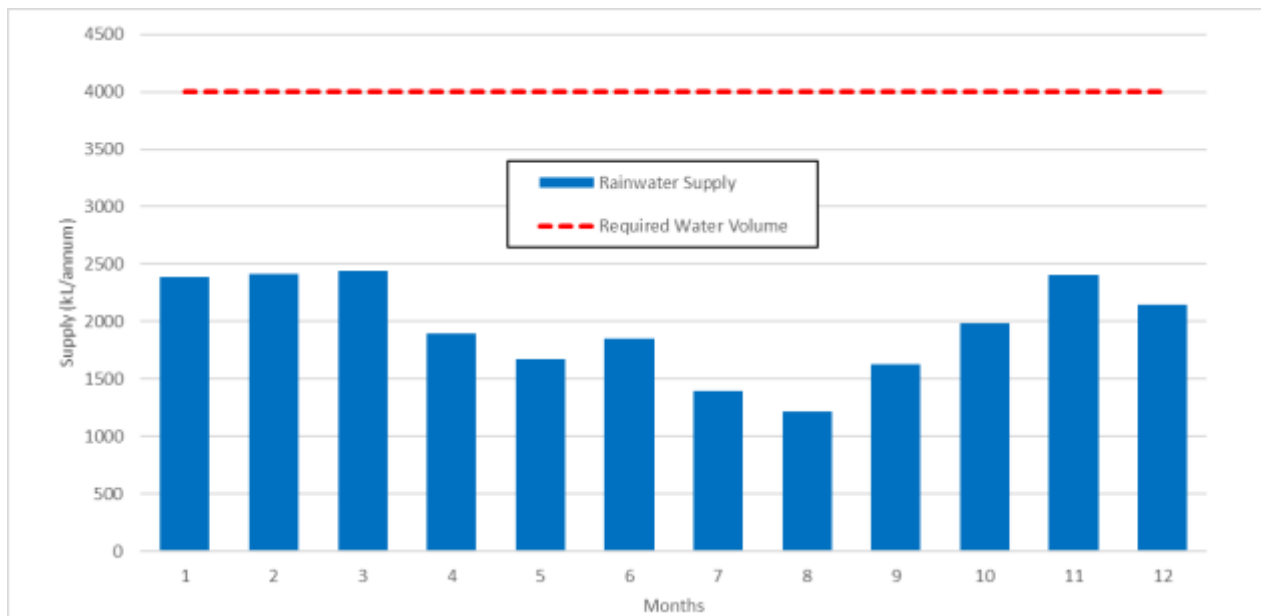


Figure 6: Monthly rainwater availability during an average year based on 50 kL storage tank and daily rainfall data from 1970 to date.

5.7 Stormwater management and mitigation measures

Golder proposes the following mitigation measures to minimise potential impact of the proposed development on the water related aspects of the adjacent receiving environment:

- A CEMP outlining environmental procedures during construction would be prepared prior to construction and implemented during construction.
- Implement the proposed stormwater erosion and sediment control strategy and plan during the construction phase (see Section 5.2.6)
- An OEMP outlining environmental procedures during operation would be prepared and implemented.
- Implement the proposed post-development stormwater management strategy and the plan (see Section 5.2.3)
- Recycle and reuse the rainwater for the Site's activities to reduce the potable water use (see Section 5.6.3)
- Allow no process water mix into the Site's stormwater system through:

- The storage and handling of materials undertaken inside the buildings.
- The floor of the building is concrete with centrally located collection pits so that all spills and contamination are contained within the buildings.
- Doorways of the building would be bunded with drive over bunding.
- Wheel and truck wash down would be undertaken inside in the wheel wash with water collected and directed to the waste water treatment plant.
- Trucks would pass over a wheel wash inside the building prior to exit preventing tracking of waste.
- Leachate collection within the building.
- Bunding of the Wastewater Treatment Plant in accordance with Australian Standards.
- Chemicals and dangerous goods will be stored and bunded in accordance with Australian Standards.
- No facility wash down would be undertaken inside the buildings generating waste water.
- Spill kits would be located adjacent to potentially contaminating activities and procedures would be in place for Spill Management and documented in the OEMP.
- Installation of water efficient fixtures to conform to Council requirements.
- No use of groundwater.
- Quarterly monitoring of the groundwater and surface water quality.

6.0 CONCLUSION

The development has no impact on flooding within the Site and on the downstream area given that the Site does not inundate for storm events including and up to 0.2% AEP. Based on the flood modelling results, the Site would inundate for the PMF event, but the development does not impact the flooding within and downstream from the Site even for the PMF event.

Given the above plus with the recommended flood management and mitigation measures (see Sections 4.4) in place the project will have negligible impact on flooding within and downstream of the site.

Golder also notes that with the recommended stormwater management and mitigation measures (see Section 5.6) in place and considering the below the project will have negligible impact on stormwater and groundwater:

- Stormwater quantity: The development does not cause increase of the impervious area, thus does not increase the runoff discharge. In fact, the proposed rainwater harvesting system would decrease the runoff discharge from the Site. The surface runoff discharge point that connects the site's drainage network to the Council drainage network will also remain unchanged.
- Stormwater quality: The proposed roof extension will reduce the carpark area, thus post-development runoff from carpark area would be less than that of the baseline. The process water will be managed and discharged separated to the stormwater at the Site.
- Watercourses, riparian areas, groundwater, and groundwater-dependent communities: The site runoff discharge point will still be the Council drainage system. The Site does not use any groundwater and does not allow infiltration of stormwater from the impervious areas into the groundwater. Only the minor garden area would allow some infiltration of incidental rainfall which is similar to the baseline conditions.

- Erosion and sediment: The development will follow the erosion and sediment control plan (see Section 5.2.6) during construction according to the guidelines provided in the Blue Book.
- Potable water usage: The development will reduce the potable water usage mainly by harvesting rainwater for the process applications and dust suppression activities.

7.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled – “Important Information Relating to this Report”, which is included in Appendix D of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder has under the contract between it and its client.

8.0 CLOSING

Golder trust that the information presented in this document relating to the flooding and stormwater management at the Site is of value and provides adequate advice to Hi-Quality and to support the EIS.

Should you have any queries concerning this report, please do not hesitate to contact the under-signed.

REFERENCES

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Signature Page

Golder Associates Pty Ltd



Amila Basnayaka
Senior Water Resources Engineer



Jacinta McMahon
Principal Environmental Engineer

AB/TR-JM/cl:jem

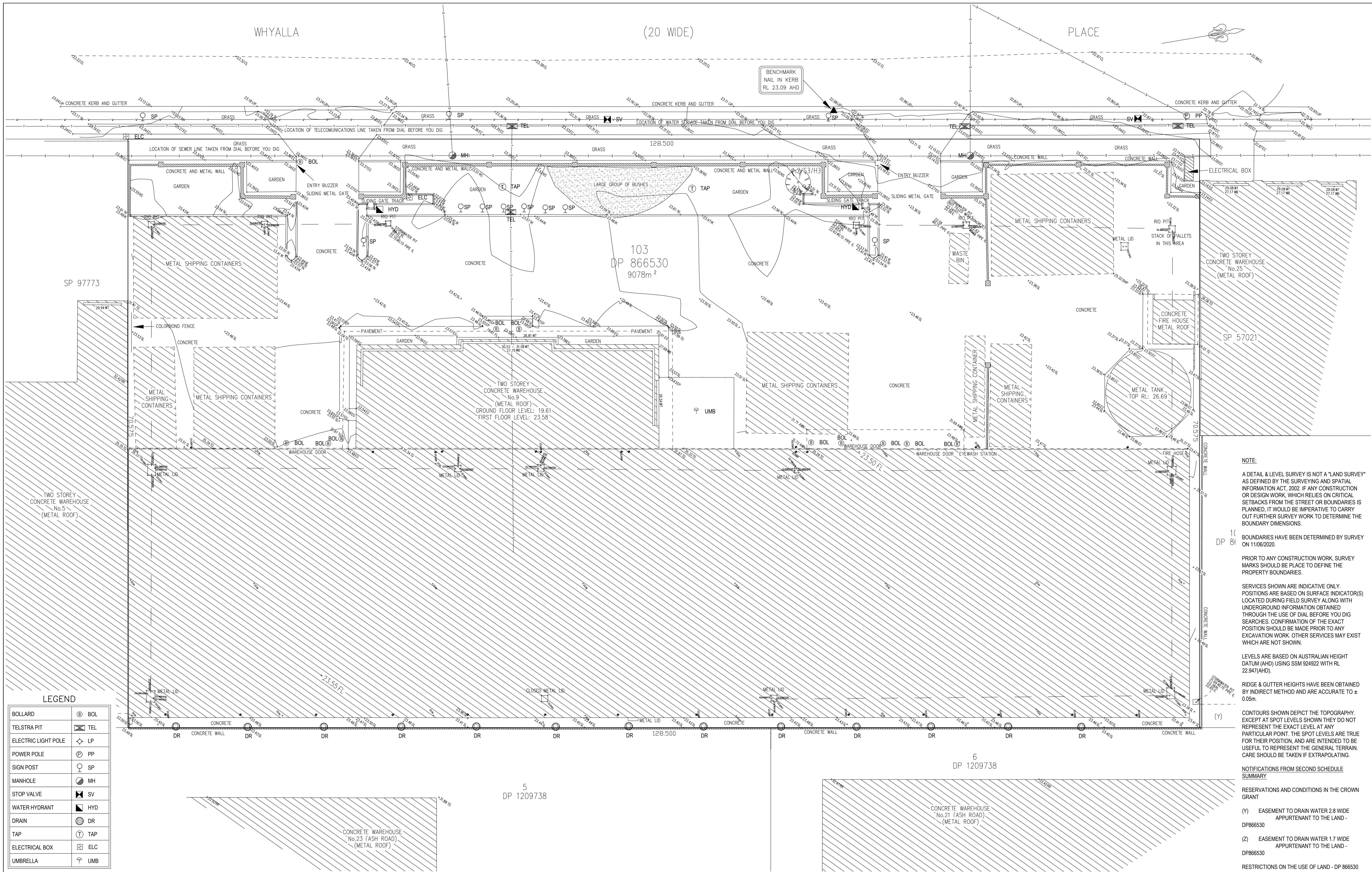
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[https://golderassociates.sharepoint.com/sites/125733/project files/6 deliverables/20142192-039-r-surface water assessment/20142192-039-r-rev0 flooding and stormwater management study.docx](https://golderassociates.sharepoint.com/sites/125733/project%20files/6%20deliverables/20142192-039-r-surface%20water%20assessment/20142192-039-r-rev0%20flooding%20and%20stormwater%20management%20study.docx)

APPENDIX A

Survey Plan



NOTE:
 A DETAIL & LEVEL SURVEY IS NOT A 'LAND SURVEY' AS DEFINED BY THE SURVEYING AND SPATIAL INFORMATION ACT, 2002. IF ANY CONSTRUCTION OR DESIGN WORK, WHICH RELIES ON CRITICAL SETBACKS FROM THE STREET OR BOUNDARIES IS PLANNED, IT WOULD BE IMPERATIVE TO CARRY OUT FURTHER SURVEY WORK TO DETERMINE THE BOUNDARY DIMENSIONS.

1C DP 866530 BOUNDARIES HAVE BEEN DETERMINED BY SURVEY ON 11/06/2020.

PRIOR TO ANY CONSTRUCTION WORK, SURVEY MARKS SHOULD BE PLACED TO DEFINE THE PROPERTY BOUNDARIES.

SERVICES SHOWN ARE INDICATIVE ONLY. POSITIONS ARE BASED ON SURFACE INDICATOR(S) LOCATED DURING FIELD SURVEY ALONG WITH UNDERGROUND INFORMATION OBTAINED THROUGH THE USE OF DIAL BEFORE YOU DIG SEARCHES. CONFIRMATION OF THE EXACT POSITION SHOULD BE MADE PRIOR TO ANY EXCAVATION WORK. OTHER SERVICES MAY EXIST WHICH ARE NOT SHOWN.

LEVELS ARE BASED ON AUSTRALIAN HEIGHT DATUM (AHD) USING SSM 924922 WITH RL 22.947(AHD).

RIDGE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY INDIRECT METHOD AND ARE ACCURATE TO ± 0.05m.

CONTOURS SHOWN DEPICT THE TOPOGRAPHY. EXCEPT AT SPOT LEVELS SHOWN THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. THE SPOT LEVELS ARE TRUE FOR THEIR POSITION, AND ARE INTENDED TO BE USEFUL TO REPRESENT THE GENERAL TERRAIN. CARE SHOULD BE TAKEN IF EXTRAPOLATING.

NOTIFICATIONS FROM SECOND SCHEDULE SUMMARY

RESERVATIONS AND CONDITIONS IN THE CROWN GRANT

(Y) EASEMENT TO DRAIN WATER 2.8 WIDE APPURTENANT TO THE LAND - DP866530

(Z) EASEMENT TO DRAIN WATER 1.7 WIDE APPURTENANT TO THE LAND - DP866530

RESTRICTIONS ON THE USE OF LAND - DP 866530

LEGEND

BOLLARD	Ⓟ BOL
TELSTRA PIT	⊠ TEL
ELECTRIC LIGHT POLE	⊕ LP
POWER POLE	⊕ PP
SIGN POST	⊕ SP
MANHOLE	⊕ MH
STOP VALVE	⊠ SV
WATER HYDRANT	⊕ HYD
DRAIN	⊕ DR
TAP	⊕ TAP
ELECTRICAL BOX	⊠ ELC
UMBRELLA	⊕ UMB

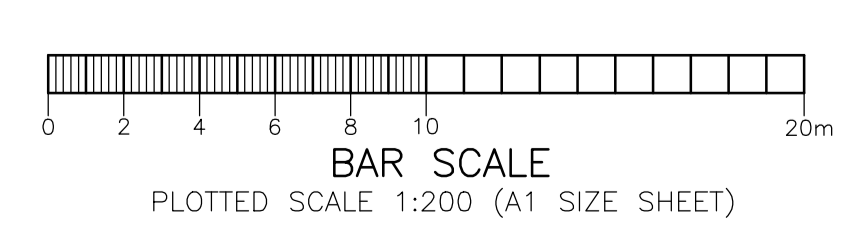
TSS TOTAL SURVEYING SOLUTIONS
 LANE COVE | CAMDEN | MANLY VALE | CENTRAL COAST

NOTE:
 INFORMATION CONTAINED IN THIS PLAN IS THE COPYRIGHT OF TOTAL SURVEYING SOLUTIONS. THE USE OR DUPLICATION WITHOUT THE WRITTEN CONSENT OF TOTAL SURVEYING SOLUTIONS CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.

REVISION No.	REVISION DATE:	COMMENT:

LEGEND:

AWN - AWNING	IL - INVERT LEVEL	TK - TOP OF KERB
CL - CENTER LINE	LIP - LIP OF KERB	WT - TOP OF WINDOW
EC - EDGE OF CONCRETE	NS - NATURAL SURFACE	WB - BOTTOM OF WINDOW
EG - EDGE OF GARDEN	RR - ROOF RIDGE	INVxxx - INVERT (PIPE SIZE mm)
EP - EDGE OF PAVEMENT	SL - SURFACE LEVEL	TREES: 0.4S/10H/16 - DIAMETER/SPREAD/HEIGHT
IK - INVERT OF KERB	TG - TOP OF GUTTER	



PLAN SHOWING DRAINAGE INFORMATION WITH PREVIOUS SURVEY OF DETAIL & LEVELS OVER LOT 103 IN DP866530

CLIENT: HI QUALITY
 PROJECT: DETAIL SURVEY - PRESTONS
 ADDRESS: 9 WHYALLA PLACE, PRESTONS

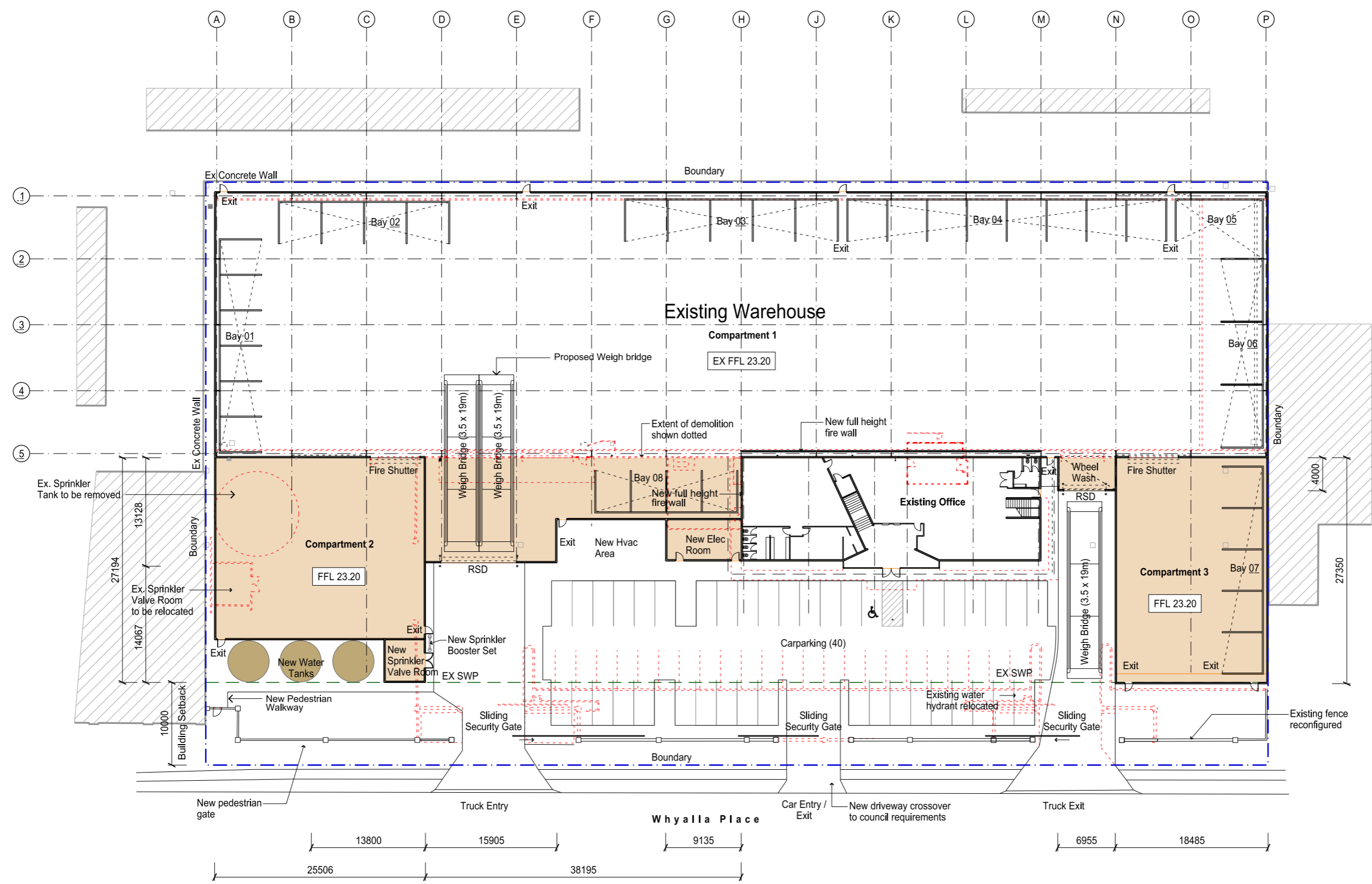
JOB No.: 201000	LGA: LIVERPOOL
PLAN No.: 201000-2	DATUM: AHD
DATE: 19/4/2021	SCALE: 1:200@A1
DRAWN: RC	CONT. INTERVAL: 0.25m
CHK: BB	SHEET 1 OF 1

APPENDIX B

Plan - Proposed Development

Legend	
	Site Boundary
	10m Building Setback
	Existing To Be Demolished

Area Schedule	
Site	9,065 sqm
Existing Warehouse	4,054 sqm
Existing Office (2 Levels)	908 sqm
New Warehouse	1,519 sqm
Total	6,481 sqm
FSR	0.71 :1

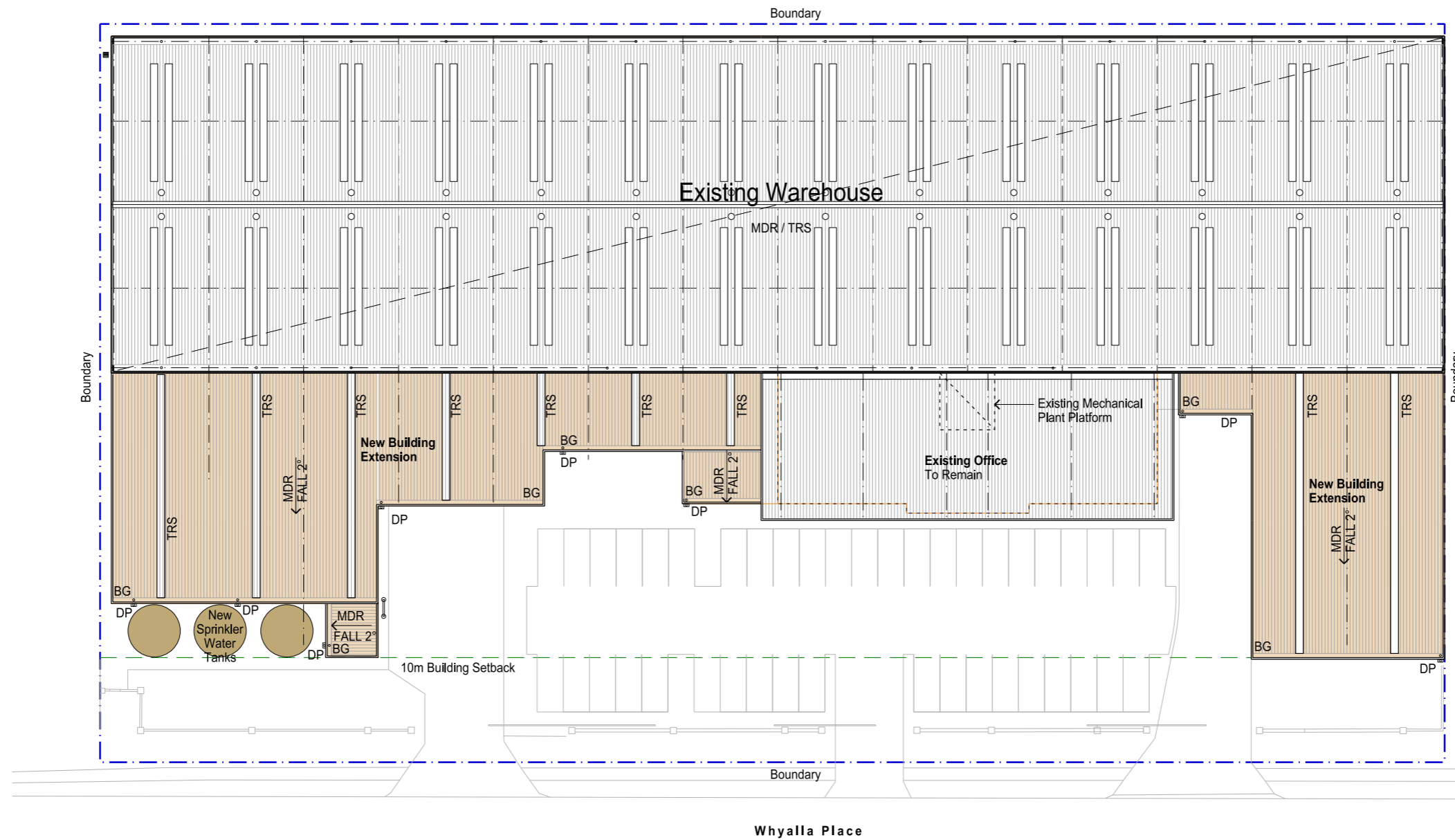


NOTE:
Location of Weigh Bridge and size of Water Tanks to be confirmed during detail design

ISSUE	REV	DESCRIPTION	DATE
P7		PRELIMINARY ISSUE	18.02.2021
P6		PRELIMINARY ISSUE	17.02.2021
P5		PRELIMINARY ISSUE	25.01.2021
P4		PRELIMINARY ISSUE	22.12.2020
P3		PRELIMINARY ISSUE	04.12.2020
P2		PRELIMINARY ISSUE	26.11.2020
P1		PRELIMINARY ISSUE	24.11.2020

Legend

- - - Site Boundary
- - - 10m Building Setback



APPENDIX C

Flood Inundation Maps

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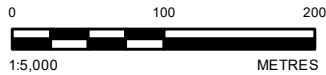
LEGEND

MAX FLOOD DEPTH (m)

- <0.5
- 0.5 - 1
- 1 - 2
- 2 - 3

- 3 - 5
- 5 - 10
- >10

- SITE EXTENT**
- WATERCOURSE**



NOTE:

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 56

REFERENCES:

1. AERIAL IMAGERY SOURCED FROM ESRI ONLINE
2. FLOOD MODEL RESULTS BASED ON CABRAMATTA CREEK FLOOD MODEL SUPPLIED BY LIVERPOOL CITY COUNCIL NSW

CLIENT
HI QUALITY GROUP

CONSULTANT



YYYY-MM-DD	2021-03-05
DESIGNED	TR
PREPARED	TR
REVIEWED	AB
APPROVED	MG

PROJECT
HI QUALITY WASTE FACILITY - ENVIRONMENTAL IMPACT STATEMENT - PRESTONS - FLOOD ASSESSMENT

TITLE
**9-13 WHYALLA PLACE (LOT 103, DP 866530)
100Y 9H (CRITICAL) STORM EVENT
MAXIMUM FLOOD DEPTHS**

PROJECT NO.	CONTROL	REV.	FIGURE
20142192	-	-	1

20mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A4

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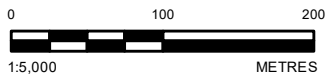
LEGEND

MAX FLOOD DEPTH (m)

- <0.5
- 0.5 - 1
- 1 - 2
- 2 - 3

- 3 - 5
- 5 - 10
- >10

- SITE EXTENT**
- WATERCOURSE**



NOTE:

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 56

REFERENCES:

1. AERIAL IMAGERY SOURCED FROM ESRI ONLINE
2. FLOOD MODEL RESULTS BASED ON CABRAMATTA CREEK FLOOD MODEL SUPPLIED BY LIVERPOOL CITY COUNCIL NSW

CLIENT
HI QUALITY GROUP

CONSULTANT



YYYY-MM-DD 2021-03-05

DESIGNED TR

PREPARED TR

REVIEWED AB

APPROVED MG

PROJECT
HI QUALITY WASTE FACILITY - ENVIRONMENTAL IMPACT
STATEMENT - PRESTONS - FLOOD ASSESSMENT

TITLE
**9-13 WHYALLA PLACE (LOT 103, DP 866530)
2009 9H (CRITICAL) STORM EVENT
MAXIMUM FLOOD DEPTHS**

PROJECT NO.	CONTROL	REV.	FIGURE
20142192	-	-	2

2mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A4

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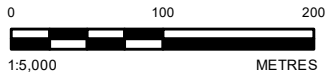
LEGEND

MAX FLOOD DEPTH (m)

- <0.5
- 0.5 - 1
- 1 - 2
- 2 - 3

- 3 - 5
- 5 - 10
- >10

- SITE EXTENT**
- WATERCOURSE**



NOTE:

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 56

REFERENCES:

1. AERIAL IMAGERY SOURCED FROM ESRI ONLINE
2. FLOOD MODEL RESULTS BASED ON CABRAMATTA CREEK FLOOD MODEL SUPPLIED BY LIVERPOOL CITY COUNCIL NSW

CLIENT
HI QUALITY GROUP

CONSULTANT



YYYY-MM-DD	2021-03-05
DESIGNED	TR
PREPARED	TR
REVIEWED	AB
APPROVED	MG

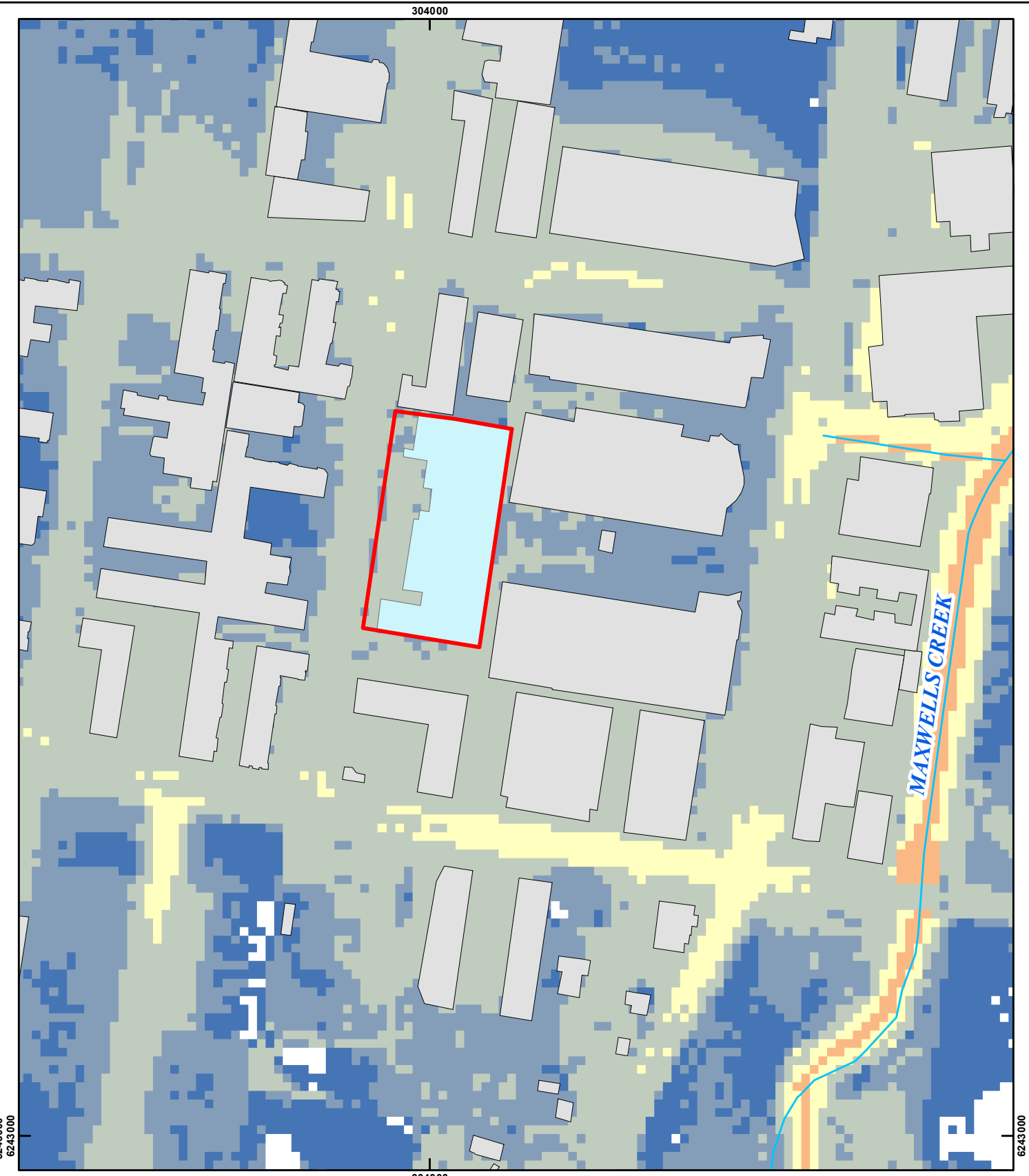
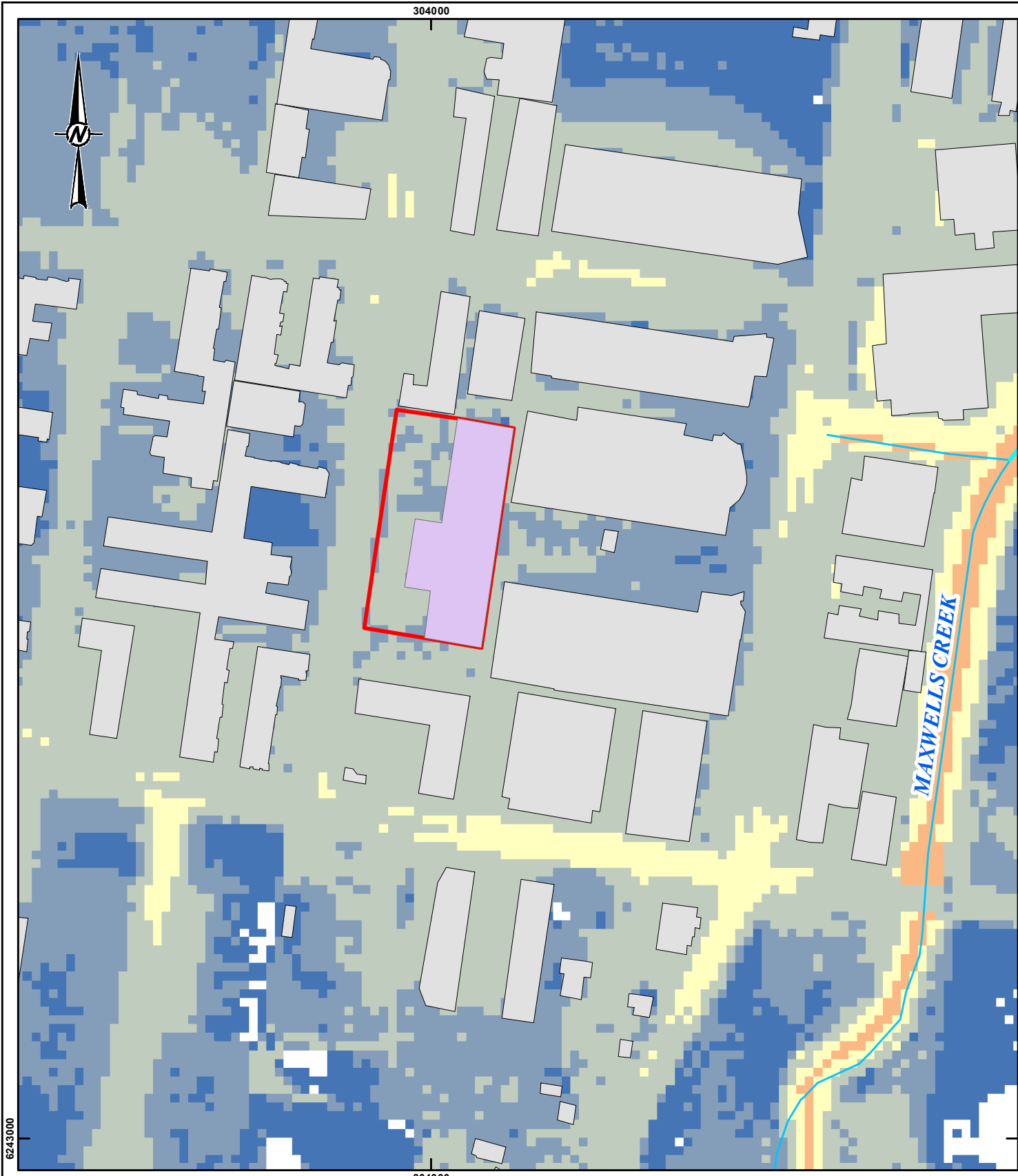
PROJECT
HI QUALITY WASTE FACILITY - ENVIRONMENTAL IMPACT STATEMENT - PRESTONS - FLOOD ASSESSMENT

TITLE
**9-13 WHYALLA PLACE (LOT 103, DP 866530)
500Y 9H (CRITICAL) STORM EVENT
MAXIMUM FLOOD DEPTHS**













PROJECT NO.	CONTROL	REV.	FIGURE
20142192	-	-	3

2mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A4

PATH: B:\H_Quality_Waste_Treatment_Series_Py_Lsp\PreStons_Flood_Study\02_PRODUCT\MAX20142192_HI_Quality_Waste_Facility_Prestons_Flood_Models\PMF2h_Comparison.mxd PRINTED ON: 2021-03-05 AT 3:40:17 PM



LEGEND

 <0.5	 SITE EXTENT
 0.5 - 1	 PROPOSED BUILDING FOOTPRINT
 1 - 2	 EXISTING BUILDING FOOTPRINT
 2 - 3	 SURROUNDING BUILDING FOOTPRINTS
 3 - 5	 WATERCOURSE
 5 - 10	
 >10	

Coordinate System: GDA 1994 MGA Zone 56
 Projection: Transverse Mercator
 Datum: GDA 1994



CLIENT
 HI QUALITY GROUP

CONSULTANT	YYYY-MM-DD	2021-03-05
	DESIGNED	TR
	PREPARED	TR
	REVIEWED	AB
	APPROVED	MG

- REFERENCE(S)**
1. AERIAL IMAGERY SOURCED FROM ESRI ONLINE
 2. FLOOD MODEL RESULTS BASED ON CABRAMATTA CREEK FLOOD MODEL SUPPLIED BY LIVERPOOL CITY COUNCIL NSW
 3. BUILDINGS FOOTPRINTS ARE BASED OFF SUPPLIED FLOOD MODEL

PROJECT
 HI QUALITY WASTE FACILITY - ENVIRONMENTAL IMPACT STATEMENT - PRESTONS - FLOOD ASSESSMENT

TITLE
**9-13 WHYALLA PLACE (LOT 103, DP 866530)
 PROBABLE MAXIMUM FLOOD (PMF) 2H STORM EVENT
 MAXIMUM FLOOD DEPTHS
 PRE AND POST DEVELOPMENT**

PROJECT NO.	CONTROL	REV.	FIGURE
20142192	-	-	4

25mm IF THIS MEASUREMENT DOES NOT MATCH WITH TS DRAWING, THE SIZE HAS BEEN VERIFIED FROM TS 0/3

APPENDIX D

Site Water Balance Assessment

1.0 INTRODUCTION

Golder Associates (Golder) Prepared a high-level water balance assessment for Prestons Waste Treatment Facility (the Site) as a part of the surface water assessment based on the potential water usage for the Waste Facility provided by Waste Treatment Services Pty Ltd (Hi Quality) and the long-term climate data sourced from the publicly available databases.

2.0 CLIMATIC DATA

2.1 General

The region where the Site is located has a humid subtropical climate, experiencing mild to cold winters and humid and hot summers, with no extreme seasonal differences. Figure 1 and Figure 2 extracted from the Bureau of Meteorology (BoM) website (BoM, 2021) summarize the distribution of average annual rainfall (1981-2010) and the average pan evaporation (1975-2005) respectively.

Based on Figure 1, the Site borders rainfall zones with average annual rainfalls ranging from 600-1000 mm and 1000-1500 mm. Based on Figure 2, the Site borders pan evaporation zones with average annual pan evaporation ranging from 1,400-1,600 mm.



Figure 1: Average annual rainfall distribution in the region for period 1981-2010 (BoM, 2021)

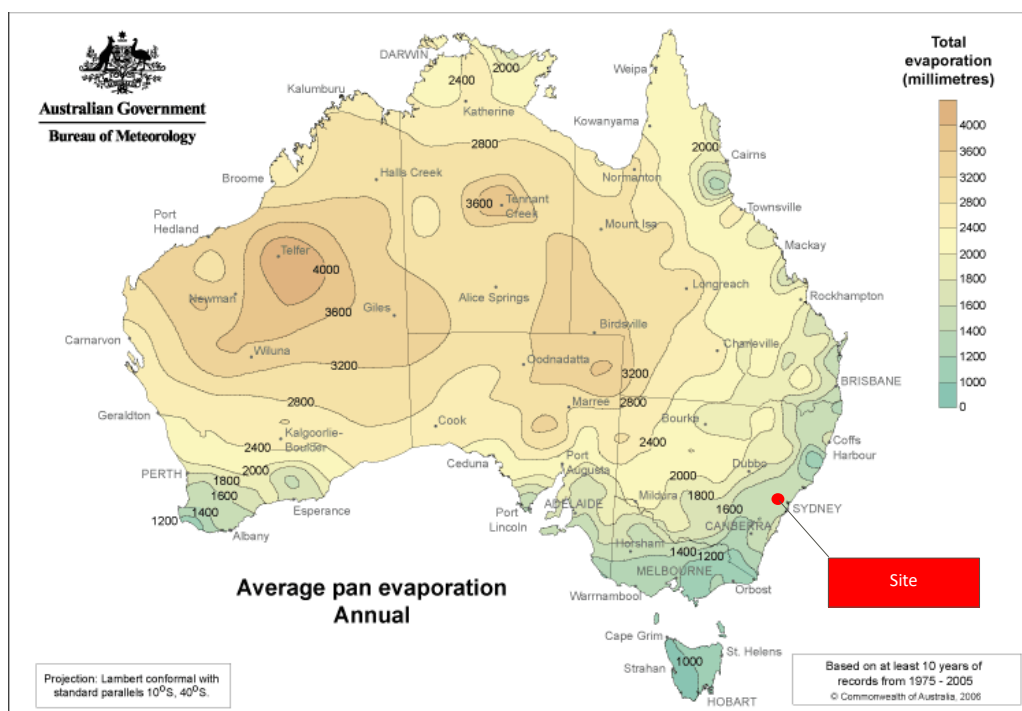


Figure 2: Average annual pan evaporation distribution in Australia for period 1975-2005 (BoM, 2021)

2.2 Data availability

The water balance assessment requires an extended long-term climate data series. Golder sourced the long-term rainfall and pan evaporation data from the Scientific Information for Land Owners (SILO) data drill¹ for the site (location: -36.95°S, 150.85°N) based on the spatial grid shown in Figure 3 on the following:

- The SILO data provides an interpolated rainfall series with median, mean, minimum, and maximum monthly and annual average values very similar to the data series from the closest BoM stations to the Site.
- SILO data provides a readily available long-term continuous data series with data gaps filled by an approved mathematical interpolation method(s).
- The BoM stations closest to the project area do not provide an extended long-term data series, whereas the SILO data has the completed data series.

In this assessment, Golder utilised the climate data only from 1970 to the present given that this period seems to represent the current climate pattern.

¹ <https://www.longpaddock.qld.gov.au/silo/>

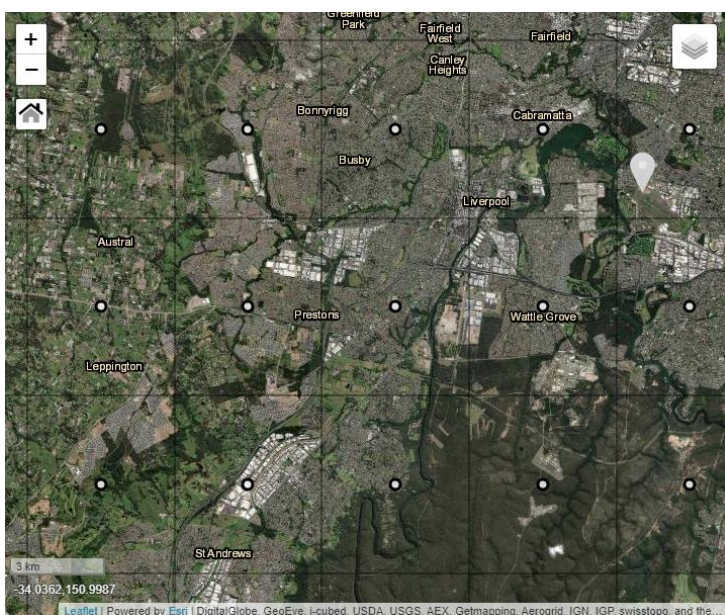


Figure 3: SILO gridded data (<https://www.longpaddock.qld.gov.au/silo/>)

2.3 Long-term rainfall data analysis

Figure 4 and Figure 5 show monthly and annual (respectively) rainfall statistics for the Site based on the record for the period from 1970 to the present. Based on the record, the Site receives averagely high rainfall during the period from November to March. However, based on the monthly maximums the Site could receive higher rainfalls during the dry period as well.

Based on the record, the maximum annual rainfall is about 1200 mm (received in 1988), 440 mm above the average annual of circa 760 mm. The lowest annual rainfall is about 410 mm (received in 1982), 350 mm less than the average.

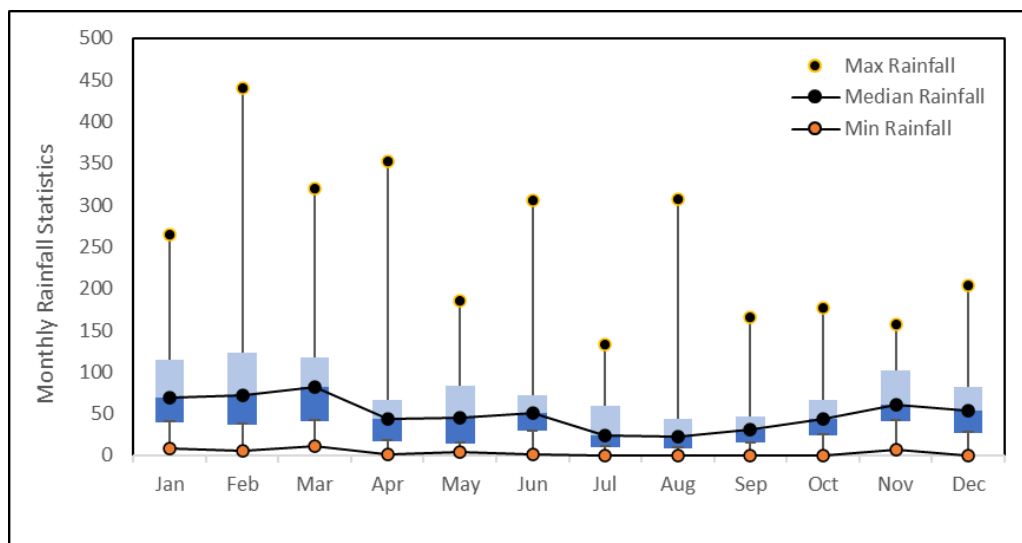


Figure 4: Long-term monthly rainfall (mm) statistics (1970 to 2021) estimated for the Site based on SILO data²

² The boxplot displays 10th, 25th, 75th and 90th percentiles as well as the median, minimum and maximum for the period of record.

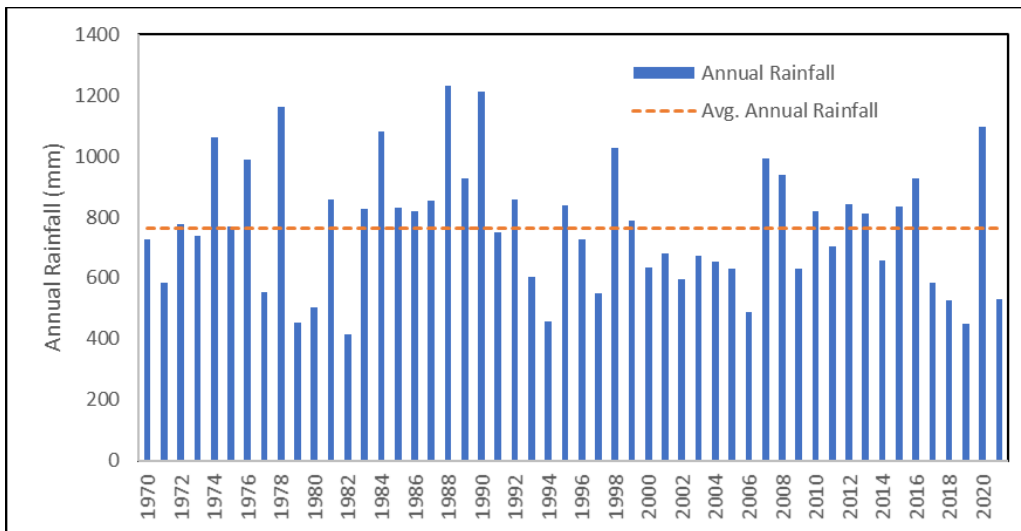


Figure 5: Long-term annual rainfall (1970 to 2021) estimated for the Site based on SILO data (note: data for 2021 is only available up to April)

2.4 Long-term evaporation data analysis

Figure 6 and Figure 7 summarize monthly and annual (respectively) pan evaporation data statistics for the Site based on the record for the period from 1970 to the present. Based on the record, the average annual evaporation for the Site is about 1450 mm.

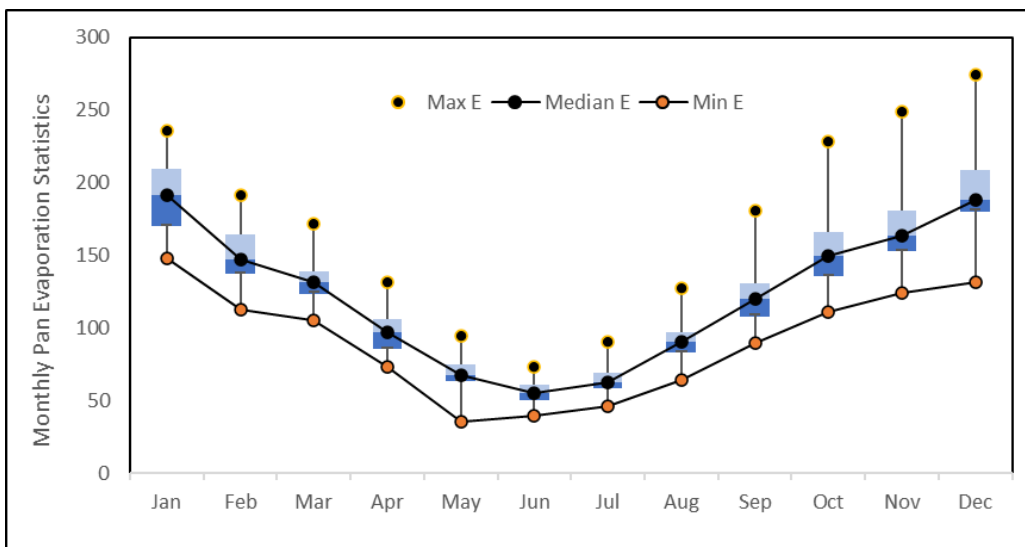


Figure 6: Monthly average pan evaporation estimated for SILO (1970-2021)

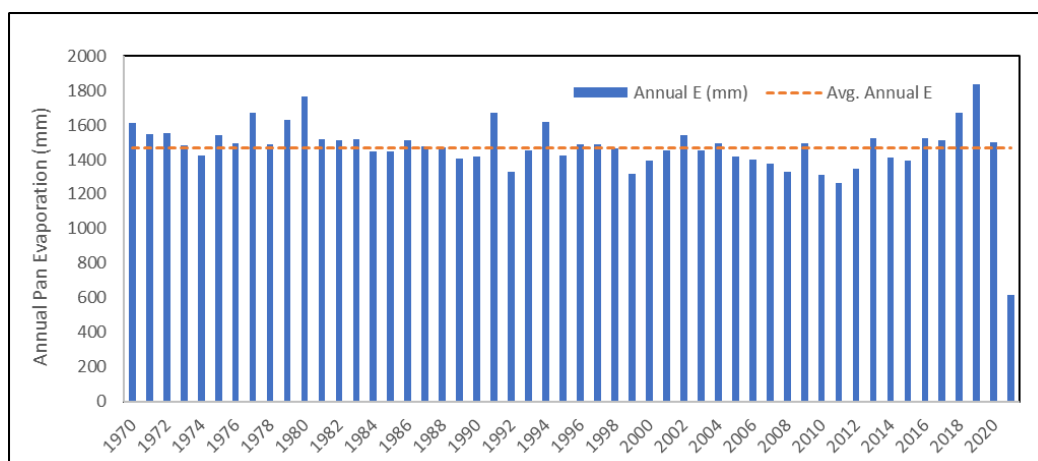


Figure 7: Annual average pan evaporation estimated for SILO (1970-2021) (note: data for 2021 is only available up to April)

3.0 WATER BALANCE

Golder estimated the water balance for the post-development Site based on the water usage data provided by Hi Quality and the rainfall statistics provided in Section 2.3. Hi Quality would store the water rain and recycled water at the Site at covered storages, thus the evaporation from these storages was assumed negligible for this assessment.

3.1 Water usage at the Site

Table 1 provides the estimated annual water usage based on the data provided by Hi Quality.

Staff amenities would continue to be supplied by potable water and the required potable water usage is estimated based on assumptions of:

- 48 working staff, including 40 regular staff plus 4 staff of afternoon and 4 staff of night shifts.
- 300 working days per annum. i.e. 50 weeks including Saturdays.

Rainwater that falls on the total warehouse roof, including the proposed extension would be collected in rainwater tanks and used for process applications and dust suppression. This would reduce the requirements for potable water.

Roof water would also be available for top up of the fire-fighting water storage tank above minimum level per regulations. Potable water would provide the minimum level requirement.

Table 1: Water usage (kL per annum)

Source	Usage	kL/yr
Staff Amenities		
Potable Water	Toilet	63
	Urinal	5
	Wash Basins and Kitchen Sinks	49
	Dishwasher	9
	Shower	0.12
	Total Water Usage for Staff Amenities	126.12
Process Applications and Dust Suppression		
Rainwater Re-use and Potable Water	Dust Suppression and Moisture Conditioning (all activities)	1,000
	Wheel Wash and Truck Wash	2,500
	Bioremediation	500
	Total Process Applications and Dust Suppression	4,000

3.2 Available rainwater and the storage capacity

To estimate the amount of rainwater available to harvest at the Site, Golder analysed the rainfall averages on monthly and annual basis. This provides a realistic rainwater availability, thus the additional potable water requirement, for long-term as well as short-term periods. Golder also assumed the total post-development roof area, including the extension, of circa 6080 m² would be connected to the rainwater harvesting network.

Figure 8 summarises a comparison of rainwater supply availability based on different storage capacity options, and the long-term (more than 50 years) of daily rainfall data. Based on the comparison, rainwater storage with 50 kL capacity would be suitable for the Site. This storage capacity would provide about 50% of the rainwater demand in average within a year, and also is slightly more than the site's rainwater demand for 4 days.

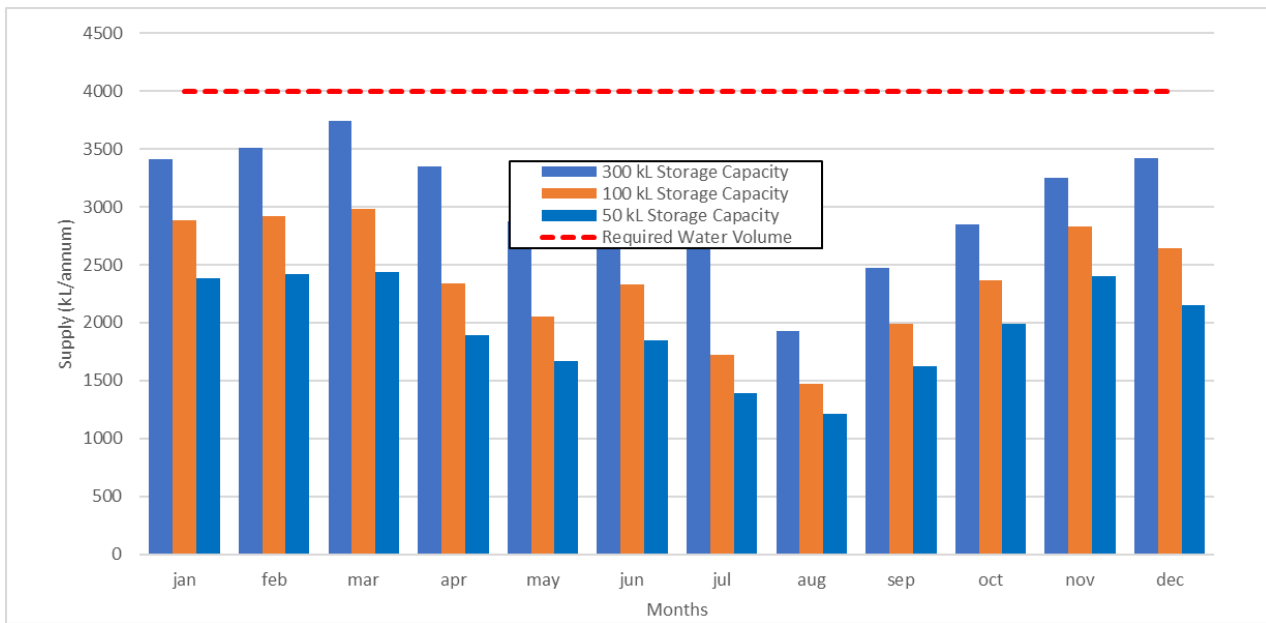


Figure 8 comparison of rainwater supply availability based on different storage capacity options, and the long-term (more than 50 years) of daily rainfall data

APPENDIX E

Important Information

The document ("Report") to which this page is attached and which this page forms a part of, has been issued by Golder Associates Pty Ltd ("Golder") subject to the important limitations and other qualifications set out below.

This Report constitutes or is part of services ("Services") provided by Golder to its client ("Client") under and subject to a contract between Golder and its Client ("Contract"). The contents of this page are not intended to and do not alter Golder's obligations (including any limits on those obligations) to its Client under the Contract.

This Report is provided for use solely by Golder's Client and persons acting on the Client's behalf, such as its professional advisers. Golder is responsible only to its Client for this Report. Golder has no responsibility to any other person who relies or makes decisions based upon this Report or who makes any other use of this Report. Golder accepts no responsibility for any loss or damage suffered by any person other than its Client as a result of any reliance upon any part of this Report, decisions made based upon this Report or any other use of it.

This Report has been prepared in the context of the circumstances and purposes referred to in, or derived from, the Contract and Golder accepts no responsibility for use of the Report, in whole or in part, in any other context or circumstance or for any other purpose.

The scope of Golder's Services and the period of time they relate to are determined by the Contract and are subject to restrictions and limitations set out in the Contract. If a service or other work is not expressly referred to in this Report, do not assume that it has been provided or performed. If a matter is not addressed in this Report, do not assume that any determination has been made by Golder in regards to it.

At any location relevant to the Services conditions may exist which were not detected by Golder, in particular due to the specific scope of the investigation Golder has been engaged to undertake. Conditions can only be verified at the exact location of any tests undertaken. Variations in conditions may occur between tested locations and there may be conditions which have not been revealed by the investigation and which have not therefore been taken into account in this Report.

Golder accepts no responsibility for and makes no representation as to the accuracy or completeness of the information provided to it by or on behalf of the Client or sourced from any third party. Golder has assumed that such information is correct unless otherwise stated and no responsibility is accepted by Golder for incomplete or inaccurate data supplied by its Client or any other person for whom Golder is not responsible. Golder has not taken account of matters that may have existed when the Report was prepared but which were only later disclosed to Golder.

Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed Golder to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the information collected by Golder or otherwise made available to Golder. Further, the passage of time may affect the accuracy, applicability or usefulness of the opinions, assessments or other information in this Report. This Report is based upon the information and other circumstances that existed and were known to Golder when the Services were performed and this Report was prepared. Golder has not considered the effect of any possible future developments including physical changes to any relevant location or changes to any laws or regulations relevant to such location.

Where permitted by the Contract, Golder may have retained subconsultants affiliated with Golder to provide some or all of the Services. However, it is Golder which remains solely responsible for the Services and there is no legal recourse against any of Golder's affiliated companies or the employees, officers or directors of any of them.

By date, or revision, the Report supersedes any prior report or other document issued by Golder dealing with any matter that is addressed in the Report.

Any uncertainty as to the extent to which this Report can be used or relied upon in any respect should be referred to Golder for clarification



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APPENDIX I

SEPP Preliminary Risk Screening



REPORT

**Prestons Waste Treatment Facility, 9-13 Whyalla
Place, Prestons**

SEPP 33 Preliminary Risk Screening

Submitted to:

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20142192-049-R-Rev1

August 2021



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1.0 INTRODUCTION

Hi-Quality Waste Treatment Services Pty Ltd (Hi-Quality) is seeking to construct and operate a Waste Treatment Facility (the Project) at 9-13 Whyalla Place, Prestons NSW 2170 (the Site). The Site is zoned IN3 Heavy Industrial under the *Liverpool Local Environment Plan 2008*.

The Project proposes to utilise technologies for treating solid and liquid wastes to a level suitable for reuse, disposal to landfill or disposal to sewer.

The Waste Treatment Facility would process up to 270,000 tonnes of solid and liquid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated soils;
- Contaminated sludges; and
- Liquid wastes.

New ancillary infrastructure would be constructed as part of the Project including:

- weighbridges;
- warehouse extension;
- new driveway;
- parking; and
- wheel wash and truck wash down bay.

Hi-Quality's head office would also be sited at this location utilising existing office space.

2.0 METHODOLOGY

Based upon the Scoping Report provided for the Project, the Pre-lodgement meeting held with the Department of Planning, Industry and Environment (DPIE) and the subsequent SEARs (SSD-9346594) issued by DPIE, it is identified that the Project is required to address the following:

- **Hazards and Risk** – including
 - a preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and *Applying SEPP 33* (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is “potentially hazardous” a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (DoP, 2011) and *Multi-Level Risk Assessment* (DoP, 2011).

This report addresses the preliminary risk screening in accordance with SEPP 33 and “Applying SEPP 33” (Department of Planning, 2011) to determine if a Preliminary Hazard Analysis (PHA) is required for the Project.

3.0 LEGISLATIVE REQUIREMENTS

3.1 State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33)

The aim of SEPP 33 is to allow for the assessment of the environmental and safety performance of potentially hazardous and offensive development. SEPP 33 seeks to:

- Amend the definitions of hazardous industries where used in environmental planning instruments.
- Render ineffective a provision of any environmental planning instrument that prohibits development for the purpose of a storage facility on the ground that the facility is hazardous or offensive if it is not a hazardous or offensive storage establishment as defined in the Policy.
- Ensure that in determining whether a development is a hazardous or offensive industry, any measures proposed to be employed to reduce the impact of the development are taken into account.
- Ensure that in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact.
- Under SEPP 33 potentially hazardous industry has the following definition:
 - *‘Potentially hazardous industry’ means a development for the purpose of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in the locality—*
 - *To human health, life or property; or*
 - *To the biophysical environment;*

and includes a hazardous industry and a hazardous storage establishment.

3.2 Applying SEPP 33

The objective of “Applying SEPP 33: Hazardous and Offensive Development Application Guidelines” is to provide advice on implementing SEPP 33 by:

- Clarifying the type of development to which the policy applies;
- Establishing a risk screening process and provides a discussion of factors that can cause a development to be potentially hazardous; and,
- Listing all materials and specifies screening thresholds for residential/sensitive land uses and other less sensitive uses, where appropriate.

The risk screening procedure is shown in the Figure 1 flowchart as adopted from “Applying SEPP 33”. If this procedure identifies that the Project as a ‘potentially hazardous industry’ a PHA will be undertaken in accordance with the SEARs (SSD-9346594) for the Project and SEPP33, “Applying SEPP 33” and Hazardous Industry Advisory Papers.

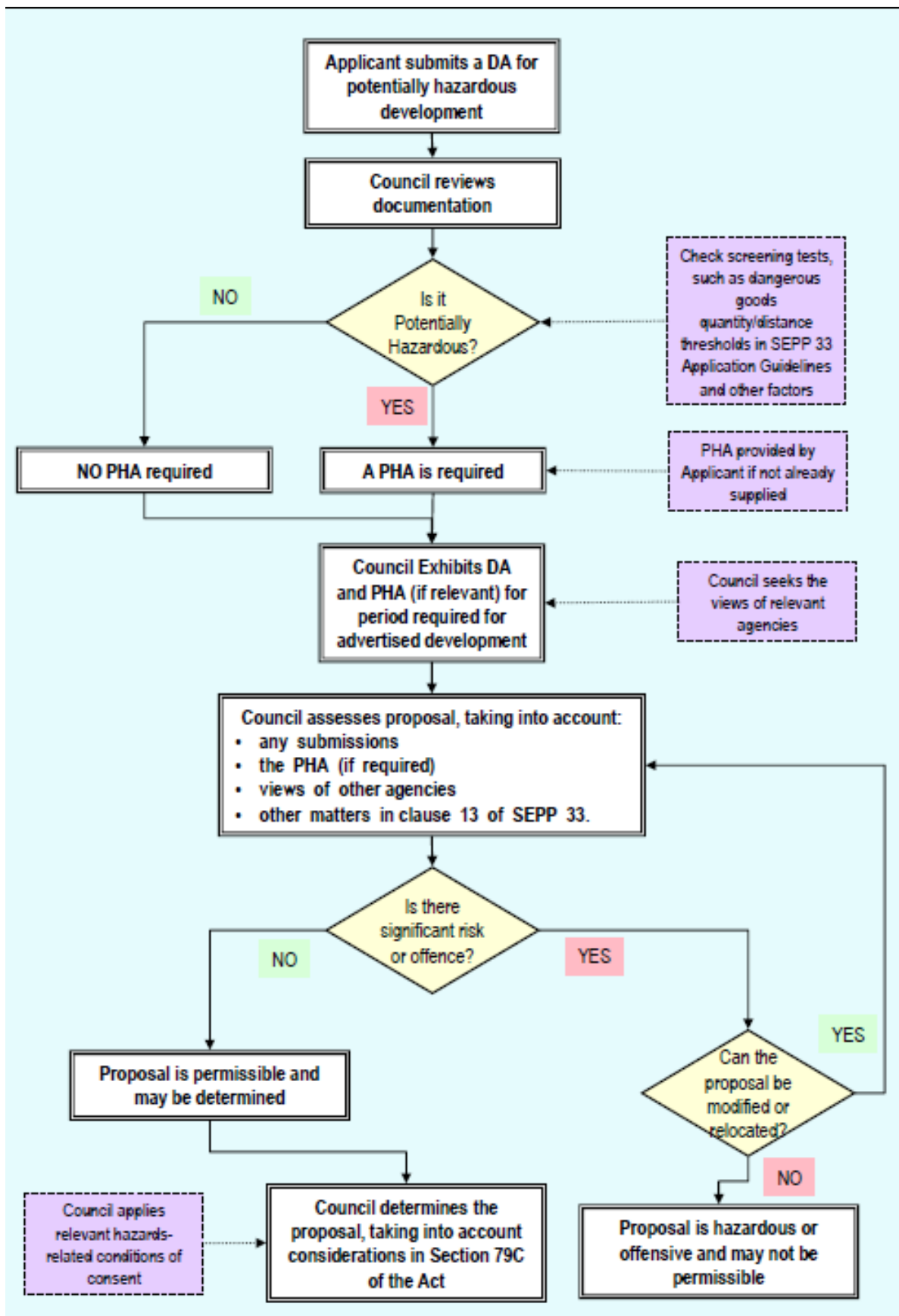


Figure 1: SEPP 33 Process

3.3 Risk Screening Process: Materials Stored on Site

Dangerous goods are substances or articles that pose a risk to people, property or the environment, due to their chemical or physical properties. Dangerous goods are usually classified with reference to the immediate hazard they pose rather than the long-term health effects.

In Australia, dangerous goods are defined by the National Transport Commission (2018), “Australian Code for Transportation of Dangerous Goods by Road and Rail” Edition 7.6, 2018 (DG).

The storage and handling of dangerous goods would be as per the relevant Australian Standards. This includes:

- Corrosive substances (Class 8) to be stored and handled by following the methods outlined in AS 3780-2008, The storage and handling of corrosive substances.
- Storage and handling of Class 5.1 oxidizing substances to be undertaken in accordance with AS 4326-2008, The storage and handling of oxidizing agents.

Table 1: Dangerous Goods to be stored at the Site

Material	Classification	Max Estimated Quantity	Threshold for PHA (based on Applying SEPP 33).	Storage Location
Hydrogen Peroxide	DG Class 5.1 (PG I)	2 tonnes	5 tonnes	Within the Waste Treatment Facility Building stored in accordance with Australian Standards
Potassium Permanganate	DG Class 5.1 (PG II)	1 tonnes		Within the Waste Treatment Facility Building stored in accordance with Australian Standards
Sodium Persulphate	DG Class 5.1 (PG III)	1 tonnes		Within the Waste Treatment Facility Building stored in accordance with Australian Standards
Hydrochloric Acid (37% w/w)	DG Class 8 (PG II)	5 tonnes	25 tonnes (packing group II)	Within the Waste Treatment Facility Building stored in accordance with Australian Standards
Caustic soda (30% w/w)	DG Class 8 (PG II)	5 tonnes		Within the Waste Treatment Facility Building stored in accordance with Australian Standards

All dangerous goods would be banded and stored within the Waste Treatment Facility building. The materials identified within Table 1 will be delivered and placed into dedicated bands inside the building in accordance with Australian Standards to allow for suitable and required separation distance between material and DG classes.

Materials identified within Table 1 will be delivered to the Waste Treatment Facility within intermediate bulk containers (IBCs) and will be below the relevant annual or weekly cumulative vehicle movements for transporting DG Class 5.1 and DG Class 8 as identified in Table 2 of Applying SEPP 33.

In accordance with “Applying SEPP 33” (Department of Planning, 2011) the maximum estimated quantities are not above the threshold for further assessment through a PHA (as identified in Table 1). As such, based on the information in Table 1, including the class, quantity, transport and/or location of dangerous goods associated with the development, the Project does not trigger the requirement for a PHA and is not considered to be potentially hazardous.

4.0 POTENTIAL HAZARD MITIGATION AND MANAGEMENT

As the Project does not trigger the requirement for a PHA and is not considered to be potentially hazardous no further assessment of hazards within this report is required. However, as identified within the EIS and further technical reports, the Project will implement a number of mitigation and management measures to reduce the risk of potentially hazardous scenarios of the Project. Refer to respective chapters of the EIS for details on these mitigation and management measures.

In addressing hazard mitigation and management measures for the Project, the following hierarchy of controls (which range from most effective to least effective) have been considered.

- 1) **Elimination** is a permanent solution and should be attempted in the first instance. The hazard is eliminated altogether. For example, the elimination of a hazardous process or substance.
- 2) **Substitution** involves replacing the hazard by one that presents a lower risk. This could involve the substitution of a toxic substance with a less toxic substance.
- 3) **Engineering** controls involve some structural change to the work environment or work process to place a barrier to, or interrupt the transmission path between, the worker and the hazard, or the environment and the hazard. This may include machine guards, isolation or enclosure of hazards, the use of extraction ventilation, bunding and manual handling devices.
- 4) **Isolation**: This involves the separation of persons or environment from the hazard by means or relocation of the hazard to a remote location, or by segregating the hazard to prevent personal exposure.
- 5) **Administrative** (procedural) controls reduce or eliminate exposure to a hazard by adherence to procedures or instructions. Documentation should emphasise all the steps to be taken and the controls to be used in carrying out a task safely and with environmental awareness. Successful administrative controls are dependent on appropriate human behaviour. Examples include safe working procedures and permits to work, training/inductions.
- 6) **Personal Protective Equipment** (PPE)/Environmental Control Equipment (ECE) are worn/used by people as a barrier between themselves/the environment and the hazard. The success of this control is dependent on the protective equipment being chosen correctly, as well as fitted correctly and worn at all times when required.

5.0 CONCLUSION

All dangerous goods would be stored and banded within the Waste Treatment Facility building in accordance with the relevant Australian Standards, allowing for suitable separation distance between material and DG classes. In addition, the threshold quantities of DG identified in Table 1 do not trigger the requirement for a PHA and the Site is located approximately 470 metres from the nearest residential receiver.

Based upon the preliminary risk screening assessment completed in this report, the Project is not considered to be hazardous. As such, the Project does not require further assessment in accordance with SEPP 33.

Despite the Project not triggering the requirement for a PHA consideration and establishment of proposed safeguards and mitigation should they be required will be implemented for the Project. These measures have been considered based upon a hierarchy of controls to ensure effective hazard mitigation and management.

6.0 REFERENCES

AS 1940-2004 “The storage and handling of flammable and combustible liquids”. Commonwealth of Australia (2014) “The Australian Dangerous Goods Code” Edition 7.3.

AS 3780-2008, The storage and handling of corrosive substances. Commonwealth of Australia (2008)

AS 4326-2008, The storage and handling of oxidizing agents. Commonwealth of Australia (2008)

Department of Planning and Infrastructure (2011) “Applying SEPP 33” State of New South Wales through the Department of Planning Department of Planning and Infrastructure (2011) *Hazardous Industry Planning Advisory Paper No. 6 — Hazard Analysis*

Department of Planning and Infrastructure (2011) *Multi-Level Risk Assessment guideline*

Department of Planning, Industry and Environment (September 2020) “Prestons Waste Treatment Facility” Secretary’s Environmental Assessment Requirements (SSD-9346594)

National Transport Commission (2018), “Australian Code for Transportation of Dangerous Goods by Road and Rail (Dangerous Goods Code) Edition 7.6, 2018

NSW Environmental Protection Agency (2014), *Waste Classification Guidelines Part 1: Classifying Waste*, November 2014.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

WorkCover NSW (2005), *Code of Practice for the Storage and Handling of Dangerous Goods*.

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APPENDIX A

Study Limitations

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APPENDIX J

Health Impact Assessment



REPORT

Screening Level Health Impact Assessment

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20142192-047-R-Rev1 HIA

August 2021



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1.0 INTRODUCTION

This Screening Level Health Impact Assessment (HIA) has been undertaken to support the EIS for the construction and operation of a Waste Treatment Facility (the Project) at 9 Whyalla Place, Prestons, NSW (the Site) (Figure 1).

The HIA assesses the potential for community exposure to contaminants from the Project, but does not assess the potential impacts upon employees at the Site, which is assessed within Chapter 13 of the EIS. The Project proposes to utilise existing buildings and new infrastructure on the Site to provide treatment of solid and liquid waste to a level suitable for reuse, disposal to landfill or disposal to sewer.

The Waste Treatment Facility (WTF) would process up to 270,000 tonnes of soil and liquid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated Soils;
- Contaminated Sludges; and
- Liquid Wastes.

1.1 Objectives

Proponent

The key objectives of the Project are to facilitate more efficient recovery of resources; diversion of waste from landfill for alternative uses and beneficial reuse; application of treatment technologies to reduce potential health and environmental impacts; and provision of a strategic resource recovery asset and waste treatment service that would play a key role in the delivery of construction and development within Western Sydney and the wider region.

Screening Level Health Impact Assessment

The requirements for assessment of human health impacts are described in the Planning Secretary's Environmental Assessment Requirements (SEARs) application number SSD-9346594 14/10/2020. Based on these requirements, the objective of the screening level HIA is to:

- Assess the potential for community exposure to contaminants from the off-site migration of contaminants during the construction and operation of the facility.

As such, this HIA provides an assessment of both potential off-site human health impacts, and consideration of preventative measures for community exposure from the off-site transfer of contaminants. The report follows the methodology of a screening level assessment, in line with both the enHealth (2017) "Health Impact Assessment Guidelines" and the enHealth (2012) "Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards".

The HIA methodology for the screening of the human health impact issues that may require further site-specific human health risk assessment is identified in Section 2.0.

1.2 Background

The WTF is proposed to be located within the existing warehouse building and warehouse building extension (Figure 2). The WTF would process up to 270,000 tonnes of waste per annum, and all waste material would be received, treated, stockpiled and loaded out within the building.

The work force is expected to comprise up to 10 personnel for the operation of the WTF, whilst four people would be required outside of operational hours for receipt of material across afternoon and night shifts. A further maximum of 30 employees would utilise the office space, which would result in up to 48 employees for

the Project, due to shift times all employees would not access the Site at the same time. Further details of the proposed development are provided in Chapter 2 of the EIS for the Project.

General processing activities would include the following:

- Bulk Soils Treatment;
- Sediments and Sludges Treatment;
- Liquid Waste Treatment; and
- Waste Storage and Transfer.

1.3 Site Setting

A summary of key details for the Site are presented in Table 1.

Table 1: Summary of Site Setting

Item	Details
Street Address	9-13 Whyalla Place, Prestons, NSW 2170
Approximate Area	9,100 m ² (0.91 ha)
Current Land Use	Industrial warehouse with a car park and office.
Local Government Area and Land Use Zoning	Liverpool City Council IN3 Heavy Industrial
Topography	The Site is generally flat and slightly grades towards the north. Based on the topography, the Site sits around 0.25 m above Whyalla Place. The warehouse and other infrastructure seem to act as barriers to the external runoff from west and east.
Surface Water	The two major nearby surface water receptors are identified as Maxwells Creek and Cabramatta Creek. Maxwells Creek, located approximately 300 m to the east of the Site, flows in a northerly direction and connects with Cabramatta Creek approximately 2.2 km northeast of the Site. Cabramatta Creek is located approximately 680 m to the north of the Site and flows in an easterly direction eventually leading into the Georges River at Warwick Farm.
Stormwater	Runoff from the Site is managed through existing drains and pipes which lead into the Council drain that appears to run along the eastern boundary of the Site. The Site's lot connection pit to the Council drain is located at the northeastern corner of the Site.
Groundwater Elevations and Inferred Flow Direction	Groundwater elevations were reported at 20.3 – 20.6 m AHD (Golder 2020, Phase 1 and Limited Phase 2 ESA report, Ref: 20142192-008-R-Rev0). These show that groundwater, encountered in the natural water bearing zone, is flowing in an easterly – north easterly direction, towards Maxwells Creek.

1.3.1 Surrounding Area

The Site is located in an area of predominantly commercial/industrial land use. Whyalla Place adjoins the Site along the western boundary. The majority of land located between Hoxton Park Road to the north and the M7 to the east, south and west has been developed for commercial/industrial uses.

There are multiple open parks and recreational areas along the Cabramatta Creek such as Powell Park and Miller Park which are 500 m to 1 km north of the Site. A recreational oval and sporting facility, identified as Liverpool Catholic Club and the Mercure Hotel, are located to approximately 350 m to the west of the Site, and Potters House Church is approximately 350 m north of the Site. There is a market garden located approximately 480 m to the south west of the Site. Two open water bodies are located in front of the Mercure hotel at the corner of Joadja Road and Hoxton Park Road.

Residential areas are approximately 500 m north from the Site, 1 km to the east (on the western side of the creek), 1.4 km to the south and 2 km to the west. The nearest schools to the Site are within the residential areas and include Miller Public School (1.5 km north), Lurnea Public School (1.3 km east), Prestons Public School (1.9 km southeast) and Dalmeny Public School (1.8 km southwest). Similarly, childcare centres closest to the Site are within the residential area and include Cartwright World of Learning and ICU Early Learning Childcare Centre (1 km and 2.4 km north), Preston's Children's Centre (1.9 km south east of the Site) and Goodstart Early Learning Hoxton Park (2.5 km northwest).

The Project is located within the Liverpool City Local Government Area in the South Western Sydney Local Health District. This area of greater metropolitan Sydney is going through a period of unprecedented growth of population, has communities, which are ethnically and culturally diverse, with both thriving younger populations and a growing older population. When considering social and environmental determinants of health, areas of the south western Sydney population have a higher-than-average level of disadvantage when compared to all of NSW. The Project scale, location and significance are unlikely to negatively concern the local community lifestyle, social or economic determinants, and may foster positively by creating increased employment opportunities, and access to increased waste management services.

1.4 Community and Stakeholder Engagement

A Project Community and Stakeholder Engagement Strategy was implemented for the Project in September 2020 with the key objectives of providing accessible and fit-for-purpose communication and stakeholder consultation activities. Identified stakeholders included, property owners and lessees, nearby residences and businesses, stakeholders identified with the SEARs SSD-9346594 and potential sensitive receiver land uses.

Consultation activities for the Project commenced following submission of the Scoping Report (3 September 2020), which principally involved contact with relevant government agencies and identifying and employing appropriate engagement tools for community stakeholders.

The Proponent identified a number of near-neighbour businesses and residents to seek feedback from. These were identified based upon their geographical location to the Project and land use. Promotional activities included a dedicated website and notification letter mailout identifying the website, the Project, the EIS process and seeking feedback that could be addressed in the EIS.

Further details of community and stakeholder engagement undertaken and response to engagement activities are provided in Chapter 5 of the EIS for the Project.

2.0 APPROACH AND METHODOLOGY

A screening level assessment of potential contaminant impacts from the construction and operation of the Project has been conducted as follows:

- Identify potential contaminant sources at the Site and pathways of exposure to the community (Section 3.0)
- Assessment of complete pathways from source to receptor (Section 4.0)
- Where potential contaminant migration off-site and community exposure has been assessed as presenting a potential risk to health, outline the proposed management and mitigation measures (Section 5.0)

The assessment of potential risk to community health from the identified exposure pathways for contaminant sources at the Site has been considered in terms of the likelihood and consequence as shown in Table 2 in line with the enHealth (2017) "Health Impact Assessment Guidelines".

The assessment of risk is based upon the findings from the individual technical studies conducted as part of the EIS for the Project. This assessment is considered a screening level as it is largely qualitative, with the exception of air quality and noise where modelling results have been compared to health-based standards or guidelines. The discussion of available information and assessment of risks and mitigation measure (if required) are outlined in the relevant sub-sections of Section 5.0.

Table 2: Likelihood Consequence Matrix

Likelihood	Consequences				
	Low	Medium	High	Very High	Critical
Very Unlikely	Very Low	Very Low	Low	Low	Medium
Unlikely	Very Low	Low	Low	Medium	High
Possible	Low	Low	Medium	High	Very High
Likely	Low	Medium	High	Very High	Extreme
Very Likely	Medium	High	Very High	Extreme	Extreme

3.0 CONTAMINANTS

3.1 Sources and Compounds of Interest

The wastes, comprising contaminated soils, sludges and liquid waste, will inherently be variable in composition. Source material would primarily be generated from industrial processes and contaminated sites. This includes:

- Property developers;
- Civil contractors;
- Industrial facilities producing regulated waste and contaminated soil;
- Oil refineries (remediation);
- Local Council government areas;

- Mining industry;
- Department of Defence;
- Large State and Federal Infrastructure projects;
- Airports; and
- Other waste treatment and waste management companies.

Treatment technologies for soils and sludges will generally focus on the destruction of contaminants (e.g.: chemical oxidation, bioremediation) or the separation of contaminants (e.g.: screening, chemical separation) from recoverable or more inert constituents. Waste streams include organics, halogenated hydrocarbons, metals and metalloids and other specific waste streams, further details of which are provided in Chapter 7 of the EIS for the Project.

Chemical contaminants in soils and sludges may include:

- Heavy hydrocarbon impacted soils or soils containing Non Aqueous Phase Liquids (NAPLs);
- Monoaromatics (e.g.: benzene, toluene, ethyl benzene and xylenes - BTEX) and total petroleum hydrocarbons (TPHs) where soils that have suffered fuel spills;
- Polycyclic aromatic hydrocarbons (PAHs);
- Phenols;
- Chlorinated hydrocarbons;
- Pesticides and herbicides;
- Acid sulphate soils (iron sulphides or sulphidic materials);
- Bonded Asbestos Containing Material (ACM); and
- Per- and polyfluoroalkyl substances (PFAS) (storage and transfer only).

The proposed wastewater treatment plant will have the capability of treating waste waters contaminated with:

- Hydrocarbons (including TPH and PAH);
- Organics;
- Suspended Solids;
- Acidity and Alkalinity;
- Heavy Metals;
- Nutrients; and
- PFAS.

Reagents will be also stored on-site including:

- Cement;
- Activated carbon;
- Crushed limestone or “aglime”;

- Cementitious stabilising agents (OPC, GGBFS, Pulverised Fuel Ash, Cement Kiln Dust);
- Secondary stabilising agents (Lime, Sodium Silicate, Carbons, Organophilic clays, natural pozzolans, bentonites);
- Hydrogen peroxide;
- Potassium permanganate;
- Sodium persulphate;
- Ferrous sulphate;
- Bacteria;
- Urea;
- Super phosphate;
- Biodegradable surfactant;
- Polymer;
- Aluminium sulphate;
- Hydrochloric acid;
- Caustic soda; and
- Magnesium oxide.

Other potential hazards include dust, noise and odour generated during construction and operations.

3.2 Consequence of Exposure

The health consequence of exposure to the various contaminants and hazards listed in Section 3.1 will depend upon the following factors:

- dose of contaminant or level of hazard
- toxicity or health effect of the contaminant or hazard
- duration of exposure
- sensitivity of the population exposed.

These factors will be variable depending upon the individual characteristics of the contaminants or hazard and the exposure pathway. In general, consequence is considered as a possible health effect due to exposure without management controls at the facility, and if a sensitive community (i.e. young children) was exposed. The dose or level of exposure is expected to be relatively low, as exposures would be via environmental media such as mobilised in stormwater, rather than a direct exposure to the waste or reagent. The health effects of the chemicals and compounds of interest are wide ranging, for example may include skin irritation for acute (short-term) exposures or carcinogenic effects for chronic (long-term) exposures. In the absence of quantitative estimate of exposure dose (with the exception of air quality) and given the broad range of potential health effects from the contaminants identified, the consequence of exposure has been conservatively assessed as 'high' for all contaminants and hazards for the purposes of the qualitative assessment of risk (refer Table 2).

4.0 PATHWAYS OF EXPOSURE

The exposure routes where people in the community (off-site) may be exposed to contamination derived from the site include:

- Generation of contaminated dust during operations such as bulk soils delivery, pre-treatment of sediments, separation of bulk soil and storage
- Generation of contaminated dusts during construction
- Impacts to air quality due to treatment processes
- Odour that extends beyond the site boundary during site operations from waste handling and treatment processes
- Noise that extends beyond the site boundary during site operations from exhaust fans and truck movements
- Mobilisation of contaminants from waste into stormwater system or local waterways from stormwater runoff or adverse flooding of the facility
- Loss of containment of leachate or reagents stored on site into stormwater system or local waterways or infiltration to groundwater

5.0 ASSESSMENT OF RISKS AND MANAGEMENT MEASURES

The sections below provide a summary of the outcomes of various studies conducted to inform the EIS, provides a qualitative assessment of the likelihood of risk to human health in the surrounding community and outlines the proposed management or mitigation measures if required.

5.1 Operation Phase

5.1.1 Air Quality and Odour

The potential impact to air quality from the Project is assessed by using an air dispersion model (AERMOD) to predict the maximum ground level concentration (GLC) of pollutants at the Site property boundary. Details of the model are presented in Golder (2021) *Air Quality Impact Assessment* for the Project.

The model considered impacts from the proposed three vertical exhaust ventilation stacks to sensitive receptors. As the Site is situated within a heavy industrial park, these receptors are the neighbouring businesses and adjacent premises which were modelled using a Cartesian grid with spacing of 50 m. Modelling was conducted for a three year period (1 January 2017 to 31 December 2019) for a project only scenario and a project plus baseline contribution.

Results of the air quality modelling were compared to 24 hour and annual NSW impact assessment criteria (PM_{2.5}, PM₁₀, TSP and lead) and individual toxic pollutants criteria (arsenic, chromium, benzene, and trichloroethylene). There are no NSW or Australia air quality criteria for PFAS. However, for the assessment, a health-based screening level from the US State of Michigan for PFAS of 0.07 µg/m³ for a 24-hour averaging period¹ was used as the PFAS screening criteria.

The findings are summarised as follows:

¹ Department of Environment, Great Lakes, and Energy, Michigan PFAS Action Response Team - Air Quality Related Issues
https://www.michigan.gov/documents/pfasresponse/Frequently_Asked_Questions_on_Air_Quality_Related_Issues_-_Air_Quality_Workgroup_MPART_663729_7.pdf

- 24-hour average GLC concentrations for PM_{2.5} and PM₁₀ (including baseline), are below the relevant criteria for all years modelled
- Annual average GLCs for PM_{2.5} are above the criteria for all years modelled. This is due to high annual background concentrations and not emissions from the WTF. The maximum predicted annual PM_{2.5} GLC at the nearest grided receptor outside the WTF boundary, without baseline data is 0.18 µg/m³, which is 2.3% of the annual criteria of 8.0 µg/m³.
- Annual average PM₁₀ is above the criteria for 2019. This is due to annual average baseline for PM₁₀ in 2019 being above the criteria without the addition of PM₁₀ emissions from the WTF. The annual average PM₁₀ GLC in 2019, without baseline data (0.19 µg/m³) is lower than 2017 and 2018 annual averages (0.22 µg/m³ and 0.25 µg/m³) and are all <1% of the criteria.
- The annual average GLCs for TSP are below the criteria for all years modelled.
- The maximum predicted PFAS, benzene and TCE 1-hour GLCs and maximum predicted PFAS GLCs, at the nearest grided receptor outside the WTF boundary, are below the relevant criteria for all years modelled.
- The maximum predicted 1-hour metals (arsenic, chromium VI) GLCs at grided receptors outside the WTF boundary are predicted to exceed the criteria in all three years modelled.

The compounds exceeding the relevant screening criteria were arsenic (As) and chromium VI (Cr). These results are considered to be conservative as emissions of As and Cr were modelled for every hour of the year, even though they would only occur hourly for about 12 days per year. Analysis of the hourly results shows that the ranked 1-hr As and Cr concentrations drop below the criteria at the 44th ranked occurrence, this indicates that the probability of an exceedances actually occurring is very low to negligible; i.e., less than 2-hours in any year.

The ventilation stacks serve as an air emissions control device that include filters to reduce particulate matter emissions and activated carbon to reduce emissions of VOCs and odour. As modelled within Golder (2021) *Air Quality Impact Assessment*, the two odorous VOCs (benzene and TCE) are three order of magnitude (1000X) below the applicable criteria, indicating very low to negligible risks to loss of amenity due to odour emissions.

To confirm the assumption of conservatism in the air quality model, a post-commissioning stack test for PM and metals, and VOC's or odour will be undertaken, and if necessary, in future air quality monitoring of PM, metals in PM, VOC's or odour can be undertaken to confirm compliance with the applicable NSW air quality criteria. Details of the proposed monitoring program are provided in Golder (2021) *Air Quality Impact Assessment* in addition to being outlined within the Operations Environment Management Plan (refer to Section 5.1.5).

Based upon the reported results, community exposure to contaminants in air is unlikely, and risk to health unlikely. However, these conclusions will be assessed and confirmed through the monitoring program.

5.1.2 Noise

Potential noise impacts were assessed by determining existing noise levels at nearby noise-sensitive receptors and conducting noise attenuation calculations to predict noise impacts from the site operations at these sensitive receptors. Details of the noise impact assessment are provided in Golder (2021) *Noise Impact Assessment Environmental Impact Statement, Prestons Waste Treatment Facility*.

Unattended noise monitoring was undertaken at two locations of noise-sensitive receptors and at the Site during the period 25 June 2020 to 2 August 2020 to establish the existing ambient noise levels in the area.

As identified within the Golder (2021) *Noise Impact Assessment Environmental Impact Statement, Prestons Waste Treatment Facility*, the majority of noise sources associated with the Project occur within the confines of the WTF building. The noise sources of the Project that contribute to the background environment were identified as:

- Building ventilation exhaust fans (3).
- Waste delivery trucks (B-double).

Based upon the assessment completed in the Noise Impact Assessment, the predicted sound pressure levels at the noise-sensitive receptors are compliant with the relevant regulations including the relevant Project Noise Trigger Levels calculated in accordance with the NSW EPA (2017) “Noise Policy for Industry” for day, evening and night periods and under noise-enhancing meteorological conditions. In addition, additional vehicle traffic from the Project is not assessed as having any perceivable effect on the existing residences under the NSW Road Noise Policy.

Therefore, the likelihood of exposure to increased ambient noise levels in the surrounding community as a result of the Project is unlikely, and consequent risks to human health are considered to be low and no further mitigation measures are required.

5.1.3 Surface Water

A flooding and stormwater management study was undertaken to support the EIS. Details of the study including data review, methodology, and results of the flooding and stormwater management are presented in Golder (2021) *Prestons Waste Treatment Facility Flooding and Stormwater Management Study* Ref: 20142192-039-R-RevA.

Process Water

Process water will be wholly managed within the bunded building and separate from stormwater (as a closed system) and recycled and reused where possible, thus the natural environment or the Council drainage network will not receive leachate/process water from the facility.

Consequently, community exposure to process water is very unlikely and risks to human health are low.

Stormwater Management

The assessment of the current and proposed stormwater management for the project has considered the additional onsite stormwater detention (OSD) requirements to manage the increased runoff due to increased impervious area following development. Stormwater generated from the various parts of the site will be managed via:

- Detention within onsite storage tanks for reuse
- Discharge to Council’s drainage network
- Infiltrate into existing garden beds
- Discharged into Whyalla Place (exceedance runoff from proposed driveway area, volume negligible)

The post-development stormwater management plan (SWMP) integrates into the existing drainage system with minimal alterations where practicable. Details of the SWMP and measures are provided in Golder (2021) *Prestons Waste Treatment Facility Flooding and Stormwater Management Study*.

Assessment of potential water quality has concluded that development requires no stormwater quality treatment infrastructure. The potential for contaminants from waste, process water/leachate or chemicals stored to migrate off-site via surface water flow is low, based on the following:

- Process water will be managed wholly within the bunded buildings and separate from stormwater (as a closed system).
- The storage and handling of waste materials will be undertaken inside the buildings.
- The floor of the building is concrete with centrally located leachate collection pits so that all spills and contamination are contained within the buildings. Collected leachate will be pumped to the Waste Water Treatment Plant for treatment prior to discharge to sewer. The leachate management system would ensure segregation between clean stormwater runoff and potentially contaminated runoff.
- Storage of chemicals and dangerous goods will be inside buildings in accordance with Australian Standards.
- Trucks would pass over a wheel wash inside the building prior to exit preventing tracking of waste on outside hard stand and beyond the site boundary.

Consequently, community exposure to contaminated stormwater from the site is unlikely and risks to human health are low.

Flood Inundation

The flood modelling considered baseline and post-development indicate that increased post-development building footprint partially impedes the flood flow across the Site and causes slightly less flooding at the immediate downstream of the Site's northern boundary for the post-development scenario than the baseline scenario. Therefore, it is anticipated the proposed development will not increase flood risks to the Site and the adjacent areas under the modelled scenarios.

The potential for flood water containing contaminants from the site entering the surrounding environment will be managed as part of the post-development stormwater management plan (SWMP) as discussed above. Given the containment of waste waters within the property, management of runoff into the existing network and consideration of the baseline stormwater quality, the development is not considered to require any stormwater quality treatment infrastructure.

Given the proposed operational management of surface water, the exposure of community to contaminated flood water is unlikely, and the subsequent risks to human health are low.

5.1.4 Groundwater

Any post-development runoff infiltration will be in the garden areas and will be similar or slightly less than the baseline conditions. Therefore, given the proposed management measures for minimising contaminants in stormwater runoff (refer Section 5.1.3) the proposed runoff is not anticipated to alter the groundwater quantity or quality in the underlying aquifers/groundwater system.

The potential for loss of containment of liquid wastes or treatment chemicals resulting in infiltration is expected to be low based upon the following:

- Process water will be managed wholly within the bunded buildings and separate from stormwater (as a closed system).
- The storage and handling of waste materials will be undertaken inside the buildings.
- The floor of the building is concrete with centrally located leachate collection pits so that all spills and contamination are contained within the buildings. Collected leachate will be pumped to the Waste Water Treatment Plant for treatment prior to discharge to sewer. The leachate management system would ensure segregation between clean stormwater runoff and potentially contaminated runoff.

- Storage of chemicals and dangerous goods will be inside buildings in accordance with Australian Standards.

Therefore, the potential for contamination of groundwater due to site operations is very unlikely and subsequent risks to human health due are low.

5.1.5 Operation Environmental Management Plan

In addition to the design and infrastructure control measures discussed above, the potential migration of contaminants beyond the Site boundary will also be managed under an Operation Environmental Management Plan (OEMP) outlining environmental procedures and control measure to be implemented during operation. The OEMP will include specific sub-plans for air, noise, stormwater and further environmental issues, and details of future monitoring programs to be implemented for the Project.

5.2 Construction Phase

Construction associated with the modification of the existing building on the Site will be undertaken in two stages. The duration of Stage 1 is estimated at 1-2 months and Stage 2 approximately 4 months. The majority of the facility is to be established in the existing onsite building with minimal external construction.

Examples of specific construction activities include, but may not be limited to, the following:

- Minor demolition;
- Minor earthworks;
- Construction of Weighbridges and Weighbridge office;
- New driveway;
- Building extension;
- HVAC System Integration.
- Fire Management System Upgrade
- Internal fit out – pits, push wall, bunding, water treatment plant, fire wall.

The equipment necessary for the construction of the Project may include compaction equipment, backhoes, excavators, rollers, truck, concrete pumping equipment, air compressors, concrete vibrators and saws, mobile cranes and welders.

To mitigate potential noise impacts during construction, they will be scheduled to occur between 07:00 to 18:00 Monday to Friday and 08:00 to 13:00 on Saturdays. No work on Sundays or public holidays is proposed.

5.2.1 Air Quality and Odour

A qualitative assessment of construction generated air quality impacts was conducted as provided in Golder (2021) *Air Quality Impact Assessment Environmental Impact Statement, Prestons Waste Treatment Facility*.

Potential air quality impacts may arise during external construction activities including minor demolition to remove part of the existing slab and portion of the existing warehouse wall, minor earthworks for footings and drainage. The building extension is to be constructed using prefabricated concrete panels and the HVAC system will be erected and installed by crane.

A large portion of the work required to construct the WTF will be internal fit outs and installations. This provides a lower potential for air quality impacts due to less invasive activity, minimal earthworks and the mitigation effects of the building structure.

A construction air quality management plan will be prepared and implemented and will include, but may not be limited to, the following:

- Identification of the surrounding land use and local stakeholders.
- Displaying the name and contact details of person(s) responsible for air quality at the site boundary.
- Recording all air quality complaints, identify causes and incorporating measures to reduce emissions in a timely manner.
- Include all site staff at the morning toolbox in a discussion for planning the work day around dust suppression and minimisation.
- Structure high dust generating activities (earthworks and demolition) around days with low windspeed and stop or pause these activities during dry and windy conditions.
- Loads shall be covered on trucks transporting material to and from the construction site.
- Spray the site regularly to suppress dust and use a water-assisted sweeper along the access road to reduce the potential for material to be tracked off site.
- Cover and weight stockpiles to prevent wind erosion when they are inactive.

Community exposure to air quality impacts during construction will be appropriately managed following implementation of the above management measures.

5.2.2 Noise

A qualitative assessment of construction generated noise, following the Department of Environment and Climate Change NSW (DECC), Interim Construction Noise Guidelines (Guidelines) is provided in Golder (2021) *Noise Impact Assessment Environmental Impact Statement, Prestons Waste Treatment Facility*.

The DECC Guidelines states the qualitative assessment may be used for short-term works, those that are not likely to affect an individual or sensitive land use for more than three weeks. The construction of the WTF will exceed the three-week period. However, the majority of the facility is to be established in the existing onsite building with minimal external construction.

A noise management plan will be prepared and implemented during the construction phase and will include:

- Identification of the surrounding noise-sensitive land use.
- A description of working hours and practices to minimise noise.
- A list of high noise equipment or processes along with mitigation/minimising measures where possible.
- A complaint register and written process for handling complaints.
- Community notification procedures, informing surround properties of potential noisy works and controls in place to minimise these activities.
- Contractor involvement. A description of noise generating activities will be discussed in the morning toolbox with workers to be involved in reducing the effects where possible.

Community exposure to noise during construction will be appropriately managed following implementation of the above management measures.

5.2.3 Dusts

The results of the Golder (2021) *Phase 1 Preliminary Site Investigation (PSI) and Limited Phase 2 Detailed Site Investigation (DSI)* (Ref: 20142192-008-R-Rev0) show concentrations of contaminants in soils and consequently dust derived from the Site during construction activities would be below the laboratory limit of reporting (LOR) and/or below adopted site criteria, presenting low risk to human health.

5.2.4 Erosion and Sediment Control

The proposed constructions at the Site are limited to installation of new buildings, modifications to the existing carpark, installation of a new driveway, modifications to the stormwater management network and installation of above-ground infrastructure. Therefore, minimal amount of erosion and sediments as a result of stormwater runoff is anticipated during construction activities. However, an erosion and sediment control plan will be implemented as outlined in a Construction Environmental Management Plan (CEMP).

The results of the Golder (2021) *Phase 1 Preliminary Site Investigation (PSI) and Limited Phase 2 Detailed Site Investigation (DSI)* (Ref: 20142192-008-R-Rev0) show concentrations of contaminants in sediment derived from the site during construction activities would be below the laboratory limit of reporting (LOR) and/or below adopted site criteria, presenting low risk to human health.

In addition, dust will be managed under the construction air quality management plan (refer section 5.2.1), therefore community exposure to contaminated dusts generated during construction activities is unlikely and risks to human health are low.

5.2.5 Construction Environmental Management

A Construction Environmental Management Plan (CEMP) outlining environmental procedures and control measures, including but not limited to, management of air quality, noise, and erosion and sediment control, will be prepared and implemented during construction.

6.0 CONCLUSIONS

This Health Impact Assessment (HIA) has been undertaken to support the EIS for the construction and operation of the proposed development to assess the potential for community exposure to contaminants from the off-site migration of contaminants during the construction and operation of the Project.

The assessment of potential risk to community health from the identified exposure pathways has been considered in terms of the likelihood and consequence, and is based upon the findings from the individual technical studies conducted as part of the EIS for the Project. This assessment is largely qualitative, with the exception of air quality and noise where modelling results have been compared to health based standards or guidelines.

The results of the assessment has found that based upon the design and infrastructure control measures for the Project, and the environmental management plans (OEMP and CEMP) that will be prepared and implemented for the on-going operations and construction activities (including an air quality monitoring program during operation), the potential for community exposures to contaminants from the Site is unlikely and the community health risks are low. Consequently, further site-specific human health risk assessment is not required.

7.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled - "Important Information Relating to this Report", which is included in Appendix B of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

Signature Page

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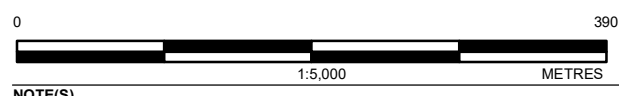
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APPENDIX A
Figures



LEGEND
 Site Boundary



NOTE(S)

REFERENCE(S)
 BACKGROUND IMAGE - COPYRIGHT OF NEARMAPS.
 IMAGE DATE
 KEY MAP: COPYRIGHT OF ESRI
 TOPOGRAPHY DATA SOURCED FROM NSW GOVERNMENT

CLIENT
HI QUALITY

PROJECT
HI QUALITY WASTE FACILITY EIS PRESTONS

TITLE
SITE LOCALITY

CONSULTANT



YYYY-MM-DD	5/08/2020
DESIGNED	GOLDER
PREPARED	KAF
REVIEWED	PV
APPROVED	SD

PROJECT NO.	CONTROL	REV.	FIGURE
20142192	008	0	1

APPENDIX B

Important Information

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APPENDIX K

**Fire and Incident Management
Assessment**



Core Engineering Group • Fire • Risk • Emergency Management

Golder Associates
Level 8, 40 Mount St
North Sydney, NSW, 2060

07 June 2021 | Final Issue | Report No. F201569_FSS_02

Fire and Incident Management Report

Prestons Waste Facility

9 Whyalla Place, Prestons, NSW, 2170

REPORT DETAILS

Project: Prestons Waste Facility
 9 Whyalla Place, Prestons, NSW, 2170

Document: Fire and Incident Management Report (FIMR)

Report No.: F201569_FSS_02

Report Revision History

REV	DATE ISSUED	COMMENT	PREPARED BY	REVIEWED BY
01	24/05/21	Draft Issue for Comment	Laurence Kwong <i>BEng (Chemical) (Hons)</i> <i>MEng (Building Fire Safety and Risk Engineering)</i> <i>MIEAust</i>	Graham Morris <i>MEng (Structural and Fire Safety)</i> <i>CPEng MIEAust NER</i>
02	07/06/21	Final Issue		

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EXECUTIVE SUMMARY

CORE Engineering Group have been engaged by Golder Associates to develop a Fire and Incident Management Report (FIMR) for the proposed Prestons Waste Facility. The waste facility is proposed to process 270,000 t/y of waste, including contaminated soil, contaminated sludge, and liquid wastes. This FIMR provides an overview of the following items to address the Planning Secretary's Environmental Assessment Requirements (SEARs):

Table 1: Response to SEARs

REQUIREMENT	RESPONSE
<p>Identification of the aggregate quantities of combustible waste products to be stockpiled at any one time</p>	<ul style="list-style-type: none"> ● The aggregate quantities of combustible waste that could be stockpiled have been provided by Golder Associates and are documented in detail in Appendix A ● The largest stockpiles are 5,000 t at any one time and these primarily comprise of contaminated soils
<p>Technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment and fire (including location of fire hydrants and water flow rates at the hydrant) management and containment measures</p>	<ul style="list-style-type: none"> ● To reduce the potential impact on air quality, a preliminary mechanical design has been proposed by others as documented in Appendix B and comprises of equipment used to filter dust, scavenge VOC's, and control vehicle exhaust ● No specific design measures are proposed to control potential noise pollution as all operations are within the building and acoustic modelling has demonstrated that this is acceptable. It is noted that the site is proposed to be in an industrial precinct. Noise control shall be based on equipment selection such as an attenuator for the filtration system ● To reduce the potential impact on water systems, the floorplate of the building shall be utilised as a bund with local upturns at doorways and drive-over bunding at the entry and exit points. ● Surface water shall be controlled through the existing surface water drainage network with drainage from the carpark to the existing stormwater connection. The existing stormwater collection pits within the building shall be removed and sealed, being replaced by the proposed leachate collection system. No connection between the leachate collection and the stormwater network is permitted and all collected wastewater is to be sent to the onsite wastewater treatment plant. ● Where spills occur, multiple measures are proposed to be implemented including Construction EMP and Operation EMPs, internal collection pits, and bunding to prevent the mixing of stormwater and process water ● Indicative locations of fire hydrants to satisfy fire brigade operations and provide coverage are documented in Figure 10-4

REQUIREMENT	RESPONSE
	<ul style="list-style-type: none"> • Fire water from hydrants, sprinklers, and drenchers shall be retained through a combination of internal bunding, both from dedicated storage areas and the general warehouse floorplate, and via the existing stormwater retention system. The proposed leachate collection system shall serve as the secondary containment measure for firewater and direct the collected waste to the onsite wastewater treatment system and storage tanks.
Details regarding the fire hydrant system and its minimum water supply capabilities appropriate to the site's largest stockpile fire load	<ul style="list-style-type: none"> • The fire hydrant system shall be capable of simultaneously providing 30 L/s of water. This is estimated to be suitable for an internal fire up to 43 MW in size which is not anticipated to be exceeded in the subject building
Details of size and volume of stockpiles and their management and separation to minimise fire spread and facilitate emergency vehicle access	<ul style="list-style-type: none"> • The size and volume of stockpiles shall comply with the requirements of FRNSW's Guideline – Fire Safety in Waste Facilities • Specifically, stockpile heights must not exceed 4 m and all stockpiles not separated by a masonry wall shall be separated by at least 6 m
Consideration of consistency with NSW Fire & Rescue Fire Safety Guideline – Fire Safety in Waste Facilities (February 2020)	<ul style="list-style-type: none"> • Hydrant systems: <ul style="list-style-type: none"> • The hydrant system shall comply with AS2419.1:2005 with the exception that the required flowrate shall be as per AS2419.1:2017 i.e. 30 L/s • There are no open yard stockpiled storage areas proposed and all hydrants are proposed to be located externally for accessibility • Sprinkler systems: <ul style="list-style-type: none"> • The building shall be fully sprinkler protected with High Hazard sprinkler system in the warehouse areas. The design of the system is to be by a fire services engineer • With the exception of the drenchers for the fire shutters, the information available does not appear to warrant dedicated drencher, deluge, mist, or foam systems • Fire detection and alarm system: <ul style="list-style-type: none"> • A roof level aspirating smoke detection system (e.g. VESDA) is proposed to provide early warning of a smouldering or developing fire. The system shall be divided into multiple detection zones to facilitate identification of the area of smouldering • The alarm system shall activate simultaneously throughout the building on sprinkler activation, drencher activation, or Fire 1 alarm signal on the VESDA • Manual call points must be located adjacent to every exit point to facilitate initiation of an early fire alarm

REQUIREMENT	RESPONSE
	<ul style="list-style-type: none"> • Visual alarms shall be provided where noisy equipment such as mobile plant is utilized • Smoke hazard management: <ul style="list-style-type: none"> • The proposed HVAC system shall be relied upon for smoke control purposes with a proposed extraction rate of 50 m³/s in Compartment 1 and 25 m³/s in Compartment 3. The smoke control system must comply with Specification E2.2b and be capable for operating for at least 2 hours. • Makeup air shall be from roller shutter doors that can be manually openable in the event of a power failure or electrical isolation. • Fire water run-off containment: <ul style="list-style-type: none"> • As discussed above, containment shall be through a combination of the onsite bunding and leachate system
<p>Detailed information relating to the proposed structures addressing relevant levels of compliance with Volume One of the National Construction Code(NCC).</p>	<ul style="list-style-type: none"> • The building shall comply with the Performance Requirements of the NCC through a combination of DtS Provisions and Performance Solutions. The following Performance Solutions are proposed: <ul style="list-style-type: none"> • C2.2 – Oversized Fire Compartment 1 • C3.3 – External exposure of fire compartments • C3.5 – Fire shutter in firewall • D1.4, D1.5 – Extended travel distances • E1.10, E2.3 – Special hazard facility

The complete fire engineering analysis will be included within the Fire Engineering Report (FER), undertaken in accordance with the International Fire Engineering Guidelines (IFEG), and as such is not documented herein.

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1 INTRODUCTION

1.1 OVERVIEW

In developing the preliminary Fire and Incident Management Report, the following overall process has been adopted. With regards to the built form of the facility, where non-conformances from the DtS Provisions of the NCC are proposed to be addressed through a Performance Solution, the methodologies defined in the IFEG [3] have been adopted to provide a workable and safe Fire Safety Strategy through a trial design.

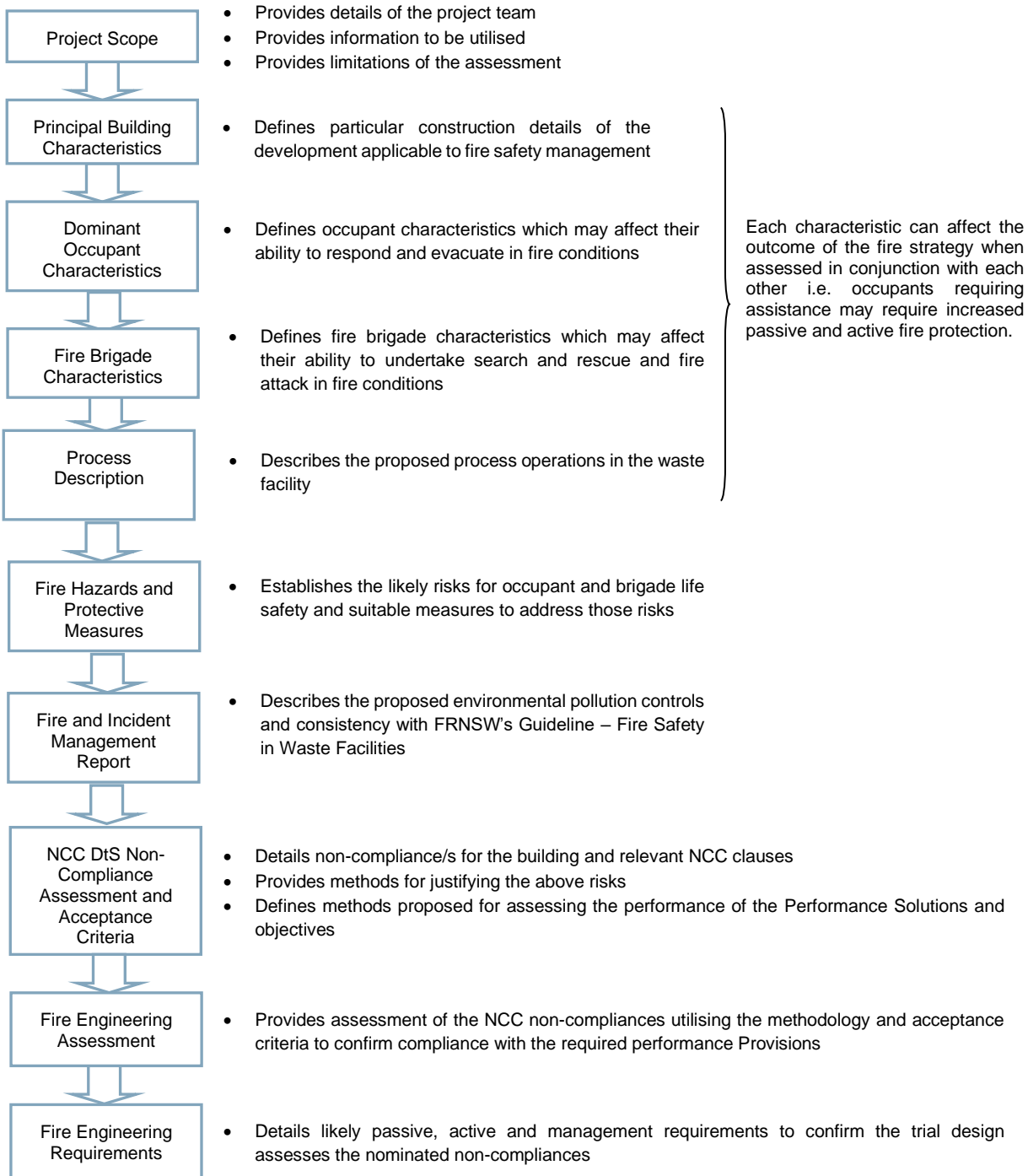


Figure 1-1: Fire Engineering Report Process

1.2 FIRE SAFETY OBJECTIVES

The objective of this Fire Engineering Assessment is to develop a Fire Safety System, which satisfies the performance requirements of the NCC whilst maintaining an acceptable level of life safety, protection of adjacent property and adequate provisions for Fire Brigade intervention. At a community level, fire safety objectives are met if the relevant legislation and regulations are complied with. As stated in the NCC, “*A Building Solution will comply with the NCC if it satisfies the Performance Requirements*”. In addition to this, certain non-regulatory objectives exist as detailed below.

1.2.1 Building regulatory objectives

The following items are a summary of the fire and life safety objectives of the NCC:

- **Life safety of occupants** - the occupants must be able to leave the building (or remain in a safe refuge) without being subject to hazardous or untenable conditions. The objective of the Fire Engineering Assessment is to demonstrate that the proposed building design and fire safety systems would minimise the risk of exposing building occupants to hazardous or untenable conditions in an event of a fire.
- **Life safety of fire fighters** - fire fighters must be given a reasonable time to rescue any remaining occupants before hazardous conditions or building collapse occurs. The objective of the Fire Engineering Assessment is to demonstrate that the proposed building design and fire safety systems would facilitate fire brigade intervention and minimise the risk of exposing fire fighters to hazardous or untenable conditions in an event of a fire.
- **Protection of adjoining buildings** - structures must not collapse onto adjacent property and fire spread by radiation should not occur. The objective of the Fire Engineering Assessment is to demonstrate that the proposed building design and fire safety systems would minimise the risk of fire spreading from one building to another.

1.2.2 Fire Brigade objectives

The overall philosophical Fire Brigade objectives throughout Australia are to protect life, property and the environment from fire according to the Fire Brigade Intervention Model (FBIM) [5] as per the Fire Services State and Territory Acts and Regulations.

Over and above the requirements of the NCC, the Fire Brigade has functions with regard to property and environmental protection and considerations regarding occupational health and safety for its employees.

1.2.3 Non-prescribed objectives

Fire Engineering has an overarching benefit to many facets of the built environment where non-prescribed objectives can have an influence on the Fire Safety Strategy adopted. Although not generally assessed within, the following can be considered if requested.

- **Business continuity** - will the loss of a particular facility due to fire / smoke damage result in excessive financial impact on the client? For example, is the facility critical to business continuity?
- **Public perception** - should a fire occur within the facility is there likely to be questionable public perception about the safety and operation of the facility?
- **Environmental protection** - fires of excessive sizes can have significant effects on the environment which may require a detailed risk assessment to minimise such outcomes.
- **Heritage salvation** - buildings can have a heritage value for both cultural and educational purposes which can be destroyed by insufficient fire protection.
- **Risk mitigation / insurance limitations** - are there specific limitations on insurance with respect to risk mitigation and fire safety design? i.e. Does the relevant insurer have concerns with respect to open voids through the building?
- **Future proofing (isolation of systems)** - what flexibility is required in the overall design to allow for future development or changes in building layout?
- **Occupational Health and Safety (OHS) requirements** - buildings may have specific fire safety requirements pertaining to OHS requirements.

This FIMR will specifically consider the environmental protection objectives with regards to air, water, noise, spill, and fire contamination.

1.3 REGULATORY FRAMEWORK OF THE FIRE ENGINEERING ASSESSMENT

1.3.1 Building Code of Australia

One of the goals of the NCC is the achievement and maintenance of acceptable standards of safety from fire for the benefit of the community. This goal extends no further than is necessary in the public interest and is considered to be cost effective and not needlessly onerous in its application.

Section A2.1 of the NCC [1] outlines how compliance with the Performance Requirements can be achieved, being satisfied by one of the following:

- (a) A Performance Solution which demonstrates–
 - (i) Compliance with all relevant Performance Requirements; or
 - (ii) The solution is at least equivalent to the Deemed-to-Satisfy Provisions; or
- (b) A Deemed-to-Satisfy Solution; or
- (c) a combination of (1) and (2).

Section A2.2 of the NCC provides several different methods for assessing that a Performance Solution complies with the Performance Requirements, through one or a combination of the following Assessment Methods:

- (a) Evidence of suitability that shows the use of a material, product, form of construction or design meets the relevant Performance Requirements.
- (b) A Verification Method including the following:
 - (i) the Verifications Methods in the NCC; or
 - (ii) other Verification Methods, accepted by the appropriate authority that show compliance with the relevant Performance Requirements.
- (c) Expert Judgement.
- (d) Comparison with the Deemed-to-Satisfy Provisions.

Where a Performance Requirement is satisfied entirely by a Performance Solution, the following method must be used to determine the Performance Requirements relevant to the Performance Solution:

- (a) Identify the relevant Performance Requirement from the Sections or Part to which the Performance Solution applies.
- (b) Identify Performance Requirements from other Sections of Parts that are relevant to any aspects of the Performance Solution proposed or that are affected by the application of the Performance Solution.

Under Section A2.4, the following method must be used to determine the relevant Performance Requirements when using a Performance Solution in combination with a Deemed-to-Satisfy Solution: These methods are summarised as follows:

- (a) Identify the relevant Deemed-to-Satisfy Provisions of each Section or Part that are to be the subject of the Performance Solution.
- (b) Identify the Performance Requirements from the same Section or Part that are relevant to the identified Deemed-to-Satisfy Provisions.
 - (i) Identify Performance Requirements from the other Sections and Parts that are relevant to any aspects of the Performance Solution proposed or that are affected by the application of the Deemed-to-Satisfy Provisions that are the subject of the Performance Solution.

1.3.2 International Fire Engineering Guidelines

The IFEG [3] document has been developed for use in fire safety design and assessment of buildings and reflects world's best practice. The document is intended to provide guidance for fire engineers as they work to develop and assess strategies that provide acceptable levels of safety.

The document is particularly useful in providing guidance in the design and assessment of Performance Solutions against the Performance Requirements of the NCC. The prescribed methodology set out in the IFEG has been generally adopted in the Fire Engineering Report.

2 OVERVIEW

2.1 OVERVIEW



CORE Engineering Group has been engaged to develop a Fire and Incident Management Report (FIMR) for the construction of Prestons Waste Facility at 9 Whyalla Place, Prestons, NSW, 2170. The waste facility is proposed to process 270,000 t/y of waste, including contaminated soil, contaminated sludge, and liquid wastes. The purpose of this FIMR is to satisfy the Planning Secretary's Environmental Assessment Requirements, including:

- identification of the aggregate quantities of combustible waste products to be stockpiled at any one time;
- technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment and fire (including location of fire hydrants and water flow rates at the hydrant) management and containment measures;
- details regarding the fire hydrant system and its minimum water supply capabilities appropriate to the site's largest stockpile fire load;
- details of size and volume of stockpiles and their management and separation to minimise fire spread and facilitate emergency vehicle access;
- consideration of consistency with NSW Fire & Rescue Fire Safety Guideline – Fire Safety in Waste Facilities (February 2020); and
- detailed information relating to the proposed structures addressing relevant levels of compliance with Volume One of the National Construction Code(NCC).

The complete fire engineering analysis for the non-conformances to the DtS Provisions identified will be included within the FER, and as such is not documented herein. This document does however outline the construction and management requirements considered necessary to achieve an acceptable level of life safety within the building as a result of the Performance Solutions. It shall be demonstrated that the building satisfies the Performance Requirements of the NCC and therefore complies with the NCC.

2.2 RELEVANT STAKEHOLDERS

This Performance Solution has been developed collaboratively with the relevant stakeholders as identified below:

Table 2-1: Relevant Stakeholders

ROLE	NAME	ORGANISATION
Facility Operator		Hi-Quality Group
Principal Planner	Todd Robinson	Golder Associates
Principal Design Engineer	Jacinta McMahon	
Principal Certifying Authority/BCA Consultant	Dean Goldsmith	Blackett Maguire + Goldsmith
Architect		SBA Architects
Fire Safety Engineer	Laurence Kwong Graham Morris	CORE Engineering Group
C10 Accredited Fire Engineer	Sandro Razzi	

It should be noted that at times some parties may have a vested interest in the outcome of the Fire Engineering assessment. Such parties can include local fire brigades, insurers, Environmental Protection Authority (EPA), project control groups, end users and community representatives. Although not always a legislative requirement, the design team should give due consideration to their inclusion in the Fire Engineering process. Where not required by legislation it is the client's decision to involve such parties, especially local fire brigade, to ensure a transparent and adequate fire safety solution for all. Where we are not notified of the inclusion of such parties it is assumed the client / representative has given due consideration to the above.

2.3 SOURCES OF INFORMATION

The following sources of information have been provided by the design team:

- NCC Compliance report prepared by Blackett Maguire + Goldsmith. Project No. 200463, dated 03/11/20
- Draft Environmental Impact Statement, Chapter 2, Report No. 20142182-010-R, Rev C, by Golder Associates, dated 11/08/20
- Scoping Report (2014192-005-R-Rev0) by Golder Associates, dated 01/09/20
- Concept HVAC design provided by Jacinta McMahon of Golder Associates via email correspondence on 05/05/21 (see Appendix B)
- Concept stormwater design provided by Jacinta McMahon of Golder Associates via email correspondence on 18/05/21 (see Appendix C)
- Planning Secretary's Environmental Assessment Requirements, Application No. SSD-9346594, issued 14/10/20
- FRNSW's Guideline: Fire Safety in Waste Facilities, Version 02.02, dated 27/02/20
- Architectural plans provided by SBA Architects, as indicated in Table 2-2.

Table 2-2: Drawings

DRAWING NO.	DESCRIPTION	ISSUE	DATE
DA100	Site Plan	P7	18/02/21
DA110	Roof Plan	P4	18/02/21
DA200	Elevations and Sections	P4	18/02/21

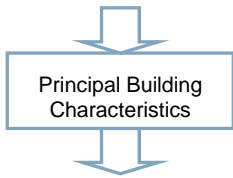
2.4 LIMITATIONS AND ASSUMPTIONS

In this instance the FIMR is developed based on applicable limitations and assumptions for the development which are listed as follows:

- The report is specifically limited to the project described in Section 2.
- The report is based on the information provided by the team as listed above in Section 2.3.
- Building and occupant characteristics are as per Section 4.3 and 4.4 respectively of this report. Variations to these assumptions may affect the FIMR and FER, and therefore should be reviewed by a suitably qualified Fire Engineer should they differ.
- As per any building design, DtS or otherwise, the report is limited to the fire hazards and fuel loads as prescribed in the IFEG [3]. The report does not provide guidance in respect to areas which are used for Dangerous Goods (DG) storage, processing of flammable liquids, explosive materials, multiple fire ignitions, or sabotage of fire safety systems.
- The development complies with the fire safety DtS provisions of the NCC [12] with all aspects in regards to fire and life safety unless otherwise stated in this report. Where not specifically mentioned, the design is expected to meet the NCC DtS requirements of all relevant codes and legislation at the time of construction and/or at the time of issue of this report.
- The assessment is limited to the objectives of the NCC and does not consider property damage such as building and contents damage caused by fire, potential increased insurance liability, and loss of business continuity.
- Malicious acts or arson with respect to fire ignition and safety systems are limited in nature and are outside the objectives of the NCC. Such acts can potentially overwhelm fire safety systems and therefore further strategies such as security, housekeeping, and management procedures may better mitigate such risks.
- This report is prepared in good faith and with due care for information purposes only, and should not be relied upon as providing any warranty or guarantee that ignition or a fire will not occur.
- The FIMR and FER is only applicable to the completed building. This report is not suitable, unless approved otherwise, to the building in a staged handover.
- Where parties nominated in Section 2.2 have not been consulted or legislatively are not required to be, this report does not take into account, nor warrant, that fire safety requirements specific to their needs have been complied with.

3 PRINCIPAL BUILDING CHARACTERISTICS

3.1 OVERVIEW



Building characteristics are assessed as part of the fire engineering assessment due to the following:

1. The location can affect the time for fire brigade intervention and potential external fire exposure issues.
2. The structure will impact on the ability to resist a developing fire and support condition to allow occupants to escape the building and the fire brigade to undertake fire fighting to the degree necessary.
3. The floor area determines the potential fire size and area required to be evacuated in the event of a fire.
4. NCC details such as Type of Construction, Class and Height will dictate passive and active fire safety systems.

3.2 SITE LOCATION

The development site is located in Prestons, approximately 45 km south-west of Sydney's central business district. The development site is located within an existing industrial area, surrounded on the north, east, and south by existing warehouses. The site is bound by Whyalla Place to the west which also serves as the principal pedestrian and vehicular access point to the site. The site is legally described as Lot 103 of DP866530.



Figure 3-1: Site Context

The building site influences the likely fire brigade intervention times, with the two nearest fire brigade stations provided with permanent staff located at Busby and Horningsea, approximately 3.6 and 6.1 km from the site respectively when considering actual driving routes.

3.3 SITE LAYOUT

The development site contains an existing warehouse facility which is proposed to be extended as part of the proposed works. The existing building comprised of a ~4,100 m² warehouse with 910 m² office. The existing walls along the boundary appear to be pre-cast concrete but do not appear to be supported on steel columns that are fire rated.

The proposed works will expand the existing warehouse with partial demolition of the external wall facing Whyalla Pl. This will create two new compartments, Compartment 2 and 3. The spring height of the existing warehouse is 11.7 m whilst the ridge height is 12.2 m. The roof height of the extension is approximately 7.5 m.

The building is proposed to be used as a waste management facility, processing 270,000 t/y of waste, including contaminated soil, contaminated sludge, and liquid wastes. The building is therefore proposed to contain equipment appurtenant to the treatment processes as well as stockpiles of the separated waste material. Compartment 2 shall contain the waste water treatment processes and Compartment 3 the immobilisation processes. The remaining processes and storage shall be in Compartment 1.

The proposed building layout is illustrated in Figure 3-2 with a total floor area of ~6,400 m² i.e. an extension of ~1,300 m². The existing office shall not be extended such that each floor of the office has an approximate area of 455 m².

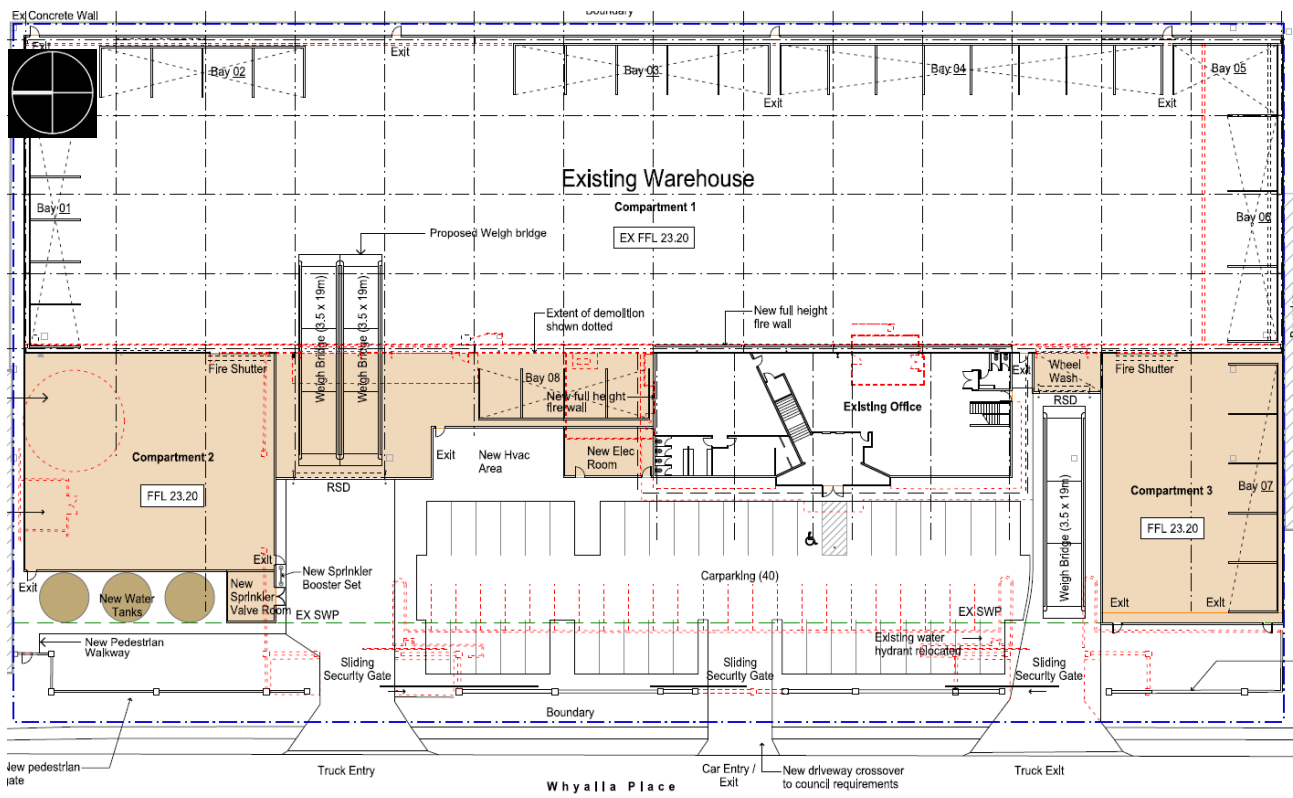


Figure 3-2: Site Plan

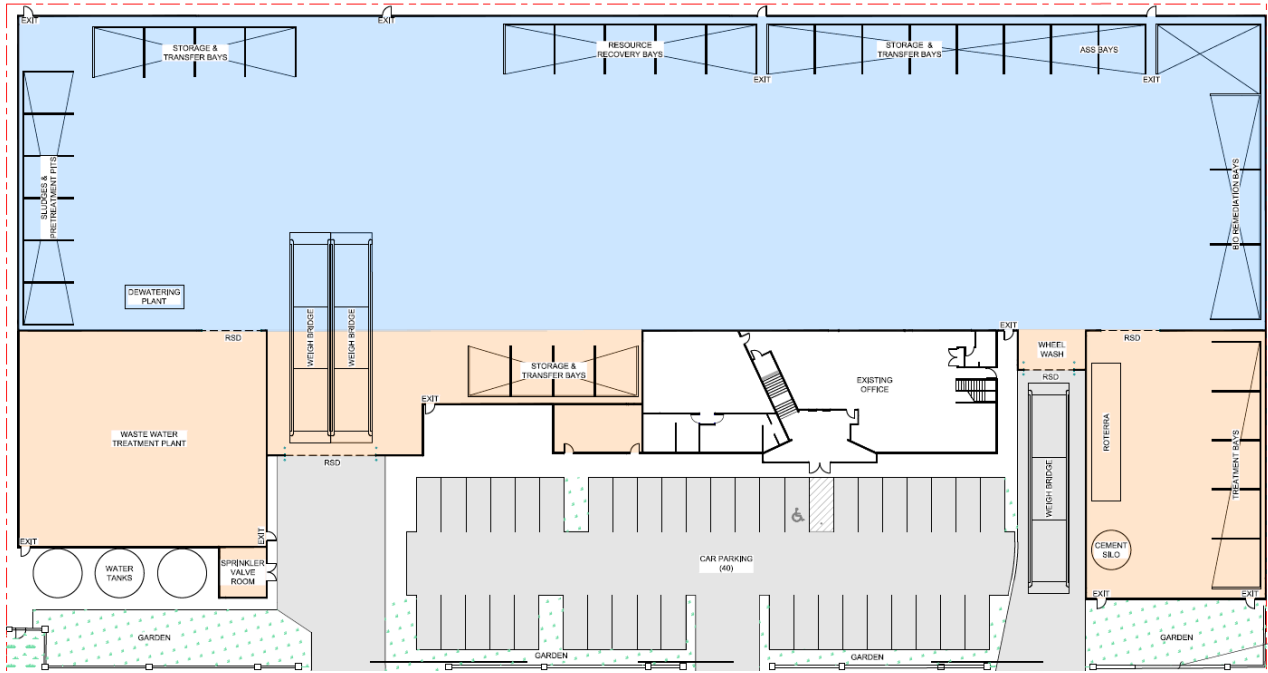


Figure 3-3: Proposed Layout of Storage Bunkers and Equipment

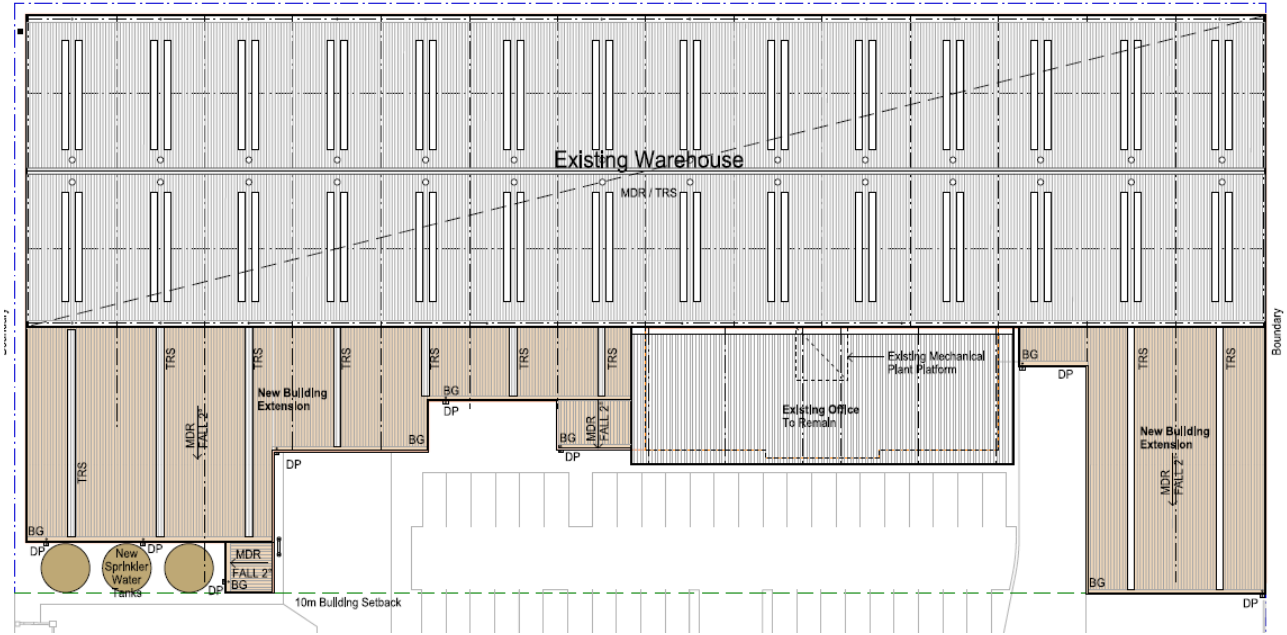


Figure 3-4: Roof Plan

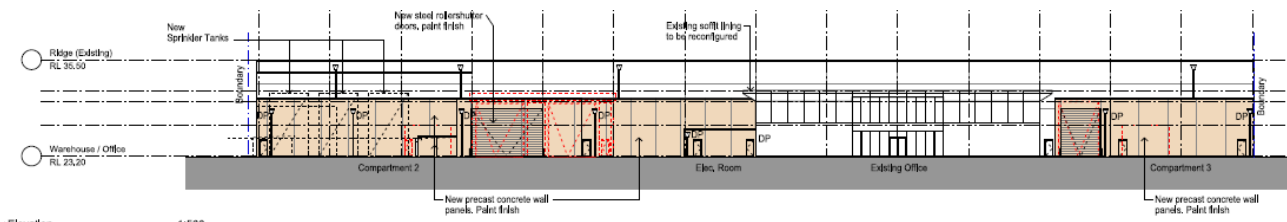


Figure 3-5: West Elevation

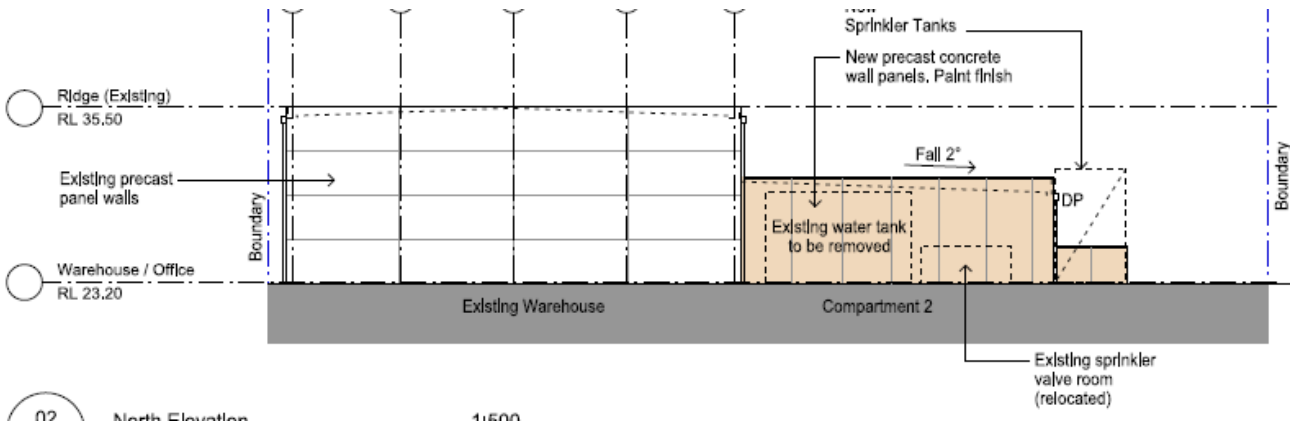


Figure 3-6: North Elevation

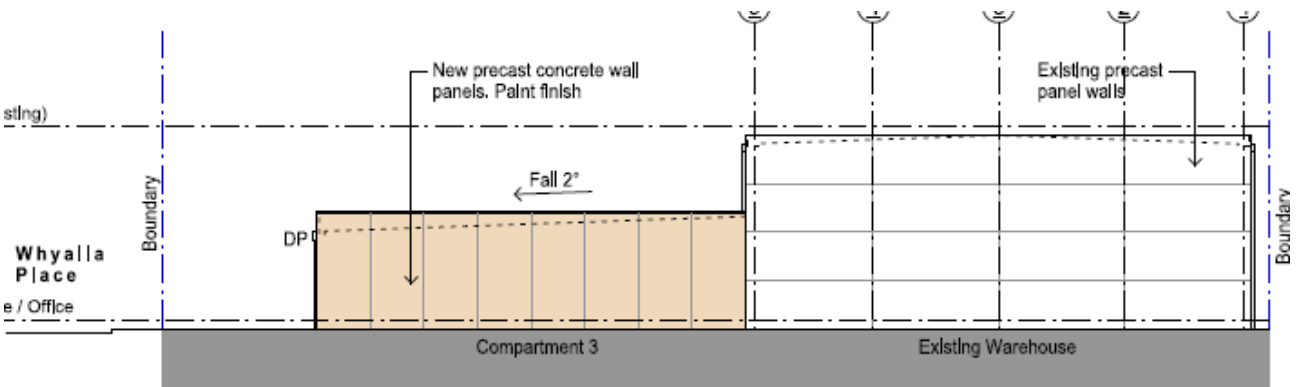


Figure 3-7: South Elevation

3.4 BUILDING STRUCTURE

The existing building appears to be constructed of pre-cast concrete panels, supported internally by steel columns. The existing steel columns do not appear to be fire sprayed and therefore do not currently achieve an FRL. It is anticipated that the extension shall similarly be constructed of concrete construction. All materials and finishes are to be in accordance with the requirements of Type A fire resisting construction.

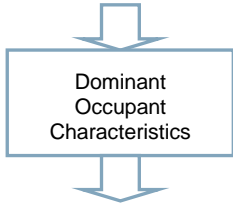
3.5 NCC ASSESSMENT SUMMARY

Table 3-1: NCC Building Characteristics

CHARACTERISTIC	DESCRIPTION
Classification	Class 5 (Office), Class 7b (Storage), Class 8 (Process)
Construction Type	Type A required based on largest fire compartment (Compartment 1)
Rise in Storeys	Two (2)
Effective Height	< 12 m
Floor Area	~ 6,400 m ²
Fire Compartment Areas	<ul style="list-style-type: none"> • Compartment 1: 4,520 m² • Compartment 2: 580 m² • Compartment 3: 490 m² • Compartment 4 (Office): 910 m²

4 DOMINANT OCCUPANT CHARACTERISTICS

4.1 OVERVIEW



The occupant characteristics are assessed within the Fire Safety Strategy due to the following:

1. Population numbers can dictate the time required to evacuate the building and the required life safety systems to be provided due to evacuation times.
2. Physical and mental attributes affect the occupants' capacity to respond to various fire cues and react accordingly.
3. Familiarity of occupants can affect the time taken to evacuate the building and subsequent active / passive requirements.

4.2 OCCUPANT NUMBERS AND DISTRIBUTION

Table D1.13 of the NCC provides a means of estimating the population of an area based on the use of that area and its size. The following occupant densities are considered applicable to each area in this building:

- Workshop – for maintenance staff: 30 m² / person
- Factory – other than for fabrication and processing: 50 m² / person
- Office: 10 m² / person

Notwithstanding these densities, it is noted from the Scoping Report by Golder Associates (2014192-005-R-Rev0, dated 01/09/20) that the warehouse areas may have up to 10 staff whilst the office areas may have up to 30 staff.

It is noted that these numbers are only listed at this stage to provide conservative inputs to the fire engineering analysis and do not form the requirements for amenities and the like.

4.3 OCCUPANT ATTRIBUTES

Occupants in the building may be of mixed age, although the elderly and children are generally not expected to be present. The population is therefore expected to be that of the general working public and be adults between the ages of 16 to 70. Due to the expected nature of the work conducted the majority of occupants are assumed to be able bodied people with a small number of less mobile occupants requiring assistance during an evacuation.

All occupants are expected to be awake and alert adults or in the direct company of an adult, capable of entering the leaving the building under their own volition. Occupants in all of these areas are not expected to be adversely impaired by drugs, alcohol, fatigue or other adverse conditions to degrees greater than in other warehouse and office buildings.

- **Staff and Security** are expected to be mobile with normal hearing and visual abilities, and occupants in this group are considered to take and implement decisions independently, and require minimal assistance during evacuation in a fire emergency. This occupant group is expected to be awake and fully conscious at all times when inside the building; and
- **Clients / Visitors** are expected to be mobile with normal hearing and visual abilities, this occupant group are expected to be capable of making and implementing decisions independently however may require assistance in locating the nearest and safest egress path in an emergency; and
- **External Maintenance Contractors** are expected to be mobile with normal hearing and visual abilities and occupants in this group are considered to take and implement decisions independently and require minimal assistance during evacuation in a fire emergency. The contractors are expected to be awake and aware of their surroundings at all times when inside the building; and
- **FRNSW** are expected to be equipped with safety equipment and will be educated in fire fighting activities and the dangers associated with fire incidents. This occupant group would be expected to be in a position to assist other occupants requiring assistance to evacuate. It is not expected that this occupant group would be present in the building at the time of fire ignition; however, they are expected to enter the building at a later stage to assist with the evacuation of occupants, if required, and to undertake fire suppression activities.

4.4 OCCUPANT FAMILIARITY

The majority of occupants within the building are expected to be staff and therefore the population in general are likely to react favourably in an emergency situation.

- **Staff, Maintenance and Security** can be expected to have a good familiarity with the building and the fire safety systems provided and may be trained in emergency procedures; and
- **Clients and /or Visitors** may or may not be familiar with the layout of the building and may require assistance in locating the exits; and
- **External Maintenance Contractors** this occupant group is expected to have a reasonable familiarity with the building as they would have to undergo site specific induction prior to commencement of work on site; and
- **FRNSW** are not expected to have any familiarity of the building layout, however are assumed to obtain the required information from the site block plans and tactical fire plans available prior to entering the building. Notwithstanding this they will be equipped with breathing apparatus and specialist equipment to prevent them from being adversely affected by fire hazards.

4.5 EMERGENCY TRAINING

Given the industrial and specialised nature of the facility, all staff are expected to receive training in the emergency procedures for the building. Under the Work Health and Safety (WHS) Legislation as well as best practice, an Emergency Management Plan (EMP) must be developed in accordance with AS3745:2010.

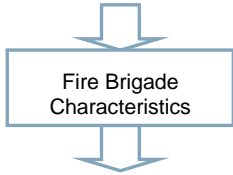
The EMP shall be developed by the Emergency Control Organisation and nominate the responsibilities of the fire wardens, the evacuation routes, and the procedures to follow in a fire event. It is expected that the procedures will include whether plant is required to be shut down in an emergency.

Given the potential fuel load that may be present and the potential environment impact, it is anticipated that occupant first aid firefighting will form an important part of the fire strategy to reduce the likelihood of a fire developing. All occupants shall therefore be provided with fire suppression training with the fire hose reels and fire extinguishers on an annual basis.

5 FIRE BRIGADE CHARACTERISTICS

5.1 OVERVIEW

Fire brigade characteristics are assessed within the FIMR as brigade characteristics can dictate the time required for fire brigade intervention including search and rescue, and fire attack.



5.2 FIRE BRIGADE ASSESSMENT

Figure 5-1 illustrates the site plan with fire services provided on the site. The existing Main FIP is located in the office on Ground Floor whilst the new sprinkler booster assembly shall be located along the truck entryway to the building adjacent the proposed sprinkler valve room. A new hydrant booster assembly shall be provided to the site as part of the proposed works.

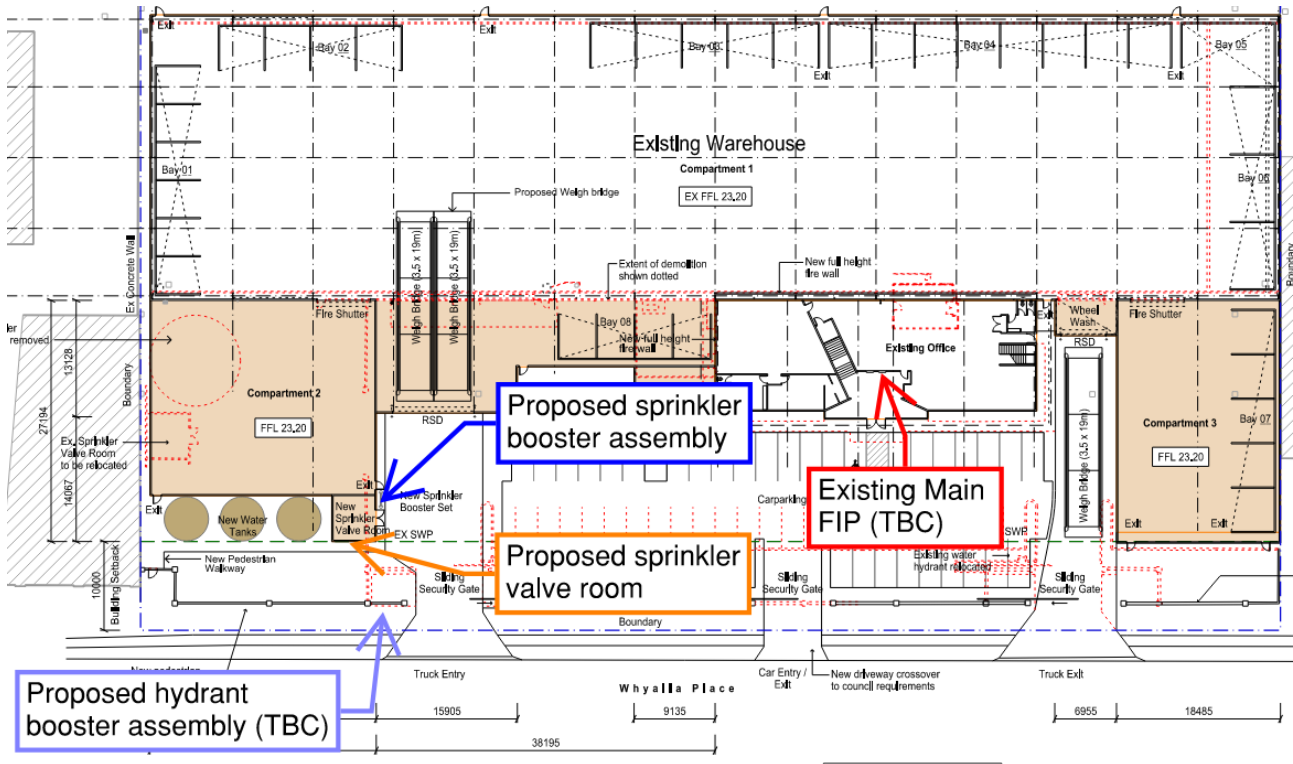


Figure 5-1: Fire Brigade Access and Site Facilities

The building is located within the Fire and Rescue New South Wales (FRNSW) jurisdictional turnout area. The closest two fire stations to the site that are provided with permanent staff are located in Busby and Morningsea, approximately 3.6 and 6.1 km from the site respectively when considering actual driving routes

6 PROCESS DESCRIPTION

6.1 OVERVIEW

The proposed waste facility is intended to treat up to 270,000 t/y of waste, comprising of:

- Contaminated soil;
- Contaminated sludge; and
- Liquid waste

Waste is received from various clients, treated, then stockpiled for subsequent distribution.

The treatment process implemented depends on the nature of the received waste and can include one or a combination of the following processes:

- Pre-treatment activities, which may comprise dewatering or the addition of additives to improve the treatability of sludges as part of a step process prior to treatment;
- Physical and chemical separation;
- Chemical Oxidation;
- Bioremediation;
- Immobilisation (stabilisation and / or solidification), using a high energy mobile mixing plant that can control the effective dosing rate;
- Acid Neutralisation; and
- Other treatment processes approved by NSW EPA.

Liquid waste/wastewater may be received from industrial and commercial organisations, as well as leachate from internal treatment processes. The wastewater treatment process shall be designed to treat the following contaminants:

- Hydrocarbons (including Total Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons);
- Organics;
- Suspended Solids;
- Acidity and Alkalinity;
- Heavy Metals;
- Nutrients; and
- Per/Poly-Fluoroalkyl Substances

6.2 PROCESS STREAM THROUGHPUT

Various technologies will be implemented to separate, treat, or immobilise the waste. The expected throughput for each process is estimated below.

- Sediments and sludges shall be received and unloaded into treatment pits and treated to such an extent that they can be treated as a 'Bulk Soil'. A throughput of 20,000 t/y of sediment and sludge is expected. These pits are located along the northern wall of Compartment 1.
- In addition, 80,000 t/y of 'Bulk Soil' will be received and will be unloaded into pre-allocated bays. The total throughput of 'Bulk Soil' is therefore 100,000 t/y and the relevant Unit Operations as per Table 6-1 are gravity separation, chemical separation, chemical oxidation, bioremediation, immobilisation, and batch mixing for the acid sulphate soils.
- Liquid waste at ~1-2 ML/day (or 70 ML/a) shall be transported to the site via tankers and unloaded into the 8 x 200 kL holding tanks located within Compartment 2. Waste will only be treated in 50 kL batches

Table 6-1: Expected Throughput of Process Operations

UNIT OPERATIONS	MATERIAL	THROUGHPUT (t/y)
Gravity Separation	Scrap metal	2,000 t/y
	Cardboard and paper	1,000 t/y
	Plastic	2,000 t/y
	Wood waste	5,000 t/y

UNIT OPERATIONS	MATERIAL	THROUGHPUT (t/y)
	Concrete, brick, rubble	10,000 t/y
Chemical Separation	Hydrocarbon or non-aqueous phase liquid impacted soil	N/A – not expected to be routinely used
Chemical Oxidation	Organic pollutants e.g.: <ul style="list-style-type: none"> • Monoaromatics (eg: BTEX) and Total Petroleum Hydrocarbons where soils that have suffered fuel spills; • Polycyclic Aromatic Hydrocarbons; • Phenols, • Chlorinated hydrocarbons; and • Some pesticides / herbicides 	10,000 t/y
Bioremediation (Aerobic)	Petroleum affected waste soil	10,000 t/y
Immobilisation	Metals, metalloids, coal tar contaminated soil, pesticide impacted material, PAH impacted material	60,000 t/y
Batch Mixing	Acid sulphate soil	30,000 t/y
Liquid Waste Treatment	Wastewater, leachate, decanted water from settled wastewater sludge, internally generated water from wheel and truck wash	70 ML/a 4,000 t/y (filter cake output) 1 kL (oil output into IBC - frequency of this volume is unknown)
Drill mud processing plant	Drill mud	10,000 t/y

6.3 STOCKPILED QUANTITIES

Based on the project description by Golder Associates, it appears that there are multiple storage areas in which combustible materials may be located. Material may be located in temporary holding areas for holding upon arrival, in-process (which may include within stockpiles where treatment occurs), as well as in stockpiles (and Intermediate Bulk Container/s (IBC) for oil from wastewater) awaiting subsequent disposal.

The stockpiled quantities are summarised in detail in Appendix A. The materials stockpiled to a mass of 1000 t or greater are summarised in Table 6-2:

Table 6-2: Largest Stockpiled Materials

MATERIAL	MAXIMUM CONCENTRATION	MAXIMUM CAPACITY OF BULK MATERIAL
Mineral Oils	20% w/w	2,000 t
Hydrocarbon contaminated soil	1% w/w	5,000 t
Hydrocarbon contaminated soil (incl. coal tars)	--	5,000 t
Soil contaminated with hazardous substance (e.g. organics)	20%w/w	5,000 t
Filter cake (incl. organics)	20% w/w	1,000 t

MATERIAL	MAXIMUM CONCENTRATION	MAXIMUM CAPACITY OF BULK MATERIAL
Contaminated soil with chlorinated compounds	--	1,000 t
Arsenic and arsenic compounds	--	2,000 t
Calcium and cadmium compounds	5%w/w	1,000 t
Chromium compounds	5%w/w	2,000 t
Copper compounds	5%w/w	2,000 t
Fly ash (incl. metals)	5%w/w	5,000 t
Lead and lead compounds	5%w/w	2,000 t
Waste from manufacture (e.g. containing chromium, copper, arsenic, and organics)	5%w/w	1,000 t
Vanadium compounds	5%w/w	1,000 t
Zinc compounds	5%w/w	2,000 t
Oil and water mixtures/emulsion or hydrocarbon and water mixtures/emulsion	30%	1000 kL
Waste containing peroxides	5%w/w	1,000 t
Waste from manufacture (incl. organic and silver)	5%w/w	1,000 t
Contaminated soils with asbestos	1%w/w	5,000 t
PFAS contaminated materials	--	5,000 t

It is noted that the stockpiles having the greatest mass (5,000 t) are generally contaminated soils. With a 4 m height limitation, it is not anticipated that there will be a significant amount of concurrent storage of soils due to limitations in available stockpiling space.

6.4 CHEMICAL STORAGE

In addition to the raw waste and treated waste products, chemical reagents used throughout the various separation and treatment processes shall also be stored on site. These are summarised in Table 6-3 below.

Table 6-3: Storage Quantities of Chemicals

MATERIAL	QUANTITY
Cement	50 t
Activated carbon	10 t
Hydrogen peroxide*	2 t
Potassium permanganate*	1 t
Sodium persulphate*	1 t
Ferrous sulphate	5 t
Bacteria (not specified)	1 t
Urea	5 t
Super phosphate	5 t
Biodegradable surfactant	2 t
Polymer (not specified)	2 t

MATERIAL	QUANTITY
Limestone / Aglime	20 t
Aluminium sulphate	5 t
Hydrochloric acid [#]	5 t
Caustic soda [#]	5 t
Magnesium oxide	5 t

*Dangerous Goods – Class 5.1 oxidising substances

Dangerous goods are generally expected to be storage adjacent the firewall separating the office and the warehouse parts.

It is noted that there shall be separate storage of chemicals within a bunded area in the Wastewater Treatment Plant. The quantities of materials stored here are:

Table 6-4: Storage Quantities of Chemicals – Wastewater Treatment

MATERIAL	QUANTITY
Hydrochloric acid [#]	2 t
Caustic soda [#]	2 t
Aluminium sulphate	2 t
Polymer (not specified)	2 t
Activated carbon	2 t
Magnesium oxide	2 t
Ferrous sulphate	2 t

[#]Dangerous Goods – Class 8 corrosive substances

7 FIRE HAZARDS AND PROTECTIVE MEASURES

7.1 OVERVIEW



The fire hazard analysis forms the basis for the review of non-compliances within the building. In assessing expected and statistically validated hazards, preventative and protective measures are developed commensurate with those expected risks. The following section reviews applicable hazards and recommends possible measures to address those risks. Furthermore, the hazards identified can form a justified basis for selected scenarios.

7.2 FIRE HAZARDS

Subsequent to a review of the relevant fire statistics and hazards, the fire hazards specific to this building are summarised below.

7.2.1 General Layout

Exits from the warehouse are generally provided along the eastern and western perimeter of the building with no exit possible along the north and south elevations. Due to the location of the exits, extended travel distances are likely to occur.

No hazards to adjoining buildings have been identified. Due to the open space and multiple egress opportunities, internal fire exposures are also expected to be minimal as occupants in the area of fire origin are likely to immediately become aware of fire and are likely to commence evacuation.

7.2.2 Activities

Activities within the office area are not anticipated to pose a greater risk of fire than that in other office buildings. In the warehouse area where the waste treatment processes will occur, it is expected that there will be significant operation of mobile plant necessary for the processes, including excavators, front end loaders, dump trucks, and a mixer.

High temperature machinery cannot be discounted given the use of the building, such as the belt driven gravity separator.

Treatment of wastewater can yield oil which is stored on site in an IBC before disposal. Dangerous goods may also be stored on site and particular attention is drawn to the Class 5.1 oxidising substances which may exacerbate a fire.

7.2.3 Ignition Sources

The causes of ignition relevant to this site, in descending order of likelihood of occurrence are as follows:

Waste Facilities [11]

- Self-ignition
- Unknown
- Reignition due to past fire

Office [5]

- Intentional
- Electrical distribution / lighting
- Heating equipment

Furthermore, the waste material most typically involved in fire in descending order of frequency are [11]:

- General waste
- Batteries
- Electrical and electronics waste
- Wood waste
- Park and garden waste
- Hazardous waste
- Paper and cardboard

- Other

In consideration of the above, given that the waste facility is not anticipated to process general waste, electrical waste such as batteries or electronics, wood waste, park or garden waste, or paper and cardboard, it is anticipated that the likelihood of fire due to self-ignition is reduced. Indeed, hazardous or organic waste, and sludge is noted to have low ignition frequency.

7.2.4 Fuel Sources

Quantity of Materials

The mean fuel load density expected of the office space is 800 MJ/m² with isolated peak values reaching 1600 MJ/m².

The quantity of combustibles that are likely to be present in the warehouse has been described in Section 6.2. Note that this refers exclusively to the waste material and chemical reagents necessary for the treatment processes. The presence of mobile plant and other equipment may also contribute additional fuel for a fire.

Dangerous Goods

Both Class 5.1 (oxidising) and Class 8 (corrosive) dangerous goods are likely to be present in the facility to support the waste treatment processes. The quantity of storage, as well as placarding and manifest requirements shall be governed by Schedule 11 of the Work Health and Safety Regulation (2017).

Location of Materials

With the office area, combustible materials can be expected on workstations, in waste bins, and in storage cabinets. Materials and assemblies shall be in accordance with C1.10 to reduce fire spread and smoke production in the event of fire in common areas.

As described in Section 6.2, combustible materials may be located in storage areas prior to processing, within the process equipment, and in storage piles or containers post treatment. As described in Appendix A, waste materials are typically located in banded areas.

The nature of the raw waste upon receipt is generally bulk soil, sludge, or wastewater as described in Section 6.2. The concentration of combustible material within the raw waste is therefore inherently diluted by water or dirt. Combustible materials are likely to be in a more concentrated form post separation and treatment and may be located in stockpiles (e.g. cardboard and wood) or in an IBC (e.g. oil from wastewater).

It should be noted that the central path through the warehouse is anticipated to remain clear of storage for the majority of its width to facilitate truck movements.

Fire Behaviour

Fire growth rates will vary with fuel type and conditions of ventilation and compartmentation. The most likely outcome of any fire outbreak within the building is a sprinkler controlled fire. This would be expected to grow at a medium t² fire growth rate until sprinkler activation in the office areas, at which point the sprinklers are expected to control the fire. Within the waste facility, a fast to ultrafast t² fire growth rate may be expected due to the varied nature of the combustible materials present. Where fire involves the Class 5.1 oxidising agent, such a fire is likely to be accelerated and grow at an ultrafast t² rate, if not greater.

7.3 PREVENTATIVE AND PROTECTIVE MEASURES

7.3.1 Fire Initiation and Development and Control (Sub-System A)

To minimise the risk of fires initiating and growing to a size which may impact on the building occupants, fire safety systems are to be utilised within the building as listed in the following sections. Without additional information supplied, the following general advice may also be provided to limit the likelihood of fire initiation and development.

- Class 5.1 oxidising agents must be stored in accordance with AS4326:2008 and relevant Dangerous Goods storage regulations. These chemicals must not be stored near parked vehicles (including mobile plant), near flammable or combustible materials, or near the IBC used to store waste oil
- The size of stockpiles, particularly of combustible materials resulting from the separation processes, should be minimised where possible
- Ensure that plant equipment, including mobile plant, is regularly serviced in accordance with the manufacturer's specifications
- Where organic containing materials such as filter cake and contaminated soil have the potential to degrade exothermically, these should be well aerated on a regular basis to prevent an accumulation of heat and subsequent self-ignition.

7.3.2 Smoke Development and Spread and Control (Sub-System B)

It is recognised that smoke is one of the most serious threats to life safety in the event of a fire. The following measures are provided to control the development and spread of smoke:

- The volume of the building will act as a large smoke reservoir to increase the available evacuation time for occupants.
- HVAC system as per Section 8.2.1 and intended to be used as a smoke exhaust system

7.3.3 Fire Spread and Impact and Control (Sub-System C)

To limit the extent and impact of fire spread through the buildings, the following are to be implemented in the building.

- Type A construction
- Sprinkler system as documented in Sub System D
- Internal firewalls achieving 240/240/240 FRL
- Fire shutters achieving --/240/-- FRL with drenchers on both sides
- External walls achieving 120/120/120 FRL

7.3.4 Fire Detection, Warning and Suppression (Sub-System D)

The following active systems are to be used within the buildings to facilitate occupant warning and suppress a potential fire.

- Occupant warning system with visual alarm devices at high level
- High hazard sprinkler system at roof level
- Warehouse roof level multi-point ASD system e.g. VESDA
- Fire hose reels
- Fire extinguishers
- Process instrumentation (to be confirmed in detailed design)

7.3.5 Occupant Evacuation and Control (Sub-System E)

The building is to be provided with the following systems to assist in the evacuation of occupants:

- Emergency lighting
- Exit signage
- Emergency management plan

7.3.6 Fire Services Intervention (Sub-System F)

The building is to be provided with the following systems to assist in fire brigade intervention:

- External fire hydrants
- Automatic link to fire brigade
- Main FIP
- Emergency Services Information Package (ESIP) provided at the FIP
- Local fire brigades in close vicinity supported by full time staff

8 FIRE AND INCIDENT MANAGEMENT REPORT

In order to address the specific requirements of the Planning Secretary's Environmental Assessment Requirements, a preliminary Fire and Incident Management Report has been developed.

8.1 AGGREGATE QUANTITIES OF COMBUSTIBLE WASTE PRODUCTS

The maximum quantity of combustible waste products that will be stockpiled at any one time are summarised in Section 6.3 for materials exceeding a 1,000 t stockpile and otherwise summarised in Appendix A in detail. It is not anticipated that all materials listed in Appendix A will be present simultaneously and at their largest stockpile. The largest stockpiles of circa 5,000 t are predominantly contaminated soils and due to inherent space limitations due to compliance with FRNSW's stockpile height limitation as well as a general space limitation, it is not anticipated that all bulk soil materials will be present simultaneously.

8.2 ENVIRONMENTAL PROTECTION EQUIPMENT

The following environmental protection equipment is proposed for the development:

8.2.1 Air

To control potential air pollution within the building, including dust discharge, vehicle exhaust, and VOC's, it is proposed to provide a HVAC system to each compartment. See Appendix B for the proposed concept design by others.

The building shall be provided with a sprinkler system that is anticipated to control a fire and limit the production of smoke and potential environmental pollutants.

8.2.2 Water

Surface water from the carpark is proposed to be drained via the existing site infrastructure with the on-grade carpark leading to the existing stormwater connection at the rear of the property.

All internal pits and drainage points for the building shall be sealed and removed, to be replaced by an internal leachate collection system. No connection between the leachate collection system and the stormwater network is permitted. Water from the leachate collection system shall be directed to the onsite wastewater treatment plant. The site shall also be provided with bunding at all doorways and truck entry points.

8.2.3 Noise

No specific acoustic measures are proposed to mitigate noise from the facility. All operations proposed shall be internal within the building and acoustic modelling has demonstrated that this is acceptable. It is noted that the building is located within an industrial precinct and over 500 m away from the nearest residential area. It is proposed that noise shall be predominantly controlled through appropriate equipment selection e.g. attenuator for the rooftop filter

8.2.4 Spill

All materials must be stored on a sealed and bunded surface to minimise the extent of potential spills. All doorways to the building shall be bunded with drive-over bunding provided at the truck entry and exit locations.

The following mitigation measures are proposed to minimise the risk of a spill:

- A Construction Environmental Management Plan (CEMP) outlining environmental procedures during construction would be prepared prior to construction and implemented during construction.
- Implement the proposed stormwater erosion and sediment control strategy and plan during the construction phase
- An OEMP outlining environmental procedures during operation would be prepared and implemented.
- Implement the proposed post-development stormwater management strategy and the plan
- Recycle and reuse the rainwater for the Site's activities to reduce the portable water use
- Allow no process water mix into the Site's stormwater system through:
 - The storage and handling of materials undertaken inside the buildings.
 - The floor of the building is concrete with centrally located collection pits so that all spills and contamination are contained within the buildings.
 - Doorways of the building would be bunded with drive over bunding.

- Wheel and truck wash down would be undertaken inside in the wheel wash with water collected and directed to the waste water treatment plant.
- Trucks would pass over a wheel wash inside the building prior to exit preventing tracking of waste.
- Leachate collection within the building.
- Bunding of the Wastewater Treatment Plant in accordance with Australian Standards.
- Chemicals and dangerous goods will be stored and bunded in accordance with Australian Standards.
- No facility wash down would be undertaken inside the buildings generating waste water.
- Spill kits would be located adjacent to potentially contaminating activities and procedures would be in place for Spill Management and documented in the OEMP.
- No use of groundwater.
- Quarterly monitoring of the groundwater and surface water quality.

It is noted that although not directly related to fire, the prevention of spills of hazardous chemicals is expected to reduce the risk of fire ignition.

8.3 CONSISTENCY WITH FRNSW GUIDELINE – FIRE SAFETY IN WASTE FACILITIES

8.3.1 Introduction

FRNSW's Guideline on Fire Safety in Waste Facilities is intended to ensure that:

- Fire safety is considered throughout all stages in the site selection, planning, design, assessment, and operation of a waste facility
- Fire safety systems are commensurate to the special hazards identified within a waste facility and also meet the operational needs of firefighters
- Storage and stockpiling of combustible waste material is safe based on the expected combustibility of the material and its maximum pile size
- Planning for fire safety occurs, including procedures for the event of fire or emergency incident

It is noted that FRNSW's guideline does not apply to:

- Landfill (but may apply to a waste facility on the landfill site)
- Composting
- Liquid waste treatment
- Hazardous chemicals or special waste treatment
- Less than 50 m³ of combustible waste material

With regards to the application of FRNSW's guideline to the subject building, it is noted that the intended waste facility will contain liquid waste treatment as well as the potential handling of hazardous chemicals.

Nonetheless, consideration of this guideline has been undertaken as non-hazardous chemicals and materials also have the potential to be handled.

8.3.2 Common Burn Temperatures and Fire Risk

The fire risk posed by a stockpile of waste can be categorised by its ignitability, flammability, fuel load, and its burn temperature. To simplify the design for special hazards, FRNSW suggest the following surface burn temperatures and likely fire risk rating for common combustible waste materials.

Type of waste material	Burn temperature	Fire risk
Paper and carboard	850°C	Ordinary
Wood products	860°C	Ordinary
Plastic	1,200°C	High
Rubber	1,130°C	High
Refuse derived fuels	900°C	Ordinary
Solid recovered fuels	950°C	Ordinary

Figure 8-1: Extract from FRNSW's Guideline – Fire Safety in Waste Facilities

Based on the summary of materials to be handled and stored as documented in Appendix A, the most likely fire risk is 'ordinary'. It is noted that there is anticipated to be a small quantity of plastics that will be handled and recovered at the facility. As noted in Table 6-1, a maximum of 2,000 t/y of plastic is anticipated to pass through the facility. Therefore although potentially posing a 'high' fire risk and an elevated burn temperature at 1,200°C, the likelihood of this occurrence is anticipated to be low.

8.3.3 Specific Requirements of FRNSW Guideline

The following Table 8-1 summarises the specific actions that shall be undertaken to comply with the FRNSW Guideline from Clause 7.4 onwards. These clauses have been extracted and shown in Appendix E

Table 8-1: Assessment of Consistency with FRNSW's Guideline

MEASURE	CLAUSE	ACTION
Firefighting Intervention	7.4.1	<ul style="list-style-type: none"> Access for firefighters shall be in accordance with FRNSW's Guideline – Access for fire brigade vehicles and firefighters No specific provision for fire brigade vehicles is proposed given the existing nature of the building structure
	7.4.2	<ul style="list-style-type: none"> The building is not proposed to be treated as a Large Isolated Building and therefore no specific provision for fire brigade vehicles is provided External fire rated walls are proposed to be provided where in proximity to side boundaries to reduce the potential impact of fire spread on surrounding sites
	7.4.3	<ul style="list-style-type: none"> No external stockpiles are proposed and the building shall be fully sprinkler protected Provision for fire brigade vehicles are described below for Clause 7.4.4
	7.4.4	<ul style="list-style-type: none"> The sprinkler and hydrant boosters shall be designed to allow fire brigade vehicles to access the site without impeding the carriageway Whyalla Place has a significant width to enable a multiple vehicle response The truck entry and exit routes are hardstands with loadbearing capacity
	7.4.5	<ul style="list-style-type: none"> The building shall be fitted with an automatic fire sprinkler system
	7.4.6	<ul style="list-style-type: none"> A Sydney Water pressure flow enquiry shall be provided by others as part of the DA submission
	7.4.7	<ul style="list-style-type: none"> All hydrants are proposed to be located externally to facilitate access The Main FIP shall be located within the Ground Floor office, in a fire separated compartment from the remainder of the waste facility The sprinkler valves are readily accessed from a dedicated enclosure upon entry to the site
Fire Hydrants	7.5.1	<ul style="list-style-type: none"> The building shall be provided with a fire hydrant system that complies with AS2419.1:2005
	7.5.2	<ul style="list-style-type: none"> Fire hydrants shall be located externally only for firefighter protection, being adjacent to exit doors and in readily identifiable areas Indicative locations of fire hydrants are shown in Figure 10-4 There is no open yard storage proposed
	7.5.3	<ul style="list-style-type: none"> The building shall be fully sprinkler protected and hydrants shall therefore be designed as per AS2419.1 The flowrate should be determined in accordance with AS2419.1:2017 (30 L/s) as per Section 10.5.1
	7.5.4	<ul style="list-style-type: none"> No external stockpiles are proposed and external hydrants shall be located at least 10 m from internal stockpiles

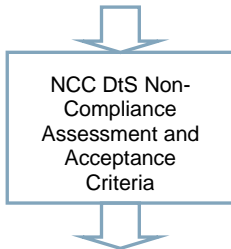
MEASURE	CLAUSE	ACTION
	7.5.5	<ul style="list-style-type: none"> Based on the information provided, the provision of external fire monitors does not appear to be warranted as the building is sprinkler protected
	7.5.6	<ul style="list-style-type: none"> The site hydrant booster assembly shall be located at the designated site entry point There are no external stockpiles proposed, therefore the booster is not proposed to be provided with a masonry wall
	7.5.7	<ul style="list-style-type: none"> The fire hydrant system shall have a minimum water supply capacity to meet the maximum demand of 30 L/s for not less than 4 hours
	7.5.8	<ul style="list-style-type: none"> Fire hose reels as per DtS Provision E1.4 and AS2441:2005 shall be provided No external stockpiling is proposed All staff shall be trained in the use of fire hose reels and fire extinguishers on an annual basis as part of the Emergency Management Plan
Automatic Fire Sprinkler Systems	7.6.1	<ul style="list-style-type: none"> The facility shall be sprinkler protected throughout
	7.6.2	<ul style="list-style-type: none"> The sprinkler system shall comply with AS2118.1:2017 Drenchers shall be provided on both sides of the fire shutters for Fire Compartment 2 and 3 Barring the above and based on the information provided, it does not appear that measures in excess of the standard are required
	7.6.3	<ul style="list-style-type: none"> The sprinkler system shall be High Hazard (to be confirmed by fire services engineer during detailed design) Based on the information provided, it does not appear that an enhanced level of performance in excess of the standard is required as a High Hazard system is documented in AS2118.1:2017 as suitable for <i>recycling and sorting waste plastics</i>
	7.6.4	<ul style="list-style-type: none"> The sprinkler system shall comply with AS2118.1:2017 Based on the information provided, it does not appear that measures in excess of the standard are required
	7.6.5	<ul style="list-style-type: none"> The sprinkler booster assembly shall be located within sight of the designated site entry point
	7.6.6	<ul style="list-style-type: none"> The sprinkler system shall have a minimum water supply capacity to meet the maximum hydraulic demand for a minimum 2 hour period
	Fire Detection and Alarm Systems	7.7.1
7.7.2		<ul style="list-style-type: none"> Visual alarm devices shall be provided at high level and as per AS1670.1:2018 due to the potential for noisy machinery The occupant warning system shall activate on fire alarm throughout the whole building simultaneously
7.7.3		<ul style="list-style-type: none"> Activation of the fire alarm (detectors, sprinklers, or drenchers) shall activate the smoke exhaust system, makeup air points, occupant

MEASURE	CLAUSE	ACTION
		warning system, automatic brigade notification, and drop all fire shutters
	7.7.4	<ul style="list-style-type: none"> Manual call points as per Clause 3.14.2 shall be provided in clearly visible locations adjacent to all building exit points and in the wheel wash and weighbridge areas. These shall not automatically notify the fire brigade.
Smoke Hazard Management	7.8.1	<ul style="list-style-type: none"> Due to the presence of combustible waste material, a dedicated smoke exhaust system shall be provided in both Fire Compartment 1 and 3 <ul style="list-style-type: none"> The exact exhaust rates shall be confirmed in detailed design As Fire Compartment 2 will largely consist of liquid waste treatment processes (i.e. not stockpiles) where the FRNSW Guideline does not apply, an automatic smoke exhaust system was not considered necessary. Furthermore, the wastewater fire compartment is less than 1,000 m² where sprinklers would not be prescriptively required. The provision of sprinklers is therefore considered to provide a greater level of fire safety than the provision of smoke exhaust to this compartment.
	7.8.2	<ul style="list-style-type: none"> Smoke exhaust system to be designed to maintain appropriate visibility for firefighting intervention
	7.8.3	<ul style="list-style-type: none"> Makeup air points shall be from roller shutters in the external wall of the building Roller doors shall have a manual override to enable operation in the event of an electrical isolation
	7.8.4	<ul style="list-style-type: none"> The smoke control system shall be capable of continuous operation for at least 2 hours
	7.8.5	<ul style="list-style-type: none"> The smoke exhaust system and sprinkler system shall be designed such that smoke exhaust does not cause undue delay in the activation of the sprinkler system
Fire Water Run-Off Containment	7.9.1	<ul style="list-style-type: none"> The primary containment of firewater shall be achieved from process bunding pits as well as the general warehouse floorplate with bunds at all entry points and drive-over bunds at the vehicle entry points The height of the building bunding shall be such that it can contain: <ul style="list-style-type: none"> Fire hydrants operating at 30 L/s for minimum 4 hours; and High hazard sprinklers operating for minimum 2 hours; and Drenchers operating for minimum 2 hours
	7.9.2	<ul style="list-style-type: none"> The proposed leachate collection system shall serve as secondary containment for fire water run-off The leachate collection system must not have any connection to the stormwater system and shall direct all liquid collected within the building to the wastewater treatment plant.
	7.9.3	<ul style="list-style-type: none"> No external quarantine area is required as the building is sprinkler protected
	7.9.4	<ul style="list-style-type: none"> All containment areas shall be sealed
	7.9.5	<ul style="list-style-type: none"> The proposed leachate collection system shall be used as a secondary containment
	7.9.6	<ul style="list-style-type: none"> No connection between the leachate collection system and the stormwater network is permitted All liquid generated within the building shall be drained to the leachate collection system and sent to the wastewater treatment plant

MEASURE	CLAUSE	ACTION
Bushfire Prone Land	7.10	<ul style="list-style-type: none"> The site has not been identified as being in bushfire prone land
Storage and Stockpiles	8.2	<ul style="list-style-type: none"> All stockpiles will be limited to a 4 m height and 1,000 m³ volume, in adherence to the guideline
Stockpile Movement	8.3	<ul style="list-style-type: none"> Operational procedures shall allow for stockpiles to be regularly rotated to dissipate any internally generated heat
External Stockpiles	8.4	<ul style="list-style-type: none"> No external stockpiles are proposed
Internal Stockpiles	8.5	<ul style="list-style-type: none"> All stockpiles will be limited to a 4 m height and 1,000 m³ volume, in adherence to the guideline All internal stockpiles shall have 6 m of unobstructed width on each accessible side, not facing a masonry wall

9 NCC DTS NON-COMPLIANCE ASSESSMENT

9.1 OVERVIEW



In this instance the NCC DtS non-compliances have been formulated based on the regulatory review as provided by the principal certifying authority. Where not listed herein the building is required to achieve compliance with relevant DtS provisions or if existing, comply with relevant codes, reports and / or Standards approved at the time of consideration.

The following table lists the departures from the DtS Provisions of the NCC for the proposed building and the analysis methodology proposed for the Fire Engineering assessment, which is to be generally in accordance with the IFEG [3].

9.2 NCC DTS NON-COMPLIANCE ASSESSMENT

Table 9-1: Summary of Performance Solutions

NCC DTS PROVISIONS	DETAILS OF PERFORMANCE BASED SOLUTION
<p>Oversized Fire Compartment 1</p> <p>NCC DtS Provisions DtS Provision C2.2: General Floor Area and Volume Limitations</p> <p>Performance Requirements CP1 and CP2</p>	<p>Relevant NCC DtS Provisions DtS Provision C2.2: The size of any fire compartment must not exceed that in Table C2.2 which for a Class 7b or 8 part is no greater than 5,000 m² in area and 30,000 m³ in volume for a Type A building.</p> <p>DtS Variation Although less than 5,000 m² in floor area, the volume of Fire Compartment 1 is ~54,000 m³ in lieu of 30,000 m³.</p> <p>Performance Solution The proposed Performance Solution shall rely on the provision of sprinklers throughout the building to control the potential growth and development of fire. Furthermore, there will be a restriction on storage to prevent any combustible storage above 4 m AFFL, noting that a maximum stockpile height of 4 m shall be implemented as per FRNSW's Guideline – Fire Safety in Waste Facilities.</p> <p>Assessment Methodology The approach to the analysis shall be comparative and qualitative in nature in accordance with Clauses A2.2(1)(a) and A2.2(2)(d) of the NCC. The analysis shall seek to demonstrate that the volume of combustible material within the building is no greater to that in a DtS Solution.</p>
<p>External Exposure Between Fire Compartments</p> <p>NCC DtS Provisions DtS Provision C3.3: Separation of external walls and associated openings in different fire compartments</p> <p>Performance Requirements</p>	<p>Relevant NCC DtS Provisions DtS Provision C3.3: The distance between parts of external walls and any openings within them in different fire compartments must not be less than that in Table C3.3 unless those parts of each wall have an FRL not less than 60/60/60.</p> <p>DtS Variation The external wall the main fire compartment does not achieve 60/60/60 FRL at the wheel wash and weight bridge entry.</p> <p>Performance Solution The proposed Performance Solution shall rely on the external wall of the office and Fire Compartment 3 achieving minimum 120/120/120 FRL.</p> <p>Assessment Methodology The approach to the analysis shall be comparative and quantitative in nature in accordance with Clauses A2.2(1)(a) and A2.2(2)(d) of the NCC. The analysis shall seek to demonstrate that the single 120/120/120 FRL wall will provide an equivalent level of fire separation as two 60/60/60 FRL external walls.</p>

NCC DTS PROVISIONS	DETAILS OF PERFORMANCE BASED SOLUTION
<p>CP2 and CP4</p> <p>Fire Shutter in Firewall</p> <p>NCC DTS Provisions DtS Provision C3.5: Doorways in Firewalls Specification C1.1: Fire resisting construction</p> <p>Performance Requirements CP2 and CP4</p>	<p>Relevant NCC Dts Provisions DtS Provision C3.5: An opening in a firewall protected by a fire shutter must achieve the integrity required by the firewall except that the insulation may be 30.</p> <p>DtS Variation The fire shutters used between Fire Compartment 1 and 3, and Compartment 1 and 2 achieve only --/240/-- in lieu of --/240/30 FRL.</p> <p>Performance Solution The proposed Performance Solution shall rely on the provision of drenchers on both sides of the fire shutter to attenuate heat and prevent fire spread.</p> <p>Assessment Methodology The approach to the analysis shall be absolute and quantitative in nature in accordance with Clauses A2.2(1)(b) and A2.2(2)(b)(ii) of the NCC. The analysis shall seek to demonstrate that the provision of drenchers on both sides of the fire shutters will prevent fire spread to an equivalent to a DtS Solution.</p>
<p>Extended Travel Distances</p> <p>NCC DTS Provisions DtS Provision D1.5: Distance between alternative exits</p> <p>Performance Requirements DP4 and EP2.2</p>	<p>Relevant NCC Dts Provisions DtS Provision D1.5: Alternative means of egress must not be located more than 60 m apart.</p> <p>DtS Variation Extended travel distances occur within the main warehouse of:</p> <ul style="list-style-type: none"> Up to 65 m between alternative exits in lieu of 60 m <p>Performance Solution The proposed Performance Solution shall rely on the large internal volume of the warehouse providing a sufficient smoke reservoir to enable occupant evacuation.</p> <p>Assessment Methodology The approach to the analysis shall be absolute and quantitative in nature in accordance with Clauses A2.2(1)(b) and A2.2(2)(b)(ii) of the NCC. The analysis shall utilise CFD smoke modelling to demonstrate that occupants can safely evacuate.</p>
<p>Special Hazard Facility</p> <p>NCC DTS Provisions DtS Provision D1.4: Exit travel distances DtS Provision D1.5: Distance between alternative exits</p> <p>Performance Requirements DP4 and EP2.2</p>	<p>Relevant NCC Dts Provisions DtS Provision E1.10: Suitable additional provision must be made if special problems of fighting fire could arise. DtS Provision E2.3: Additional smoke hazard management measures may be necessary due to the special characteristics and function or use of the building, as well as the type or quantity of materials to be stored.</p> <p>DtS Variation The building is proposed to be a waste facility and is considered to pose special hazards. Additional fire safety measures are proposed to address the potential risk.</p> <p>Performance Solution The following measures are proposed to be provided over the minimum DtS Provisions to mitigate the potential for risk arising from the special hazard facility:</p> <ul style="list-style-type: none"> 30 L/s of concurrent flow for the waste facility Rationalised smoke exhaust system <p>Assessment Methodology The approach to the analysis shall be absolute and qualitative in nature in accordance with Clauses A2.2(1)(b) and A2.2(2)(b)(ii) of the NCC. The analysis shall review the potential special hazards that may arise and the ability of the performance measures to mitigate the risk.</p>

10 PROPOSED FIRE STRATEGY

10.1 OVERVIEW



The FSS outlined below has been proposed to satisfy the fire and life safety objectives specified for this project by the relevant stakeholders. In addition, the FIMR is required to adequately address the specific fire and life safety hazards identified for the proposed development, and as such have been generally derived from the preventative and protective measures outlined within the NCC, and fire engineering literature and research. Where items of non-compliance have not been identified by the design team in the concept design phase, it is expected that those items will be DtS solutions.

This section provides guidance for the design and application of fire safety measures. It highlights specific design considerations for a range of fire safety measures that will undergo analysis as part of the FER to ascertain whether the relevant Performance Requirements of the NCC are satisfied. Design guidance (general informative details and specific requirements) for a range of specific fire safety measures is provided. This list is not exhaustive and the use of other fire safety measures including new technologies will require additional review.

10.2 PASSIVE FIRE PROTECTION

10.2.1 Type of Construction Required

Due to the size of the largest fire compartment (Fire Compartment 1) having a floor area of approximately 4,480 m², the building is required to achieve Type A fire resisting construction. The required FRL for building elements is described by Table 3 of Specification C1.1. The FRL required to be achieved in the Class 7b/8 parts is generally 240 min FRL whilst in Class 5 parts is 120 min FRL.

As the building is located within 3 m of the side allotment boundaries on the north, east, and south elevations, the external walls must achieve 240/240/240 FRL if loadbearing or --/240/240 FRL if non-loadbearing. Given that the external walls of the existing warehouse appear to be pre-cast concrete panels supported from internal steelwork, the internal structural steel may require additional treatment to achieve a 240/--/-- FRL.

Note that this will also require most exit doors from the warehouse achieving --/240/30 FRL where within 3 m of the side allotment boundaries.

In order to maintain fire compartments within the limitations of DtS Provision C2.2, internal fire compartmentation is required. Between Fire Compartment 1 and 2, and 1 and 3, a firewall achieving minimum 240/240/240 FRL is required to be achieved in both directions.

DtS Provision C2.8 notes that where classes of different classifications are located on the same storey, they shall be separated by a firewall achieving the higher FRL or the entire storey shall achieve the higher FRL. In this case, it is also proposed for the firewall separating the office and warehouse to achieve 240/240/240 FRL, thereby permitting the office slab, beams, and columns to achieve a lower 120/120/120 FRL.

It is noted that existing walls may be used as firewalls, provided they are upgraded and certified to achieve the required FRL.

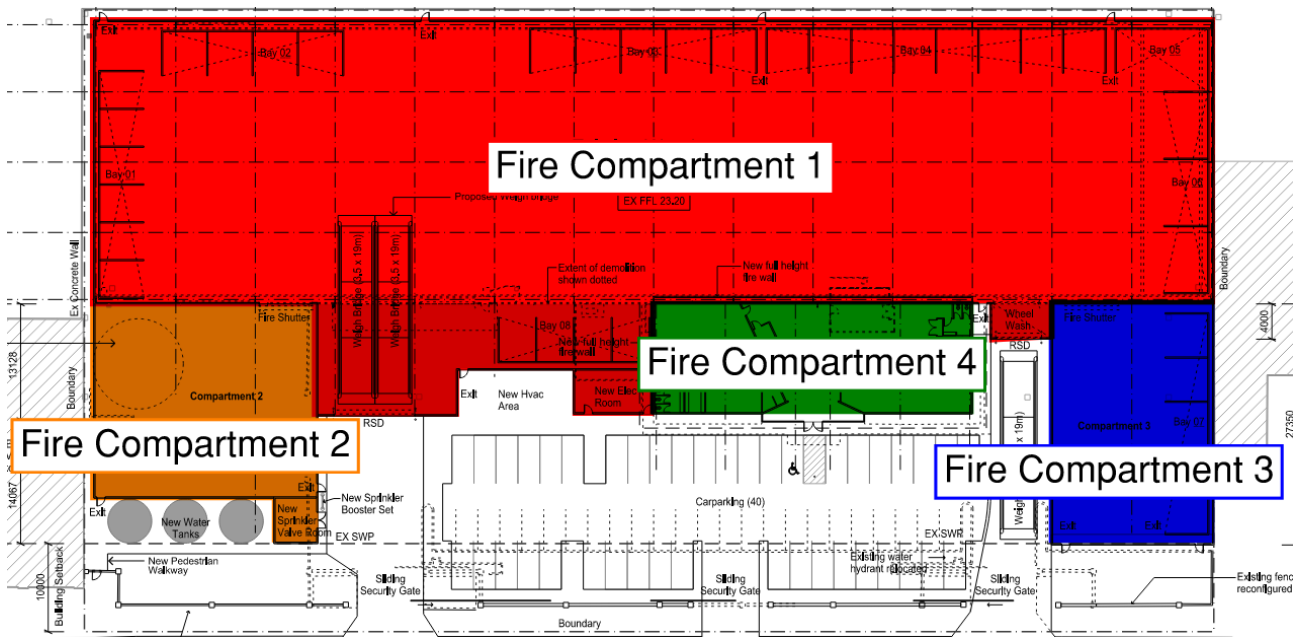


Figure 10-1: Proposed Fire Compartmentation

10.2.2 Size of Fire Compartments

DtS Provision C2.2 specifies the maximum sizes of fire compartments in Table C2.2 based on the use of the building and Type of Construction to limit the size of a potential fire. For a Class 7b or 8 building, the maximum floor area in a building of Type A construction is 5,000 m² in floor area and 30,000 m³ in volume.

Fire Compartment 1 in this case is ~4,480 m² in floor area, but due to the ridge height, is approximately 54,000 m³ in volume.

A Performance Solution is proposed, relying on the provision of automatic sprinklers at roof level to control the potential development of a fire. Furthermore, a restriction on height of storage shall be implemented such that there are no combustible materials stored to a height exceeding 4 m such that the total volume of combustible material within the building does not exceed 30,000 m³. Based on the floor area of Fire Compartment 1 in conjunction with the 4 m height limitation, it is expected that a maximum of 18,100 m³ of combustible material could be present.

It is noted that FRNSW's Guideline – Fire Safety in Waste Facilities requires that stockpiles not be stored to a height greater than 4 m, thereby inherently restricting the volume of combustible material. As such, the volume is considered equivalent to that in a DtS Solution.

10.2.3 External Exposure Between Fire Compartments

DtS Provision C3.3 requires that where the external walls of fire compartments are exposed to each other, they must both achieve 60/60/60 FRL for a distance dictated by Table C3.3, depending on the angle between the walls.

In the subject building, it is proposed that the external wall of the wheel wash and weighbridge entry will not achieve the requisite 60/60/60 FRL. A Performance Solution is proposed to rely on the external wall of the adjacent Fire Compartment 2, 3, and 4 achieving minimum 120/120/120 FRL.

10.2.4 Fire Shutters in Firewalls

Due to the proposed use of fire shutters within the firewalls separating Compartment 1 and 2, and 1 and 3, which do not achieve an insulation rating of 240 min (i.e. the fire shutter achieves --/240/-- FRL), a Performance Solution is proposed. The proposed Performance Solution shall rely on the provision of drenchers being located on both sides of the fire shutter to attenuate heat and provide a degree of fire separation equivalent to the FRL required by the DtS Provisions.

The drenchers shall be designed to provide a flowrate commensurate to the size of the fire shutter at a density no less than 0.2 L/(s·m²) or as per AS2118.2:2010, whichever is greater, and otherwise in accordance with AS2118.2:2010. The drenchers shall be supplied from an isolation valve independent of the sprinkler system and the drencher water demand must be considered simultaneously to the required sprinkler and hydrant demand for a period no less than 2 hours i.e. as per the sprinkler system.

The fire shutters shall descend automatically on general fire alarm or power failure (fail safe) and otherwise comply with AS1905.2:2005.

A summary of the required fire rated walls is shown in Figure 10-2. All firewalls must comply with the construction requirements of DtS Provision C2.7 and Specification C1.1.

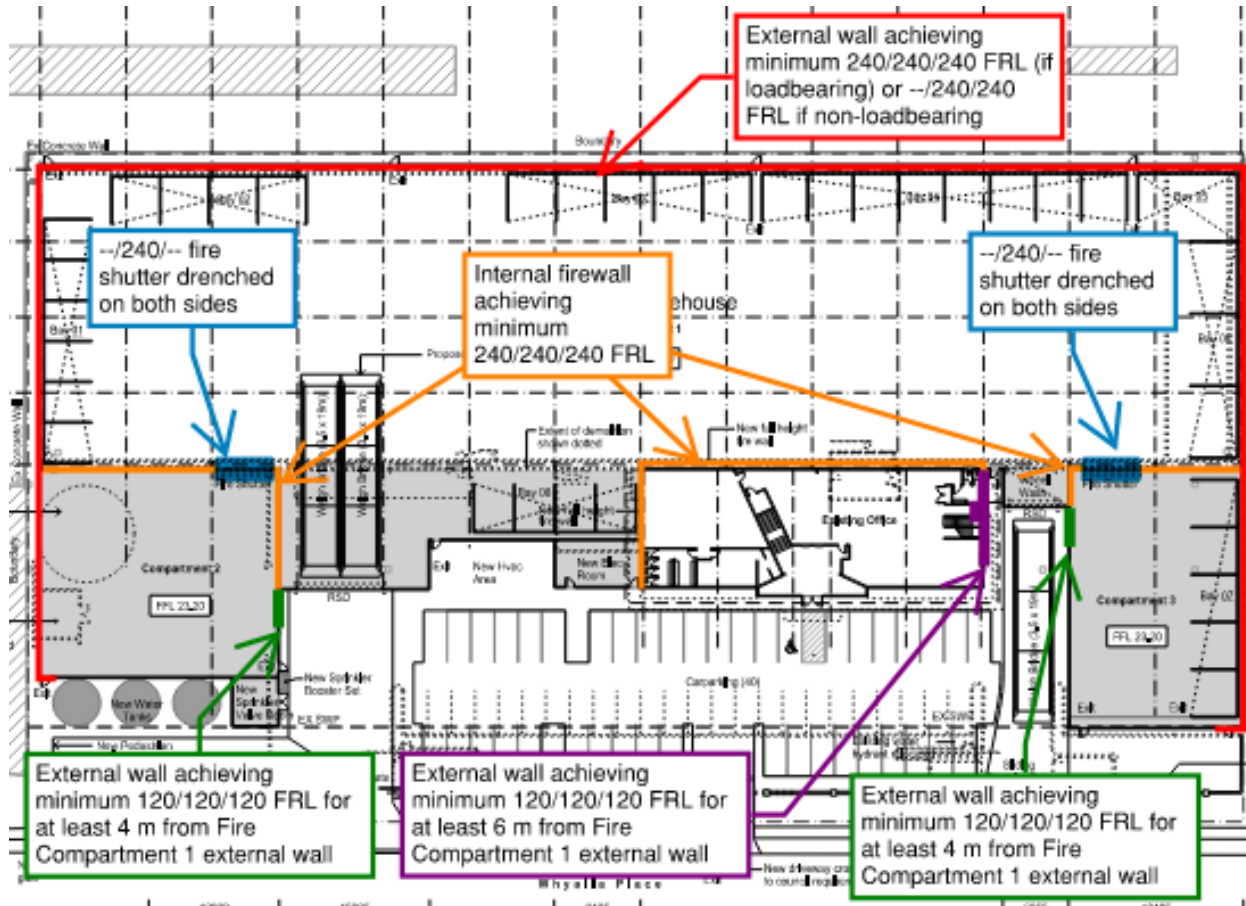


Figure 10-2: Summary of Required Fire Rated Walls

10.3 ACCESS FOR FIREFIGHTERS

Access to the site shall be in accordance with FRNSW's Guideline: Access for fire brigade vehicles and firefighters.

- The hardstand for connection to the sprinkler booster assembly and hydrant booster assembly shall have sufficient loadbearing capacity to support the fire brigade vehicles nominated in this guideline
- The fire services engineer is to advise whether a large bore suction arrangement is required to satisfy the flow requirements of the sprinkler system with suitable hardstand, and turn areas provided to facilitate a connection to the booster assembly at an angle not exceeding 45°
- Gates, barriers, and bollards installed to inhibit vehicle access must be removable, retractable, or foldable to enable fire brigade access
- Any vehicle gate that is required to be locked shall be secured with a non-hardened metal chain and lock; or
- All locks fitted to vehicle access gates or security devices are to be keyed alike and copies deposited at the two nearest brigade stations, or kept with site security if they are present 24/7; or
- Any electrically operated vehicle access gate should incorporate either mechanical override, fail-safe open, or activation by site security to enable access to the site

10.4 EGRESS PROVISIONS

10.4.1 Evacuation Strategy

Activation of any smoke detector, drencher, or sprinkler head shall initiate the evacuation of all areas of the building. Dedicated fire wardens from the warehouse and office areas should ensure that all clients, visitors, and staff are promptly evacuated.

10.4.2 Travel Distances

It is envisaged that the presence of plant equipment, stockpiles, and storage areas may result in the potential for extended travel distances. DtS Provision D1.4 and D1.5 limit travel distances to a maximum of 40 m to the nearest exit and 60 m between alternative exits.

A Performance Solution is proposed to address the following extended travel distances:

- Up to 65 m between alternative exits

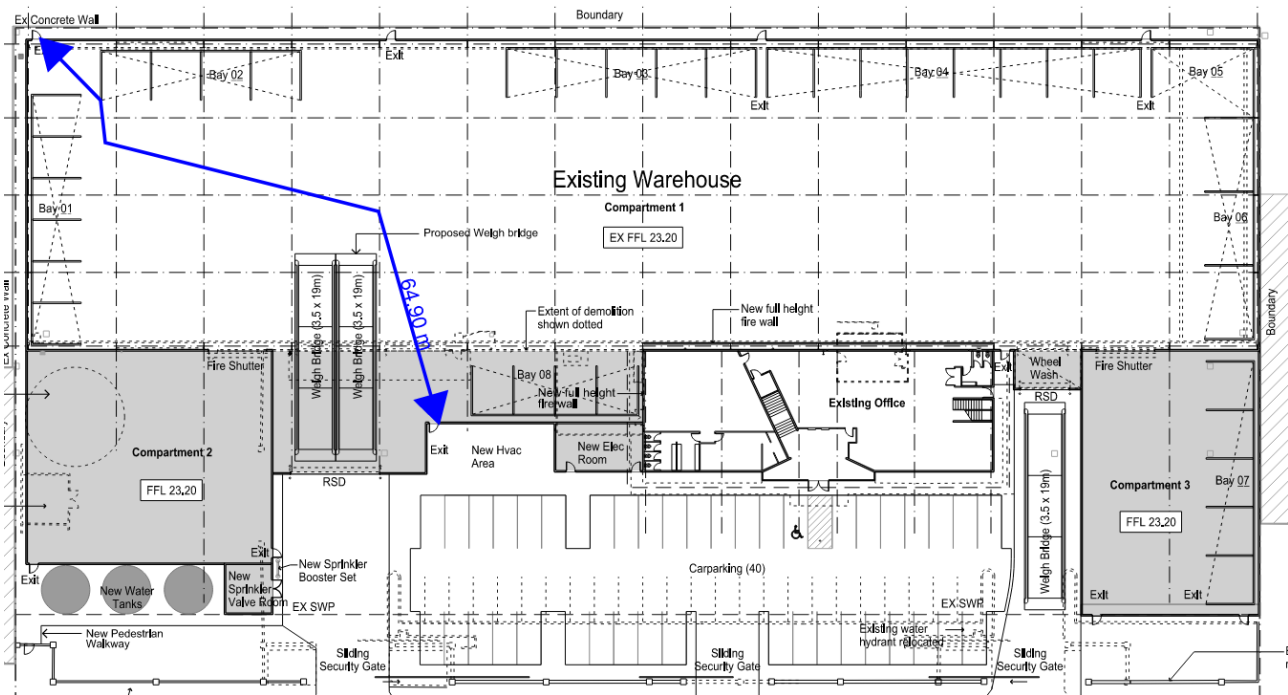


Figure 10-3: Extended Travel Distances in the Warehouse

10.4.3 Door Hardware, Operation and Mechanisms

All exit doors and doors in a path of travel to an exit are required to be DtS compliant throughout the building. This includes the swing of doors, the applied latching and locking mechanisms and the force required on mechanism used to open sliding doors.

All roller shutter doors shall be provided with an override such that they can be manually opened under a power failure or electrical isolation scenario.

10.5 FIRE SAFETY SYSTEMS

10.5.1 Fire Hydrants

A dedicated hydrant system with independent booster assembly must be provided in accordance with NCC DtS Provision E1.3 and AS2419.1:2005 with the following specifications:

- The total simultaneous hydrant demand shall be as per AS2419.1:2017 for a fire compartment exceeding 30,000 m³ in volume i.e. 30 L/s for a period of no less than 4 hours
- As far as possible, the hydrant system should consist of external hydrant points (see Figure 10-4)
- All hose connections in the system are to be fitted in accordance with FRNSW Technical information sheet – FRNSW compatible hose connections (available at firesafety.fire.nsw.gov.au). These couplings should be tested as part of the system when the commissioning tests are undertaken.

- The proposed location of the hydrant booster assembly is to be confirmed by the fire service engineer in detailed design

10.5.1.1 Required Water Demand

Although not gazetted in NCC 2019 Amendment 1, the current AS2419.1:2017 has a more onerous requirement for the hydrant design than AS2419.1:2005. Specifically, fire compartments in Class 7 or 8 buildings exceeding 30,000 m³ in volume require three (3) hydrants operating simultaneously i.e. 30 L/s. Given the special hazard associated with this facility, the AS2419.1:2017 requirement for 3 hydrants operating simultaneously at the minimum requisite pressure should be designed for.

10.5.1.2 Indicative Fire Hydrant Locations

The indicative location of fire hydrants is indicated in Figure 10-4 and shall comprise solely of external fire hydrants. These hydrant locations have been chosen for the following factors:

- Provide system coverage based on 60 m of hose with an additional 10 m of water spray (not shown on Figure 10-4)
- External hydrants are located 10 m away from stockpiled storage as per FRNSW's Guideline and are in locations readily identifiable by the fire brigade
- Additional fire hydrants at the rear of the building (eastern elevation) are protected by a 240/240/240 FRL external wall and provide an additional angle of fire attack. These hydrants also ensure coverage can be achieved for the proposed equipment layout

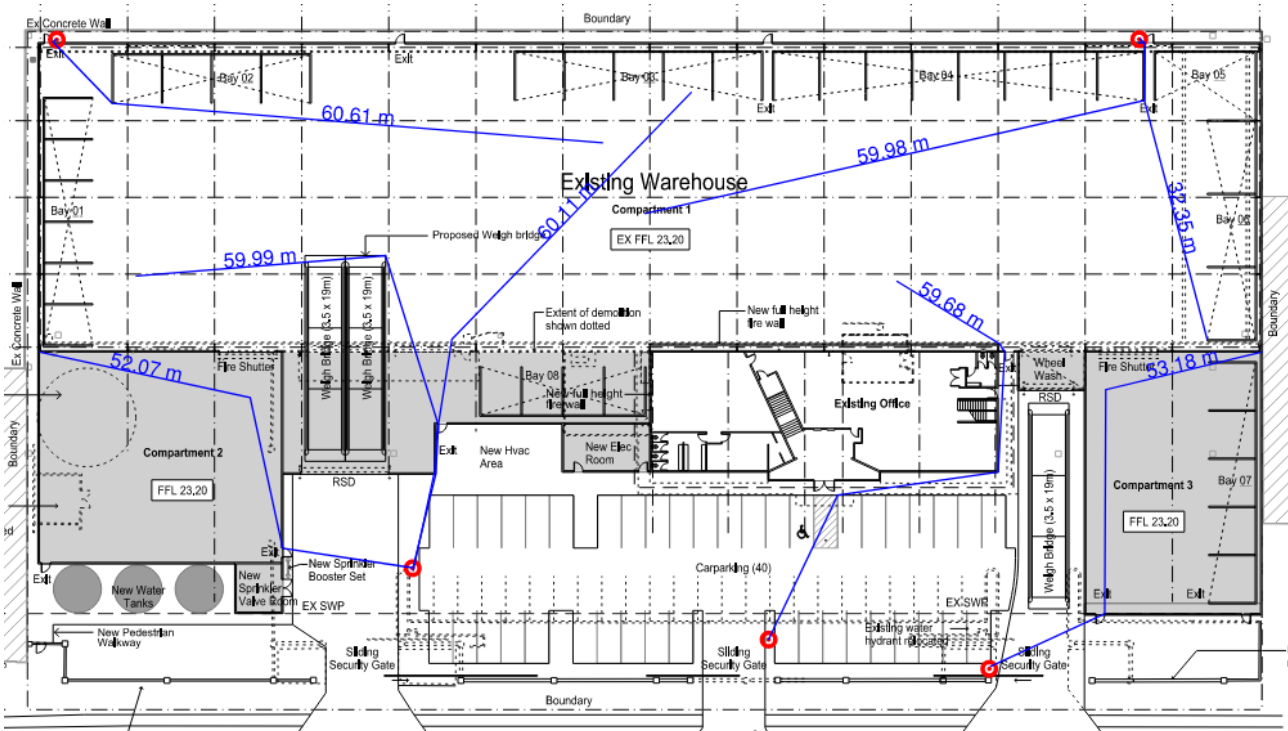


Figure 10-4: Indicative Location of Fire Hydrants Shown in Red – Coverage Based on Open Plan Layout

10.5.2 Fire Hose Reels

Fire hose reel shall be provided throughout the building in accordance with DtS Provision E1.4 of the NCC and AS2441:2005.

10.5.3 Fire Sprinkler System

A fire sprinkler system shall be provided throughout the building in accordance with AS2118.1:2017.

- High hazard sprinkler system likely required at roof level in warehouse areas – To be confirmed by fire services engineer in detailed design
- The sprinkler system shall be capable of providing the highest demand rate for a period of no less than 2 hours
- All sprinklers within the warehouse area are to have fast response heads on standard spacing i.e. RTI no greater than 50 m^{1/2}s^{1/2}

- Upon sprinkler activation, the building occupant warning alarm and smoke exhaust systems shall be initiated throughout the building, and the direct brigade notification activated. Fire shutters must also automatically descend on sprinkler activation.

10.5.4 Portable Fire Fighting Equipment

Portable fire extinguishers are to be provided throughout the building in accordance with Table E1.6 of the NCC and selected, located, and distributed in accordance with AS2444:2001.

10.5.5 Fire Detection

It is proposed to provide a multi-point aspirated smoke detection system (e.g. VESDA) at the warehouse roof level complying with AS1670.1:2018. The smoke detection system shall have minimum Class B sensitivity. The system should be designed and zoned appropriately to provide indication of the approximate location of a fire.

The intent of this system is to:

- Notify operators of a potential smouldering fire.
- Provide early occupant warning of a smouldering fire, allowing investigation by staff and initial first aid fire suppression if necessary.
- Activate the building occupant warning system, fire shutters on detection of a flaming fire
- Notify the fire brigade to expediate attendance at the site

The office building is to be provided with smoke detection complying with Section 5 of AS1670.1:2018.

10.5.6 Building Occupant Warning System

A building occupant warning system shall be throughout all parts of the building. The system should be in accordance with the prescriptive requirements of Specification E1.5 and Clause 6 of Specification E2.2a of the NCC 2019 Amendment 1 and AS1670.1:2018. The occupant warning alarm should be sounded throughout all areas of the building upon activation of the sprinkler systems.

- Visual alarm devices shall be provided as part of the occupant warning system to enable occupant warning in the event of elevated environmental sound pressure levels
- Manual call points must be provided at all building exits as well as in the wheel wash and weighbridge areas as per Clause 3.14.2 of AS1670.1:2018. These shall not automatically notify the fire brigade.

10.5.7 Smoke Hazard Management

A smoke exhaust system is not prescriptively required by the DtS Provisions of the NCC, however, given the nature of the waste material to be handled and stockpiled within the building, additional smoke exhaust is considered necessary.

It is proposed to provide a dedicated smoke exhaust system in Fire Compartment 1 and 3, complying with the requirements of Clause 3 of Specification E2.2b, with a minimum operating duration of at least 2 hours. All mechanically forced supply air shall shutdown on fire trip, including the 25,000 L/s cyclone system.

The exact smoke exhaust rates shall be determined through detailed design.

It is noted that the current HVAC concept has yet to be fully coordinated with the proposed fire strategy documented in Section 10. The following amendments are required:

- High level makeup air louvres are proposed to be located in the 240/240/240 FRL wall between Fire Compartment 1 and 2 (see Figure 10-5). These should be relocated to maintain the integrity of the firewall or be provided with fire dampers.
- Motorised dampers are located in the external wall of Fire Compartment 3, required to achieve 120/120/120 FRL. These dampers must be relocated at least 6 m away from the wheel wash external wall (see Figure 10-6).
- The exhaust points of all mechanical systems must not be within 6 m of the side allotment boundaries.

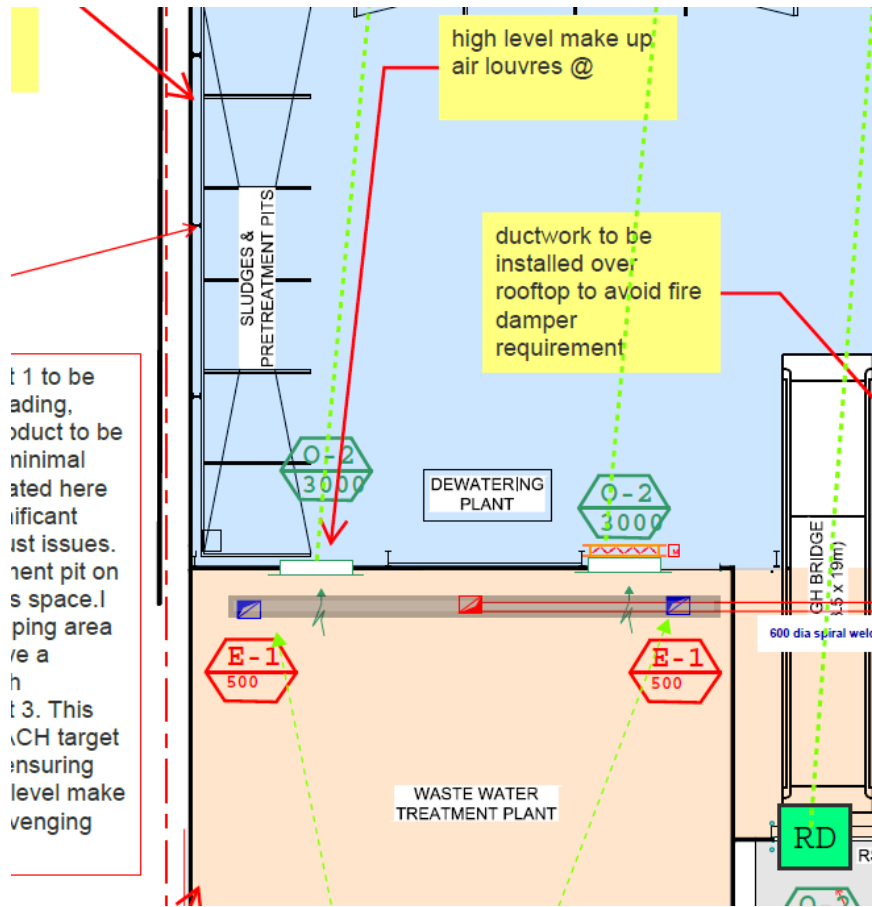


Figure 10-5: Makeup Air Louvres Located in 240/240/240 FRL Wall – Louvres to be Relocated or Provided with Fire Dampers

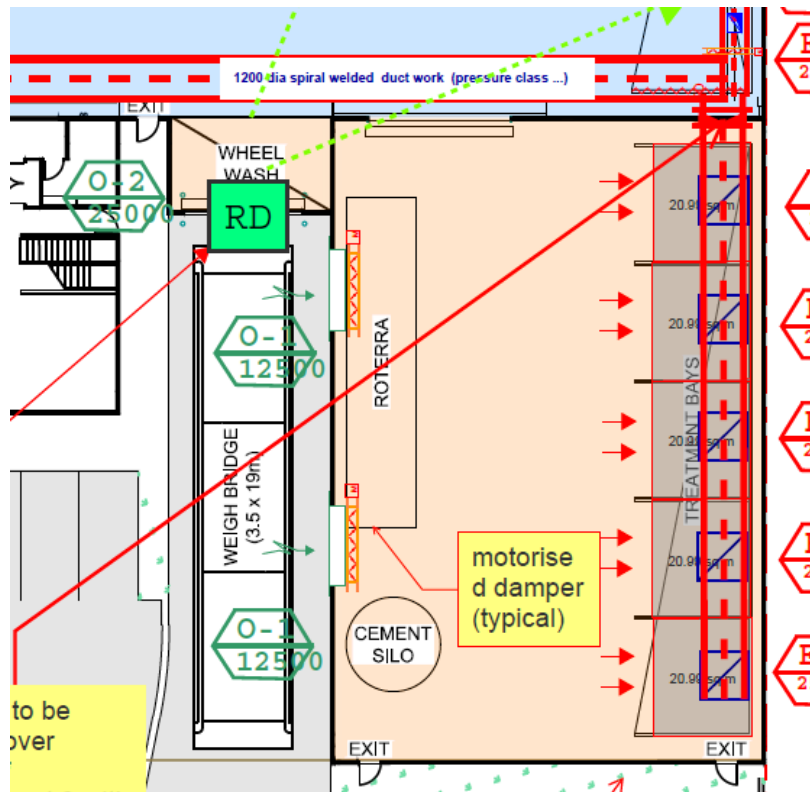


Figure 10-6: Motorised Dampers to be Located at Least 6 m from Wheel Wash External Wall – Louvres to be Relocated at Least 6 m Away from External Wall of Wheel Wash

10.5.8 Control and Indicating Equipment

The building shall be provided with a Main FIP located at the entry to the office on Ground Floor. The Main FIP must be installed in accordance with NCC Specification E2.2a and AS1670.1:2018 and have the following capabilities.

- The FIP must be capable of isolating, resetting, and determining the fire location within the building.
- A red strobe should be installed at the entry to the office to alert arriving fire brigade of the fire alarm origin and FIP location.

10.5.9 Signage and Lighting

Emergency lighting is to be provided throughout the building in accordance with DtS Provisions E4.2 and E4.4 of the NCC 2019 Amendment 1 and AS2293.1:2018

Exit signage is to be provided throughout the building in accordance with the DtS Provisions E4.5, E4.6, E4.8 of the NCC 2019 Amendment 1 and AS2293.1:2018.

10.6 MANAGEMENT AND ENVIRONMENTAL PROCEDURES

10.6.1 Fire Water Containment

Primary firewater containment shall be from process bunding pits within the building as well as the main floorplate of the building itself. This shall be achieved by bunding at all building entry points with drive-over bunding at the truck entry and exits. This primary containment must be capable of containing:

- Hydrants operating at 30 L/s for a minimum of 4 hours; and
- High hazard sprinklers operating for a minimum of 2 hours – flowrate to be advised by fire services engineer; and
- Drenchers operating for a minimum of 2 hours – flowrate to be advised by fire services engineer.

Secondary containment shall utilise the proposed internal leachate collection system which captures any potentially contaminated water and directs it to the onsite wastewater treatment plant. This process is to be specifically developed with the Emergency Control Organisation.

No water from within the building is permitted to discharge into the existing stormwater network.

10.6.2 Stockpile Storage Heights

It is understood that stockpiling will occur internally only and there will be no external stockpiling.

To ensure that the core of a waste stockpile can be readily accessed by machinery, as well as to reduce the size of the core where pressure and thermal confinement is at its greatest, stockpiles shall not exceed 4 m in height. The uncontained vertical face of all stockpiles (i.e. any face not being retained by a masonry wall) must recede on a slope no greater than 45° to minimise the risk of collapse.

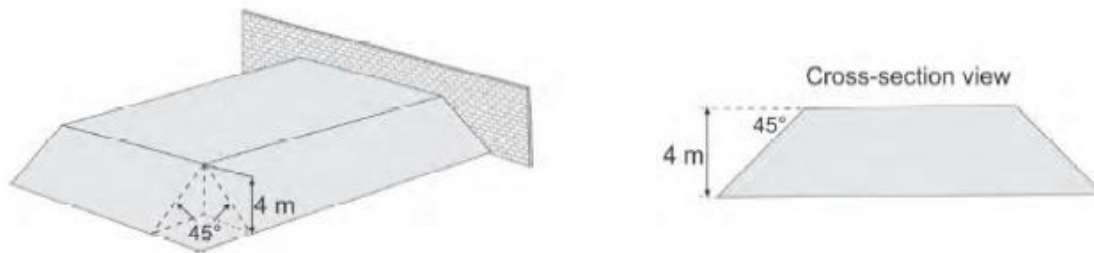


Figure 2 Maximum stockpile height and face angle

Figure 10-7: Excerpt of Stockpile Height and Angle Requirements - From FRNSW's Guideline on Fire Safety in Waste Facilities

Fire separating masonry walls shall extend at least 1 m above the top of a stockpile and at least 2 m beyond the outermost stockpile edge. The boundary limits of stockpiles must be permanently marked.

It is noted that for fire purposes, these requirements shall only apply to each 1,000 m³ stockpile. Small internal partitioning is proposed for operational purposes, however, these need not comply with these requirements.

10.6.3 Stockpile Volume and Separation Distances

The maximum size of a stockpile within the building shall not exceed 1,000 m³. It is noted from Appendix A that several materials are proposed to have a maximum stockpile capacity of 5,000 t. Depending on the density of the material, these materials may need to be divided into separate stockpiles separated by a masonry wall.

Stockpiles shall be regularly rotated to dissipate internally generated heat and minimise the risk of auto-ignition.

As a sprinkler system is proposed, each accessible side of a stockpile shall have at least 6 m of clear unobstructed space to reduce the risk of fire spread i.e. where there is no solid masonry wall.

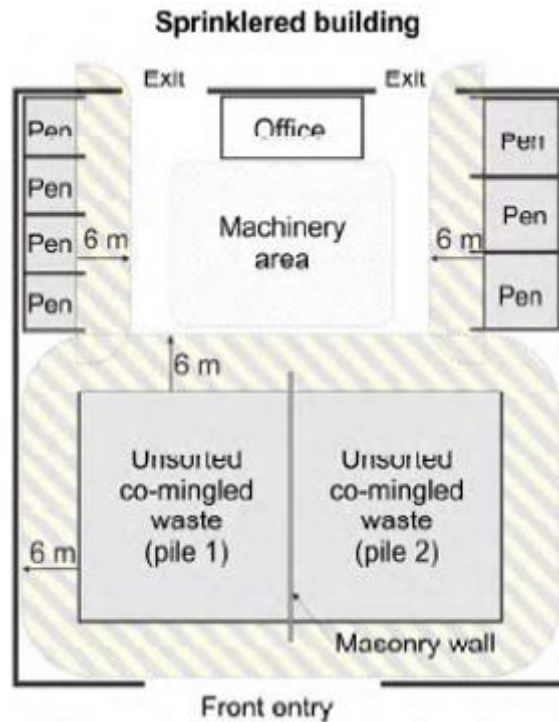


Figure 10-8: Excerpt of Internal Stockpile Separation Requirements - From FRNSW's Guideline on Fire Safety in Waste Facilities

Internal stockpiles shall not impede access to exits and a minimum 1 m path must be maintained past stockpiles to ensure requires paths of travel are accessible.

10.6.4 Building Management Measures

The ongoing management of the building is as important in maintaining a high level of life safety as the provisions recommended during the design phase of the building.

A management-in-use plan must be developed and implemented to restrict storage to a maximum height of 4 m AFFL. Stockpiles must not exceed 4 m in height as per Section 10.6.

10.6.5 Maintenance of Fire Safety Equipment

The fire safety systems should be tested and maintained in accordance with Australian Standard AS1851 or other relevant testing regime.

10.6.6 Evacuation Plan

An emergency management plan should be developed for the site in accordance with AS3745:2010.

All staff should be trained in the operation of fire hose reels and fire extinguishers on an annual basis.

10.6.7 Operations Plan and Emergency Plan

An operations plan shall be developed by the site operator as per Section 8.6 of FRNSW's Guideline – Fire Safety in Waste Facilities.

An emergency management plan must be developed as per AS3745:2010.

An Emergency Services Information Package (ESIP) must be provided at the FIP and include all information as per Section 9.4.2 of FRNSW's Guideline – Fire Safety in Waste Facilities.

11 NOMENCLATURE

ACRONYM	EXPANSION
ABCB	Australian Building Codes Board
AFSS	Annual Fire Safety Statement
NCC	Building Code of Australia
CFD	Computational Fluid Dynamics
DtS	Deemed-to-Satisfy
EPA	Environmental Protection Authority
EMP	Emergency Management Plan
FCC	Fire Control Centre
FER	Fire Engineering Report
FIP	Fire Indicator Panel
FIMR	Fire and Incident Management Report
FRL	Fire Resistance Level
FRNSW	Fire Rescue NSW
FSS	Fire Safety Strategy
IBC	Intermediate Bulk Container
IFEG	International Fire Engineering Guidelines
NCC	National Construction Code
NFPA	National Fire Protection Association
OHS	Occupational Health and Safety
VOC	Volatile Organic Compounds
WHS	Work Health and Safety
RTI	Response Time Index

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APPENDIX A STOCKPILE QUANTITIES

Waste Codes Proposed to be Treated at the Prestons Waste Treatment Facility

20142192-012-M-RevE

Waste Code	Waste Description	Solids and Sludge Treatment Technology	Liquid Waste Treatment Technology	Potential Sources	Potential Quantities	Acceptance Criteria	Treatment Chemicals Used (see also Figure 7 Flow Chart)	Resultant Wastes and Products from Processing (see also Figure 7 Flow Chart)	Storage & Containment	Maximum Facility Storage Volume	Storage and Treatment Time
CATEGORY A - Organics (Non Halogenated)											
J100	Mineral Oils	Bioremediation	Separation	TPH Contaminated soils and solids. Pure oils from various sources including machinery maintenance workshop wastes.	10,000 T/year	Up to 20% w/w oil contamination will be treated. Greater than 20% will be recycled to other licenced facilities.	Bioremediation reagents	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria Waste oil to be sent to recycling facilities	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	2,000 T	4-12 weeks
J160	Coal Derived Hydrocarbon Contaminated Soils (excludes DNAPL)	Enhanced Bioremediation or Chemical Oxidation	Separation	Gasworks or Gasworks impacted materials	10,000T/year	Up to 1% w/w as measured by TPH	Oxidants and / or surfactants	Reuse criteria met or meet solid waste criteria	Soil Treatment Bays or Pits (subject to coal tar impacts)	5,000T	1-2 weeks
J160	Coal Derived Hydrocarbon Contaminated Soils (includes residual free coal tars)	Enhanced Bioremediation and Immobilisation	Separation of NAPL	Gasworks or Gasworks impacted materials	10,000T/year	Evidence of coal tar DNAPL present in soil matrix	Immobilisation reagents	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Stored in treatment bays prior to passed to roterra for treatment	5,000T	1-2 weeks
N120	Soils contaminated with a hazardous substance	Chemical Oxidation Bioremediation Immobilisation	N/A	Soil residues, property development, site remediation, industrial waste, mining waste.	Up to 150,000 T/year	Metals, up to 5% w/w. Organics up to 20% w/w	Metals: Cement / fly ash / Magnesium oxide to immobilise metals. Organics: Activated Carbon or Oxidants, or bioremediation chemicals.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk sludge stored in treatment pits	5,000 T	2-4 weeks
G100	Ethers	Immobilisation	Adsorption	Chemical manufacturer and by-products	Up to 100 T/year	Organic up to 20%	Activated Carbon	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	30 T	2-4 days
N190	Filter cake	Immobilisation / Bioremediation / Chemical Oxidation	N/A	Residues from industrial and mining waste water treatment plants	Up to 10,000 T/year	Metals, up to 5% w/w. Organics up to 20% w/w	Metals: Cement / fly ash / Magnesium oxide to immobilise metals. Organics: Activated Carbon or Oxidants, or bioremediation chemicals.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application	Bulk solids - stored in bulk solids bunding	1,000 T	1-2 weeks

G110	Organic solvents, other than halogenated solvents	Chemical Oxidation Bioremediation Immobilisation Storage Only	Chemical Oxidation / Adsorption	Solvent manufacture. By product from paint/pigment manufacture. Alcohol by products.	Up to 1,000 T / year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Organic solvents will be recycled at economic concentrations. Waste waters and solids will be treated using oxidants and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	20 T	No storage, treated immediately
D340	Perchlorates	Bioremediation	Adsorption	Fertiliser manufacture, contaminated soils.	Up to 1,000 T / year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	20 T	1-2 weeks
G160	Waste from the manufacture, formulation or use of organic solvents	Immobilisation / Chemical Oxidation / Bioremediation	Chemical Oxidation / Adsorption	Solvent manufacture. By product from paint/pigment manufacture. Alcohol by products.	Up to 1,000 T / year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Organic solvents will be recycled at economic concentrations. Waste waters and solids will be treated using oxidants and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	20 T	1-2 weeks
N140	Fire debris and fire wash waters	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Demolition waste and fire debris and wash waters	Up to 1,000 T(KL) / year	Highly variable contaminants and concentrations. Case by case analysis. NON PFAS contaminated waste only.	Pre-treatment testing will determine treatment chemicals required, and most appropriate treatment technology	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Bulk wastes (from tankers and tipper) will be stored in the main WWTP storage tanks or in the main solids reception area.	500 T (KL)	1-2 weeks
CATEGORY B - HALOGENATED including Brominated											
G150	Halogenated organic solvents - Residues from industrial waste treatment or disposal operations	Chemical Oxidation Bioremediation Immobilisation	Chemical Oxidation / Adsorption	Solvent manufacture wastes eg: paint/pigment & alcohol by products.	Up to 1,000 T / year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Oxidants and cement, or bioremediation additives. Organic solvents will be recycled at economic concentrations.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	20 T	1-2 weeks
N205	Contaminated Soils Containing chlorinated Compounds	Chemical Oxidation Bioremediation (anaerobic)	N/A	Solid Industrial waste treatment residues, Chemical manufacturing. Contaminated soils from redevelopment	Up to 10,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Pre-treatment testing will determine treatment chemicals required, and most appropriate treatment technology	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk sludge stored in treatment pits	1,000 T	1-2 weeks
M160	Organo halogen compounds—other than substances referred to in this Table or Table 2	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100T	1-2 weeks
M160	Oxidising agents	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100T	1-2 weeks

M100	Waste substances and articles containing or contaminated with polychlorinated biphenyls, polychlorinated naphthalenes, polychlorinated terphenyls and/or polybrominated biphenyls	Immobilisation Chemical Oxidation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Absence of volatile metals	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	100T	1-2 weeks
CATEGORY C - Metals & Metalloids (excludes solid waste slags derived from metal processing industries)											
D130	Arsenic, arsenic compounds (requires valency assessment)	Immobilisation	Precipitation	Soil residues, property development, timber treatment residues, industrial waste, mining waste	Up to 20,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	2,000 T	1-2 weeks
D170	Antimony and antimony compounds	Immobilisation	Precipitation	Electrical processing factories, flame retardant	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
D290	Barium compounds (excluding barium sulphate)	Immobilisation	Precipitation	Soil residues, property development, industrial waste, mining waste	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	200 T	1-2 weeks
D160	Beryllium and beryllium compounds	Immobilisation	Precipitation	Soil residues, property development, industrial waste, mining waste	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	200 T	1-2 weeks
D310	Boron and boron compounds	Immobilisation	Precipitation	Soil residues, property development, timber treatment residues, industrial waste, mining waste	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks

D150	Cadmium and cadmium compounds	Immobilisation	Precipitation	Soil residues, property development, industrial waste, mining waste	Up to 5,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	1,000 T	1-2 weeks
D140	Chromium compounds (hexavalent and trivalent)	Immobilisation	Precipitation	Soil residues, property development, timber treatment residues, industrial waste, mining waste	Up to 20,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Hexavalent chromium will be reduced to trivalent chromium using ferrous sulphate. Cement / fly ash / Magnesium oxide to immobilise trivalent chromium.	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	2,000 T	1-2 weeks
D190	Copper compounds	Immobilisation	Precipitation	Copper refinery residues. Soil residues, property development, timber treatment residues, industrial waste, mining waste	Up to 20,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	2,000 T	1-2 weeks
N150	Fly ash	Immobilisation	N/A	Power stations	Up to 100,000 T/year	Metals, up to 5% w/w	Metals: Cement / Magnesium oxide to immobilise metals. Fly ash can be selectively used as an immobilisation reagent if metals levels are below landfill guidelines.	Solid Waste to meet landfill acceptance criteria	Bulk wastes (from tankers and tippers) will be stored in the main WWTP storage tanks or in the main solids receival area.	5,000 T	1-2 weeks
A100	Waste from surface treatment of metals & plastics	Immobilisation	Precipitation / Neutralisation	Galvanisers, electroplating industry, plastics manufacturing	Up to 1,000 T/year	Metals, up to 5% w/w. Organics up to 10% w/w	Cement / fly ash / Magnesium oxide. Activated Carbon or Oxidants.	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
D220	Lead; lead compounds	Immobilisation	Precipitation	Lead refinery waste. Soil residues, property development, service station remediation, industrial waste, mining waste	Up to 20,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	2,000 T	1-2 weeks
D120	Mercury; mercury compounds	Immobilisation	Precipitation	Soil residues, property development, demolition waste from chlor alkali plants, industrial waste, mining waste	Up to 5,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide to immobilise ionic mercury. Elemental mercury will be treated using sulphur powder to convert metallic mercury to ionic mercury. Organic mercury will be treated using chemical oxidation prior to immobilisation.	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	500 T	1-2 weeks

D100	Metal Carbonyls	Immobilisation	Precipitation / Adsorption	Nickel refineries, steel mill, chemical manufacture	Up to 1,000 T/year	Up to 5% w/w Metals (Nickel, boron, iron) for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide/Activated carbon	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Wastes in packages will be stored & contained in the package as received in a bunded area, according to ADG Code. Bulk wastes (from tankers and tippers) will be stored in the main WWTP storage tanks or in the main solids receiveal area.	100 T	1-2 weeks
D210	Nickel, nickel compounds	Immobilisation	Precipitation	Nickel refinery waste. Soil residues, property development, industrial waste, mining waste	Up to 5,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Waste water to meet trade waste criteria. Oil recovered to be sent to oil recycling facilities.	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	500 T	1-2 weeks
D300	Non-toxic salts	Immobilisation	N/A	Industrial, manufacturing and mining by-products	Up to 1,000 T/year	up to 100%	Activated Carbon / Cement / fly ash / Magnesium oxide to immobilise	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk sludge stored in treatment pits	100 T	1-2 weeks
H110	Organic phosphorous compounds	Immobilisation	Precipitation	Industrial waste, mining waste, fertiliser manufacture.	Up to 1,000 T/year	up to 100 %	Cement / fly ash / Magnesium oxide to immobilise	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
M250	Surface active agents (Surfactants)	Immobilisation / Bioremediation / Storage	Chemical Oxidation / Adsorption	Detergent manufacture. NON PFAS fire fighting foam.	Up to 5,000 T / year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Bioremediation reagents, Cement / fly ash / Magnesium oxide / activated carbon.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
D360	Phosphorus compounds	Immobilisation	Precipitation	Industrial waste, mining waste, fertiliser manufacture.	Up to 500 T/year	up to 100 %	Cement / fly ash / Magnesium oxide to immobilise	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	50 T	1-2 weeks
D240	Selenium and selenium compounds	Immobilisation	Precipitation	Contaminated soils	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide to immobilise	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
D250	Tellurium and tellurium compounds	Immobilisation	Precipitation	Contaminated soils	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks

D180	Thallium and thallium compounds	Immobilisation	Precipitation	Industrial by-products, Contaminated soils	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
H170	Waste from the manufacture, formulation or use of wood preserving chemicals	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Soil residues, Timber treatment plants, chemical manufacturing plants	Up to 10,000 T/year	Up to 5% w/w Chromium, Copper, Arsenic, Organics for treatment. For higher concentrations, recycling to other licenced facilities. Non-organic treatment chemicals such as creosote will only be received as packaged waste, not for treatment.	ferrous sulphate/ Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	1,000 T	1-2 weeks
D270	Vanadium compounds	Immobilisation	Precipitation	Vanadium pentoxide Catalysts from fertiliser manufacture or petroleum processing. Contaminated soils.	Up to 5,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	1,000 T	1-2 weeks
D230	Zinc compounds	Immobilisation	Precipitation	Soil residues, property development, industrial waste, mining waste	Up to 20,000 T/year	Up to 5% w/w Zinc for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	2,000 T	1-2 weeks
CATEGORY D - OTHER (inorganic, specialist waste streams)											
C100	Basic (alkaline) solutions or bases (alkalis) in solid form	Dissolve and treat as liquid	Dissolve / Neutralise	Industrial waste, Mining Waste	Up to 1,000 T/year	up to 100%	Bases will be neutralised with acid (sulphuric or hydrochloric).	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
B100	Acidic solutions or acids in solid form	Solids would be dissolved	Dissolve / Neutralise	Industrial waste, Mining Waste	Up to 1,000 T/year	up to 100%	Lime or Magnesium Oxide	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in banded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks banded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
T100	Chemical waste arising from a research and development or teaching activity	Immobilisation	Precipitation / Adsorption / Chemical Oxidation	Laboratory wastes from industry, schools, university, government organisation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Pre-treatment testing will determine treatment chemicals the most appropriate treatment technology .	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste - stored in banded area in accordance with the ADG Code and Australian Standards	100 T	1-2 weeks

D350	Chlorates	Immobilisation / Storage	Adsorption	Disinfection by products from water treatment	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Chlorates will be reduced to chloride salt using bacteria	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
N160	Encapsulated, chemically-fixed, solidified or polymerised wastes	Immobilisation	N/A	Waste from treatment facilities	Up to 5,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Pre-treatment testing will determine most suitable reagents required for immobilisation targets to be met	Solid Waste to meet landfill acceptance criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk sludge stored in treatment pits	500 T	1-2 weeks
M220	Isocyanate compounds	Storage / Immobilisation	N/A	Polymer manufacturing	Up to 1,000 T / year	Highly variable contaminants and concentrations. Case by case analysis.	Pre-treatment testing will determine treatment chemicals required, and most appropriate treatment technology	Solid Waste to meet landfill acceptance criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk sludge stored in treatment pits		1-2 weeks
R120	Waste pharmaceuticals, drugs and medicines	Storage	Storage	Waste mineral oils unfit for their original intended use	Up to 1,000 T/year	Up to 100% oil	N/A	N/A	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk sludge stored in treatment pits	100 T	1-2 weeks
J120	Oil and water mixtures or emulsions, or hydrocarbon and water mixtures or emulsions	N/A	Separation / Adsorption	Petroleum refineries, workshops, petrol stations, rolling mills and from edible oil and soap factories	Up to 20,000 T (KL)/year	Up to 30% oil. Higher concentrations will be transfer to licenced facilities.	Coagulants, aluminium sulphate.	Waste water to meet trade waste criteria. Oil recovered to be sent to oil recycling facilities.	Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards	1000 T (KL)	1-2 weeks
M230	Triethylamine catalysts for setting foundry sands	Immobilisation	N/A	Foundries	Up to 1,000 T/year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Bioremediation reagents, Cement / fly ash / Magnesium oxide / activated carbon.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application	Bulk wastes (from tankers and tippers) will be stored in the main WWTP storage tanks or in the main solids receival area.	100 T	1-2 weeks
E100	Waste containing peroxides other than hydrogen peroxide	Immobilisation	Precipitation / Adsorption	Industrial waste, Mining Waste	Up to 1,000 T / year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Cement / fly ash / Magnesium Oxide / Activated Carbon	Solid Waste to meet landfill acceptance criteria Waste water to meet Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	1,000 T	1-2 weeks
H100	Waste from the manufacture, formulation or use of biocides or phytopharmaceuticals	Immobilisation / Chemical Oxidation / Bioremediation	Chemical Oxidation / Adsorption	Biocide manufacture. Cooling tower decommissioning.	Up to 1,000 T / year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Bioremediation reagents, Cement / fly ash / Magnesium oxide / activated carbon	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks

F100	Waste from the manufacture, formulation or use of inks, dyes, pigments, paints, lacquers or varnish	Immobilisation / Chemical Oxidation / Bioremediation	Chemical Oxidation / Adsorption	Solvent manufacture. By product from paint/pigment manufacture. Alcohol by products.	Up to 1,000 T / year	Up to 5% w/w for treatment. For higher concentrations, transfer to other licenced facilities.	Organic solvents will be recycled at economic concentrations. Waste waters and solids will be treated using oxidants and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	20 T	No storage, treated immediately
T120	Waste from the manufacture, formulation or use of photographic chemicals or processing materials	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Photograph developers. Product destruction.	Up to 1,000 T/year	Up to 5% w/w organic and metal (predominantly Silver) for treatment. For higher concentrations, transfer to other licenced facilities.	Oxidants, activated carbon and cement, or bioremediation reagents.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
F110	Waste from the manufacture, formulation or use of resins, latex, plasticisers, glues or other adhesives	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation / Adsorption	Chemical manufacturers, resin, latex and adhesive manufacturing.	Up to 10,000 T/year	Up to 5% w/w organic and metal contamination. For higher concentrations, transfer to other licenced facilities.	Oxidants, activated carbon and cement, or bioremediation reagents.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	1,000 T	1-2 weeks
R140	Waste from the manufacture or preparation of pharmaceutical products	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Pharmaceutical manufacturing. Product destruction.	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100 T	1-2 weeks
N220	Contaminated Soils Containing Asbestos	Immobilisation	N/A	Contaminated soils derived from redevelopment / remediation programs	Up to 20,000 T/year	Up to 1% ACM in soil and / or detectible fibres requiring immobilisation to prevent airborne fibre release	Cement / fly ash / Magnesium oxide	Solid Waste to meet landfill acceptance criteria		5,000 T	1-2 weeks
N220	Pre Packaged Asbestos Waste Prepared for Disposal	Storage & Disposal Only	N/A	Demolition Wastes	Up to 20,000 T/year	Occupational Hygienist Certification Required	Transport	To meet landfill disposal criteria	Asbestos in packages will be stored & contained in the package as received in a bunded area, according to ADG Code. Bulk soil or sludge with asbestos (from tankers and tippers) will be stored in the main sludge storage tanks or in the main solids receiveal area.		
A100	Waste resulting from surface treatment of metals and plastics	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Electroplaters, galvanisers, plastis manufacturers	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100T	1-2 weeks
A110	Waste from heat treatment and tempering operations containing cyanide	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards	100T	1-2 weeks

E100	Waste containing peroxides other than hydrogen peroxide	Immobilisation	Immobilisation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards	100T	1-2 weeks
D110	Inorganic fluorine compounds excluding calcium fluoride	Immobilisation	Immobilisation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards	100T	1-2 weeks
N100	Containers and drums that are contaminated with residues of substances referred to in this list	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100T	1-2 weeks
D200	Cobalt compounds	Immobilisation	Precipitation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Up to 5% w/w	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100T	1-2 weeks
D330	Inorganic sulfides	Immobilisation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards	100T	1-2 weeks
G110	Organic solvents excluding halogenated solvents	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards	100T	1-2 weeks
N230	Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	100T	1-2 weeks
M150	Phenols, phenol compounds including chlorophenols	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards	100T	1-2 weeks
M270	Per-and poly fluoroalkyl (PFAS) contaminated materials including waste PFAS-containing products and contaminated containers (Soils & Liquid Streams)	Storage and Transfer Only	Adsorption (Activated carbon, ion exchange)	Airports, defence sites, Manufacturing (various), contaminated site remediation	Up to 10,000 T/year	Compliant with the definition of solid wastes Can meet landfill validation test and disposal requirements specific to PFAS	Activated carbon	Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	5,000T	1-2 weeks

	Acid Sulphate Soils	Neutralisation	N/A	Contaminated soils derived from redevelopment / remediation programs	Up to 30,000 T/year						
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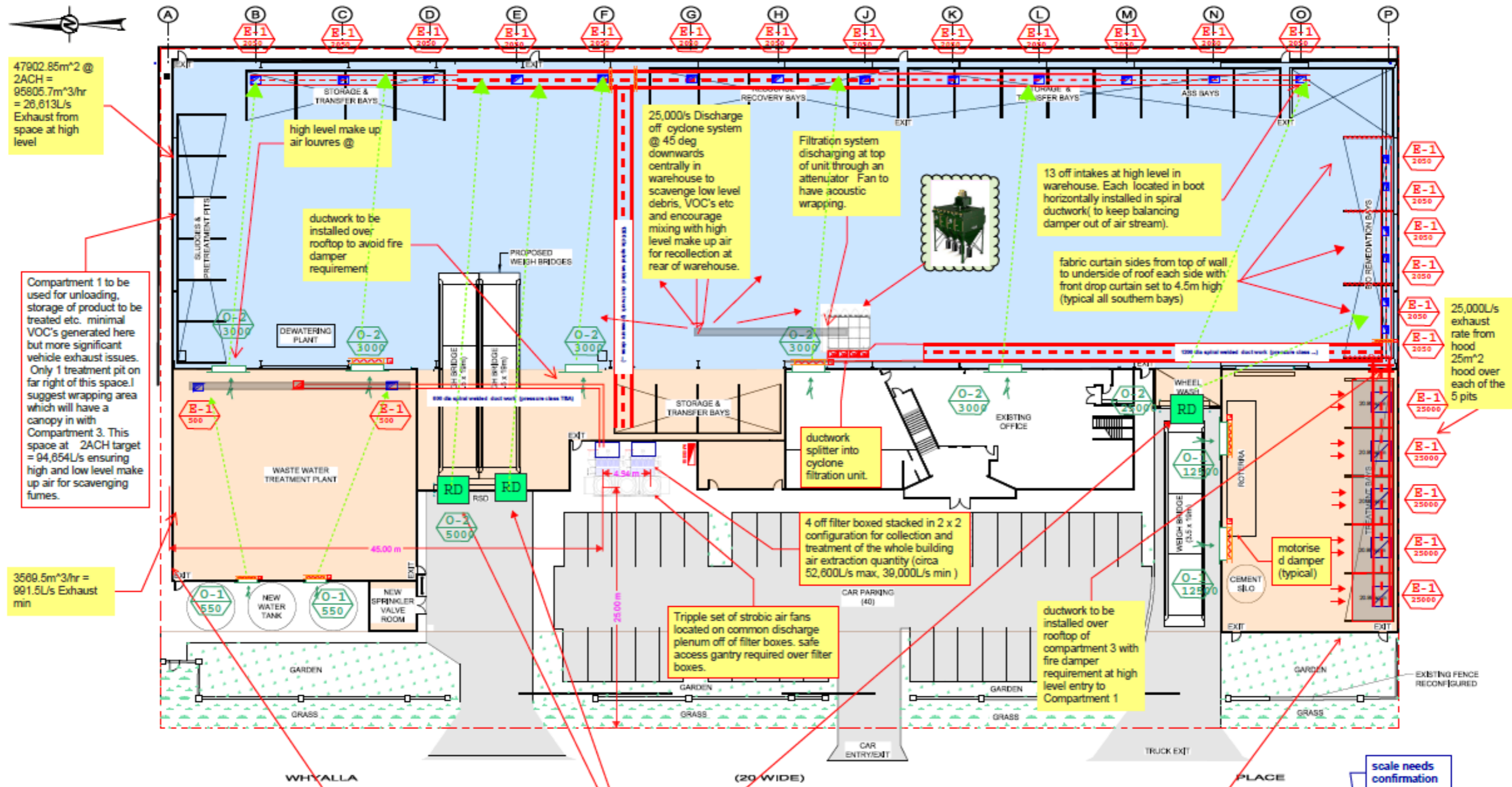
Acronym Meaning
 WWTP Waste Water Treatment Plant
 ADG Code Australian Dangerous Goods Code Edition 7.5

Updated Table 2: Waste Types for Storage Consolidation and Transfer Only

20142192-012-M-RevE

Waste Code	Waste Description	Solids and Sludge Treatment Technology	Waste Water Treatment Technology	Potential Sources	Potential Quantities per annum	Contaminant Concentration	Storage & Containment	Maximum Storage Volume	Storage Time
A130	Cyanides (inorganic)	Storage Only	Storage Only	Transformers	Up to 1,000 T/year	Up to 5% w/w	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid storage in WWTP Tanks bunded in accordance with Australian Standards Bulk sludge stored in treatment pits	50 T	1-2 weeks
M210	Cyanides (organic)	Storage Only	Storage Only	Transformers	Up to 1,000 T/year	Up to 5% w/w		50 T	1-2 weeks
M100	Material containing polychlorinated biphenyls ((PCB's), polychlorinated naphthalene's (PCN's), polychlorinated terphenyls (PCT's) and/or polybrominated biphenyls (PBB's)	Storage Only	Storage Only	Transformers	Up to 1,000 T/year	Up to 5% w/w		100 T	1-2 weeks
M260	Highly odorous organic chemicals (including mercaptans and acrylates)	Storage Only	Storage Only						
M180	Polychlorinated dibenzo-p-dioxin (any congener) Reactive Chemicals	Immobilisation / Chemical Oxidation / Bioremediation	Precipitation / Chemical Oxidation	Manufacturing (various), contaminated site remediation	Up to 1,000 T/year	Highly variable contaminants and concentrations. Case by case analysis.	Oxidants, activated carbon and cement, or bioremediation.	Solid Waste to meet landfill acceptance criteria or beneficial reuse under EOW Application Waste water meeting Trade Waste Criteria	Packaged waste stored in bunded area in accordance with the ADG Code and Australian Standards Bulk solids stored in bulk solids bunding Bulk liquid

APPENDIX B CONCEPT HVAC DESIGN



47902.85m² @ 2ACH = 95805.7m³/hr = 26,613L/s Exhaust from space at high level

Compartment 1 to be used for unloading, storage of product to be treated etc. minimal VOC's generated here but more significant vehicle exhaust issues. Only 1 treatment pit on far right of this space. I suggest wrapping area which will have a canopy in with Compartment 3. This space at 2ACH target = 94,654L/s ensuring high and low level make up air for scavenging fumes.

3500.5m³/hr = 991.5L/s Exhaust min

25,000L/s Discharge off cyclone system @ 45 deg downwards centrally in warehouse to scavenge low level debris, VOC's etc and encourage mixing with high level make up air for recollection at rear of warehouse.

Filtration system discharging at top of unit through an attenuator Fan to have acoustic wrapping.

13 off intakes at high level in warehouse. Each located in boot horizontally installed in spiral ductwork(to keep balancing damper out of air stream).

fabric curtain sides from top of wall to underside of roof each side with front drop curtain set to 4.5m high (typical all southern bays)

25,000L/s exhaust rate from hood 25m² hood over each of the 5 pits

4 off filter boxes stacked in 2 x 2 configuration for collection and treatment of the whole building air extraction quantity (circa 52,600L/s max, 39,000L/s min)

Tripple set of strobic air fans located on common discharge plenum off of filter boxes. safe access gantry required over filter boxes.

ductwork to be installed over rooftop of compartment 3 with fire damper requirement at high level entry to Compartment 1

LEGEND

	WAREHOUSE - EXISTING
	WAREHOUSE - EXTENSION
	CONCRETE DRIVE
	GRASS
	GARDEN

NOTE(S)
Compartment 1 to be used for liquid waster treatment in a sealed machine. We are largely ventilating this space for AS1688.2 Vehicular movement & human comfort rather than toxic fumes, VOC's and Duct collections. I would assume very minimal VOC's generated here but more significant vehicle exhaust issues. 1ACH target = 5870L/s

Full height vented roller shutter doors (8000L/s each @ 12Pa maximum pressure drop)

Compartment 3 to be used for dumping and mixing superfine particloes during immobilisation process. 5ACH target = 16,218L/s

scale needs confirmation

NOT FOR CONSTRUCTION

DRAFT

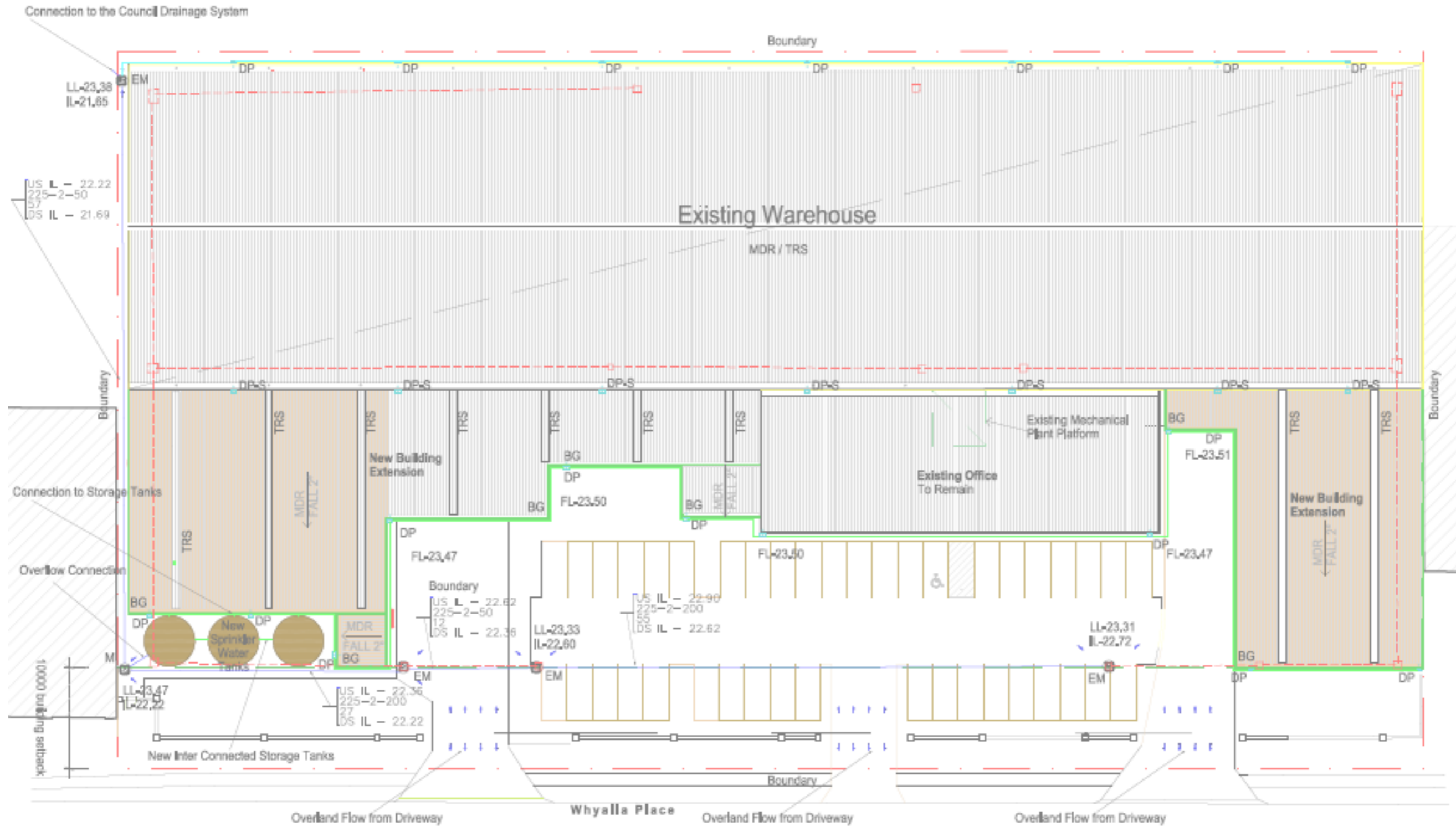
REFERENCE(S)
BASE SURVEY TAKEN FROM DRG NO. 20200_DA 100_P7_SITE PLAN.

For Review HVAC Alliance

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ABN 44 612 366 006

APPENDIX C CONCEPT STORMWATER DESIGN



Legend

- | | | | |
|--|---|--|---------------------------------------|
| Site Boundary | New Manhole with Grated Lid | LL-23,33 Lid Level | FL-23,50 Finished Level |
| 225 mm dia Concrete Stormwater Pipe | Existing Manhole with Grated Lid | IL-22,60 Invert Level | Overland Flow Paths |
| 150 mm dia PVC Stormwater Pipe (Connected to Storage Tanks) | Existing Drainage Pit to be Removed/Sealed | DP Down Pipe | US IL - 22,22 UPSTREAM INVERT LEVEL |
| 150 mm PVC Stormwater Drain (Connected to Council Drainage System) | Existing Drainage Pipe to be Removed/Capped | DP-S Down Pipe Between Different Roof Levels | 150-2-50 PIPE DIA-CLASS-GRADE |
| | | | 57 DISTANCE BETWEEN PIT CENTRES |
| | | | DS IL - 21,69 DOWNSTREAM INVERT LEVEL |

APPENDIX D COMPARISON TO EXPECTED FIRE LOAD

The Fire Brigade Intervention Model (V3.0) developed by the Australasian Fire and Emergency Service Authorities Council (AFAC) provides a means of estimating the flowrate of water necessary to control and extinguish a fire.

Based on literature studies, it was concluded in the FBIM that every 5 L/s of applied water can extinguish 8 MW (applied internally) whilst each 10 L/s of water applied externally has an extinguishing capacity of 5.25 MW. Furthermore, extinguishment will only occur if the cooling capacity is equal to or greater than 110% of the heat release rate.

The following Figure D-1 summarises the size of fire that could be extinguished for both internal and external fire attack.

Effect of internal fire attack					
Applied water (L/s)	hrr (MW)	110% hrr	90% hrr	Extinguishing capacity (MW)	Result
5	5	5.5	4.5	8	Decay
10	10	11	9	16	Decay
20	30	33	27	32	Constant
20	40	44	36	32	No effect
30	40	44	36	48	Decay
30	50	55	45	48	Constant

Effect of external fire attack					
Applied water (L/s)	hrr (MW)	110% hrr	90% hrr	Cooling capacity (MW)	Result
10	5	5.5	4.5	5.25	Constant
20	10	11	9	10.5	Constant
30	10	11	9	15.75	Decay
40	15	16.5	13.5	21	Decay
40	30	33	27	21	No effect

Figure D-1: Excerpt of Table 5.4 from FBIM V3.0

Therefore based on the above, it is expected that the application of 30 L/s of water (as per AS2419.1:2017) can extinguish a fire up to 43 MW size for internal fire attack. For external fire attack, this can only extinguish up to a 14 MW fire. Based on the size of the stockpiles documented in Appendix A, it is not anticipated that the largest fire will exceed 43 MW in size where sprinklers operate successfully and therefore the hydrant design is considered to be appropriate.

It can be seen that there is a significant difference in the size of fire that can be extinguished where internal fire attack is and is not possible. It is therefore imperative that the attending fire brigade be capable of entering the building for fire attack.

APPENDIX E FRNSW'S GUIDELINE – FIRE SAFETY IN WASTE FACILITIES

Fire and Rescue NSW

Fire safety guideline
Fire safety in waste facilities

7.3 Development of existing waste facilities

7.3.1 When development is being applied for, the owner or PCBU should undertake an assessment of the design and performance of their existing waste facility against the requirements specified within this guideline and provide this to the relevant consent or regulatory authority for determination.

7.3.2 If the assessment determines that an upgrade is required to address a deficiency in the design or performance, the relevant authority should impose an appropriate condition (e.g. licensing) or direction (e.g. issue an Order) on the owner.

Note: Under *Section 9.35(d)* of the *EP&A Act*, FRNSW authorised fire officers are empowered to issue a fire safety Order.

7.3.3 When an existing waste facility undergoes demolition, erection, rebuilding, alteration, enlargement or extension (i.e. development), the relevant consent authority should consider imposing this guideline (in part or full) as a condition on the development.

7.3.4 When an existing waste facility has restrictions on stockpile sizes and separations, control measures should be implemented to maintain such limits and ensure the fire load remains appropriate to the building and installed fire safety systems.

Note: Restrictions may be imposed by an authority including condition of consent, an order, or a licence condition. Installing or upgrading fire safety systems may remove or reduce any restrictions on operations (e.g. larger stockpiles).

7.4 Firefighting intervention

7.4.1 The waste facility is to provide safe, efficient and effective access as detailed in FRNSW guideline *Access for fire brigade vehicles and firefighters*.

7.4.2 Performance requirement CP9 of the *NCC* requires access to be appropriate to the building function/use, fire load, potential fire intensity, fire hazard, active fire safety systems and fire compartment size.

7.4.3 Enhanced fire brigade vehicle access should be provided for firefighting intervention, including a perimeter ring road around any large non-sprinklered building and access roads between external stockpiles.

7.4.4 The facility should cater for a large emergency service response (e.g. multiple alarm and multiple agency) if the potential hazard may result in a large emergency.

Note: This includes from any pollution event requiring a protracted hazardous materials response (e.g. contain and remove fire water run-off).

7.4.5 A building not fitted with an automatic fire sprinkler system should have a dedicated external quarantine area not less than four times the floor area of the largest internal stockpile to receive, breakdown and extinguish that stockpile (refer to clause 8.5.3).

7.4.6 Any development application should be accompanied by a flow rate and pressure test of the water main connected to the fire hydrant system.

7.4.7 Firefighter access should be provided to buildings, structures and storage areas, including to any fire safety system or equipment provided for firefighting intervention.

Unclassified

Fire safety guideline
Fire safety in waste facilities

Fire and Rescue NSW

7.5 Fire hydrant system

- 7.5.1 The waste facility is to have a fire hydrant system installed appropriate to the risks and hazards for the waste facility.

Note: A fire hydrant system is only required when a fire brigade station is within 50 km and equipped to utilise the system.

- 7.5.2 The fire hydrant system should consider facility layout and operations, with fire hydrants being located to provide compliant coverage and safe firefighter access during a fire, including having external fire hydrants to protect any open yard storage (i.e. external stockpiles).

- 7.5.3 The design of the fire hydrant system is to have enhanced standard of performance when combustible waste material is not protected by a fire sprinkler system, including having an additional fire hydrant outlet required to flow simultaneously for any open yard storage and for any non-sprinklered internal stockpiles, as given in Table 2.

Fire compartment floor area of non-sprinklered building	Area of open yard (used for stockpiles)	No. of fire hydrants required to flow
≤ 500 m ²	≤ 3,000 m ²	2
> 500 m ² ≤ 5,000 m ²	> 3,000 m ² ≤ 9,000 m ²	3
> 5,000 m ² ≤ 10,000 m ²	> 9,000 m ² ≤ 27,000 m ²	4
> 10,000 m ²	> 27,000 m ²	5 (or more)

Table 2 Minimum fire hydrants for non-sprinklered buildings and external storage

Note: Refer to *Australian Standard AS 2419.1-2005* for fire hydrant system design requirements of buildings that are protected by a fire sprinkler system.

- 7.5.4 Fire hydrants are not to be located within 10 m of stockpiled storage and must be accessible to firefighters entering from the site and/or building entry points.
- 7.5.5 Where appropriate to protect against high risks and hazards, suitable on-site fixed external fire monitors may be provided as part of the fire hydrant system.
- 7.5.6 The fire brigade booster assembly is to be located within sight of the designated site entry point, or other location approved by the fire brigade, and be protected from radiant heat from any nearby stockpile (e.g. by a masonry wall).
- 7.5.7 The fire hydrant system is to have a minimum water supply and capacity providing the maximum hydraulic demand (i.e. flow rate) for not less than four hours.
- 7.5.8 The fire hydrant system should incorporate fire hose reels installed in accordance with Clause E1.4 of the *NCC* and externally to cover open yard storage areas to enable effective first attack of fires by appropriately trained staff.

Note: First attack firefighting is often critical to extinguishing minor fire ignitions.

Unclassified

Fire and Rescue NSW

Fire safety guideline
Fire safety in waste facilities

7.6 Automatic fire sprinkler systems

7.6.1 The waste facility is to have an automatic fire sprinkler system installed in any fire compartment that has a floor area greater than 1000 m² and contains combustible waste material.

Note: Unsorted mixed combustible waste material generally presents a greater ignition hazard than most other combustibles.

7.6.2 The fire sprinkler system should be demonstrated as being appropriate to the risks and hazards identified for buildings, including externally as necessary (e.g. drenchers to protect plant/equipment, exposures, high-risk external storage).

7.6.3 The fire sprinkler system design should be appropriate to the hazard class (e.g. 'high hazard class') and have enhanced standard of performance as appropriate to the special hazard.

Note: Any system design limitation set by specifying content and percentages are to be maintained for the building's operating life unless the system is upgraded.

7.6.4 To protect vital systems, storages or equipment or protect against high risk hazards, a deluge, drencher, fast response, mist or foam system should be provided.

Note: A localised system may be installed to protect specific areas or equipment if the whole building is not sprinkler protected.

7.6.5 The fire brigade booster assembly for the fire sprinkler system should be co-located with the fire hydrant system booster within sight of the designated site entry point, or in a location approved by the fire brigade.

7.6.6 The fire sprinkler system is to have a minimum water supply and capacity providing the maximum hydraulic demand (i.e. flow rate) for not less than two hours.

Note: The fire sprinkler system should contain fire spread and allow firefighters to enter the building, remove burning waste material and extinguish the fire.

7.7 Fire detection and alarm systems

7.7.1 The waste facility is to have a fire detection and alarm system installed appropriate to the risks and hazards identified for each area of a building.

7.7.2 The fire detection and alarm system should warn all occupants of fire and to evacuate the facility, with each component being appropriate to the environment (e.g. flame detector or infrared detector in sorting area, visual alarms around noisy machinery).

7.7.3 Upon positive detection of fire, the system is to activate any required alarm, fire suppression system, passive measure (e.g. fire door, fire shutter) or plant/machinery override (e.g. shutdown of conveyor, shredder) as appropriate to the detector.

Note: The system may incorporate multiple levels of detection (e.g. fast acting IR detector to shutdown machinery and activate a local deluge system, and medium acting aspirating system to provide broad area detection).

7.7.4 Manual alarm points should be provided in clearly visible locations as appropriate to the environment so that staff can initiate early alarm of fire.

7.8 Smoke hazard management

7.8.1 Buildings containing combustible waste material are to have an automatic smoke hazard management system appropriate to the potential fire load and smoke production rate installed within the building.

7.8.2 Under Clause E2.3 of the *NCC*, additional smoke hazard management measures should be provided to vent or exhaust smoke so that in at least 90% of the compartment, the smoke layer does not descend below 4 m above floor level.

Note: To undertake firefighting intervention, visibility is needed so that piled waste can be safely removed using machinery.

7.8.3 Natural low-level openings, either permanent or openable such as roller doors, should be provided on two or more walls to assist with venting de-stratified (i.e. cooled) smoke and ensure minimum visibility is maintained during a fire.

Note: Roller doors should have manual override so that the door can be opened in the event of electrical isolation or failure during fire.

7.8.4 Any smoke exhaust system installed should be capable of continuous operation of not less than two hours in a sprinkler-controlled fire scenario, or four hours in any non-sprinkler-controlled fire scenario.

7.8.5 Automatic operation of the smoke hazard management system from smoke detection should not cause undue delay to the activation of any automatic fire sprinkler system.

7.9 Fire water run-off containment

7.9.1 The waste facility should have effective and automatic means of containing fire water run-off, with primary containment having a net capacity not less than the total hydraulic demand of installed fire safety systems.

Note: The total hydraulic demand is the net discharge of water from both the fire hydrant system and fire sprinkler system.

7.9.2 An alternative means of fire water run-off containment may be proposed, particularly for development of an existing waste facility, including being validated by hydrological engineering assessment where appropriate.

Note: Bunding of the processing areas may be a containment option.

7.9.3 The containment system is to wholly incorporate any dedicated external quarantine area required to extinguish any internal stockpile from a building (refer to clause 7.4.5)

7.9.4 The containment system, which includes the base of any storage area, should be impermeable (i.e. sealed) and prevent fire water run-off from entering the ground or any surface water course (e.g. river, stream, lake, estuary, open sea).

7.9.5 The containment system should include secondary/tertiary facilities such as impermeable bunds, storage lagoons, isolation tanks or modified site design (e.g. recessed catchment pit, drainage basin) as appropriate to the facility.

Note: Any external pit/basin used to breakdown and extinguish burning waste from within a building must form part of the containment system.

- 7.9.6 Pollution control equipment such as stormwater isolation valves, water diversion booms, drain mats, should be provided as necessary for the facility's emergency response procedures, and be kept readily accessible for the event of fire.

Note: Failure to contain fire water run-off can result in significant pollution of the environment, which may incur substantial remediation costs and/or fines.

7.10 Bush fire prone land

- 7.10.1 The NSW RFS *Planning for Bush Fire Protection – A guide for councils, planners, fire authorities and developers* (PBP) applies to all development on 'bush fire prone land'.
- 7.10.2 Bush fire prone land is mapped by each respective council under [section 146](#) of the *Environmental Planning and Assessment Act 1979*.
- 7.10.3 Suitable fire brigade vehicle access is to be provided to within 4 m of any static water supply if no reticulated water supply is otherwise available (e.g. bulk water tank, dam).

8 Facility operation and management

8.1 General

- 8.1.1 This whole section, being '*Facility operation and management*', applies to new and existing waste facilities as determined by the relevant regulatory authority, such as NSW EPA as a condition of licence or the local Council as a condition of consent.

Note: NSW EPA regulate waste facilities through an environment protection licence issued under the *POEO Act*.

- 8.1.2 This whole section takes guidance from the documents *Reducing fire risk at waste management sites* and *Waste fire burn trials summary non-technical report*, both published by the Waste Industry Safety and Health Forum.
- 8.1.3 This whole section addresses the operation and management of a waste facility to ensure the fire hazard from combustible waste material fire is controlled.
- 8.1.4 This whole section should not override any existing licence or consent in-force if the conditions are being met.
- 8.1.5 This whole section may be addressed by performance outcomes identified through risk management, including identification of fire hazards, assessment of risks, implementation of controls, and documented review/audit process.

8.2 Storage and stockpiles

- 8.2.1 Storage and stockpiling of combustible waste material should be limited in size and volume appropriate to the given combustible waste material, fire risks, building design and installed fire safety systems.

Note: The size, volume and type of waste of all stockpiles should be identified on a site/floor plan and submitted with any development application.

- 8.2.2 Variations to storage and stockpile requirements, including maximum size and volume, movement, separation distances etc., will be considered through an appropriate pathway such as a performance solution.

Unclassified**Fire safety guideline**

Fire and Rescue NSW

Fire safety in waste facilities

- 8.2.3 The maximum height of any stockpile, loose piled or baled, should not exceed 4 m (see Figure 2).
- 8.2.4 The uncontained vertical face of any stockpile (i.e. any face not being retained by a masonry wall) should recede on a slope no greater than 45° to minimise the risk of collapse and fire spread (see Figure 2),

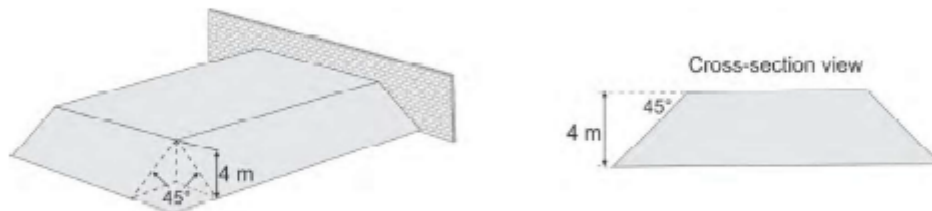


Figure 2 Maximum stockpile height and face angle

- 8.2.5 The storage method and arrangement of stockpiles is to minimise the likelihood of fire spread and provide separation which permits access for firefighting intervention,

Note: Fire separating masonry walls (e.g. bunkers) and automatic fire sprinkler systems may allow larger stockpile sizes and/or shorter separation distances.

- 8.2.6 A separating masonry wall, revetment or pen should extend at least 1 m above the stockpile height and at least 2 m beyond the outermost stockpile edge (see Figure 3),

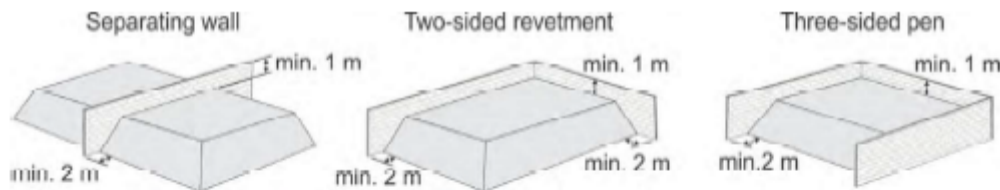


Figure 3 Example separating masonry wall, revetment or pen

- 8.2.7 Stockpile boundary limits should be permanently marked to clearly identify limits that maintain maximum stockpile sizes and/or minimum separations.

8.3 Stockpile movement

- 8.3.1 Stockpiles of combustible waste material should be rotated to dissipate any generated heat and minimise risk of auto-ignition as required.
- 8.3.2 Any stockpile of combustible waste material prone to self-heating should have appropriate temperature monitoring to identify localised hotspots; procedures outlined in the operations plan should be implemented to reduce identified hotspots.
- Note:** Temperature should ideally be measured at the core of the stockpile where thermal confinement will be highest,
- 8.3.3 Any processed or treated waste material, such as chipping, shredding, baling or producing crumb should be cooled before being stockpiled.
- 8.3.4 Procedures for stockpile rotation and monitoring of temperature during hot weather are to be included in the operations plan (refer to section 8.6),

8.4 External stockpiles

8.4.1 The maximum width of an external stockpile should be 20 m if fire brigade vehicle access is provided down both sides of the stockpile, and 10 m if access is provided down one side of the stockpile only (see Figure 4).

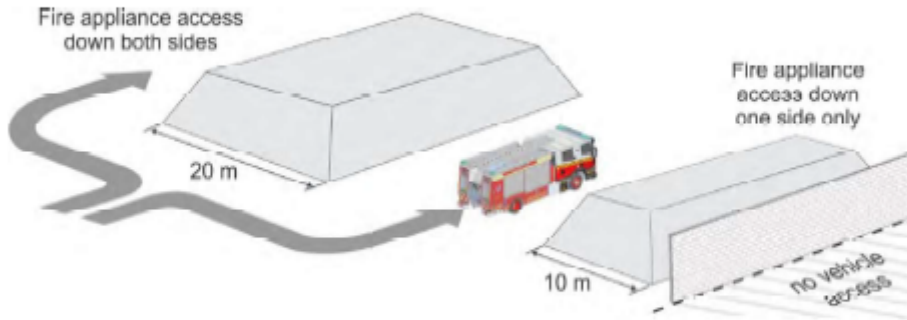


Figure 4 Maximum external stockpile widths

8.4.2 The maximum length of an external stockpile should be 50 m, or as determined from required minimum separation distances (refer to clauses 8.4.3 and 8.4.5).

8.4.3 Minimum separation should be maintained between external stockpiles, depending on storage method and fire risk of materials, as given in Table 3 (see also Figure 5).

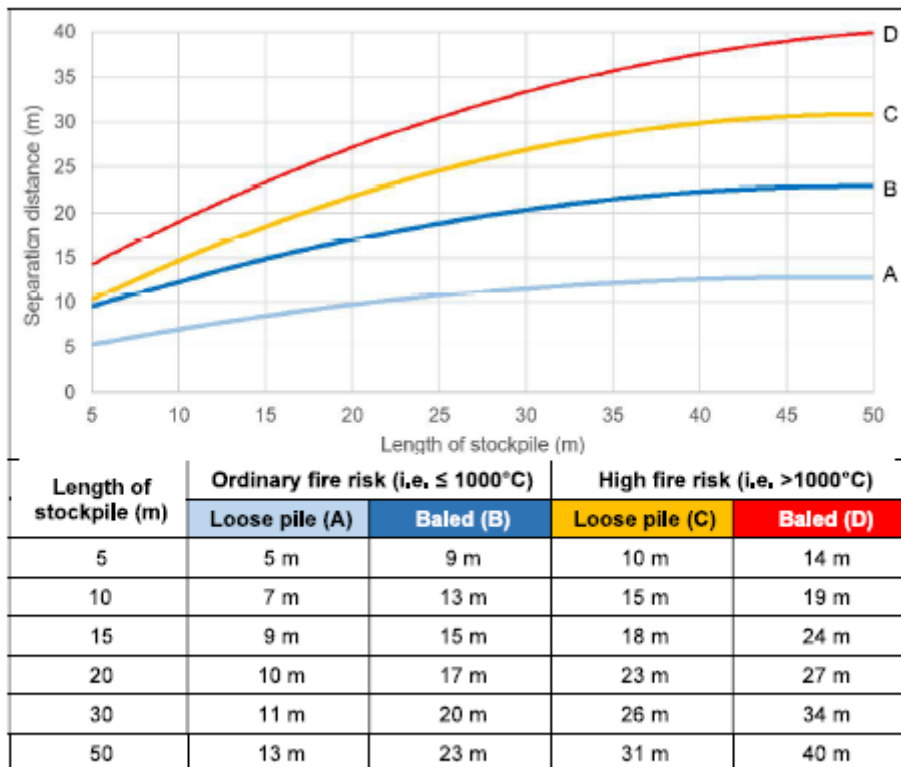


Table 3 Minimum separation distances between external stockpiles

Fire safety guideline
Fire safety in waste facilities

Fire and Rescue NSW

8.4.4 If two separation distances apply between different stockpiles (i.e. due to different lengths of each stockpile), the greatest distance is to be used (see Figure 5).

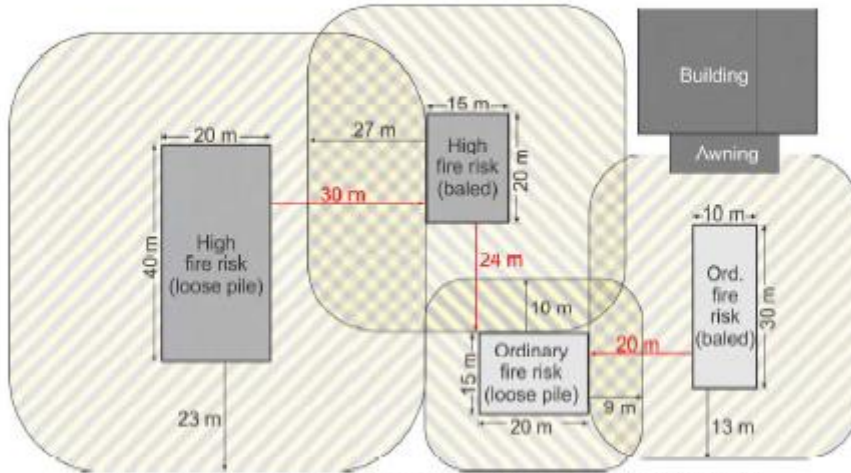


Figure 5 Examples of minimum separation between external stockpiles

8.4.5 Minimum separation should be maintained between external stockpiles and any fire-source feature, depending on storage method and fire risk of materials, as given in Table 4 (see also Figure 6):

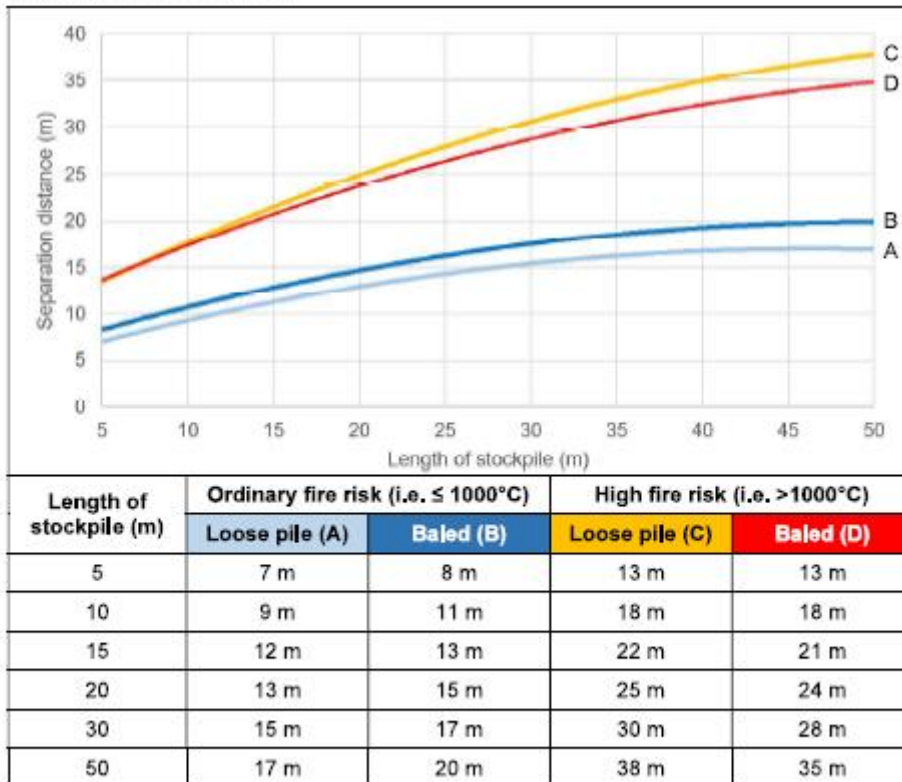


Table 4 Minimum separation between external stockpile and any fire-source feature

Unclassified

Fire and Rescue NSW

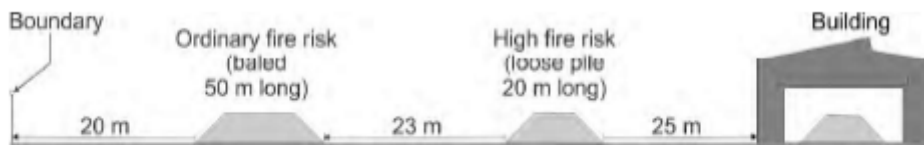
Fire safety guideline
Fire safety in waste facilities

Figure 6 Examples of separation between stockpile and fire-source features

- 8.4.6 Covered areas attached to buildings or structures, such as areas under awnings and undercrofts, should not encroach into the minimum separation distance unless protected by an automatic fire sprinkler system (see Figure 7).



Figure 7 Example of separation from any covered building part or structure

- 8.4.7 The minimum separation between external stockpiles or an external stockpile and any fire-source feature may be reduced when the stockpile is separated by masonry wall or protected by an automatic fire sprinkler system (i.e. drenchers) (see Figure 8).

Note: The masonry wall should intersect the direct line between the fire source feature (e.g. building) and top of the stockpile, and be located to provide fire appliance access as necessary.

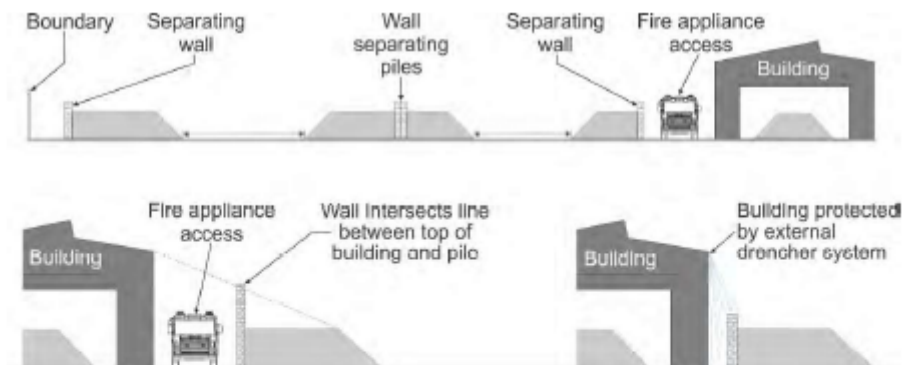


Figure 8 Examples of reduced separation using masonry wall or sprinkler system

- 8.4.8 External stockpile limits should be maintained and not exceeded as per the operations plan, and as appropriate to the facility, boundaries, exposures, buildings, terrain, drainage, vegetation, prevailing winds, vehicular access etc.
- 8.4.9 External stockpiles should be protected from high or unnecessary external risks (e.g. bushfire, adjacent property fire, arson, self-combustion in hot weather).
- 8.4.10 External stockpiles should be maintained so that all buildings access and egress points are always kept clear and unobstructed.
- 8.4.11 External stockpiles should be maintained so that all required fire brigade vehicle access (e.g. around buildings, between stockpiles and to hardstand areas) is always kept clear and unobstructed.

8.5 Internal stockpiles

- 8.5.1 Internal stockpiles of combustible waste material should be maintained as determined by the operations plan, and appropriate to the building size/layout, compartmentation, installed safety systems, process equipment and plant etc,
- 8.5.2 The maximum internal stockpile size in a building fitted with an automatic fire sprinkler system should be 1,000 m³.
- 8.5.3 Internal stockpiles should have a minimum of 6 m unobstructed access on each accessible side in a building fitted with an automatic fire sprinkler system, or a 10 m in a building not fitted with an automatic fire sprinkler system (see Figure 9).

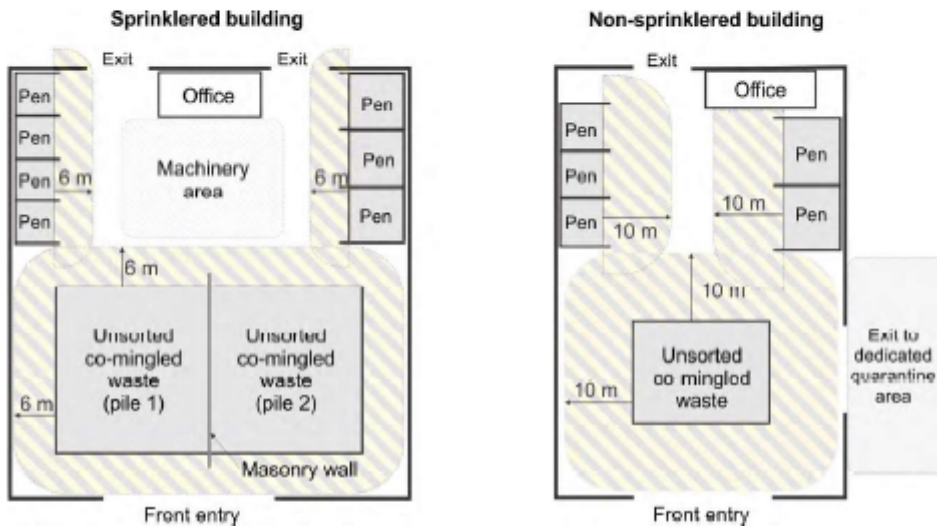


Figure 9 Example of unobstructed access around internal stockpiles

- 8.5.4 Internal stockpiles may be located side by side when separated by a masonry wall (refer to clause 8.2.6).
 - 8.5.5 The internal stockpile of a building not fitted with an automatic fire sprinkler system should be limited in size to be able to be moved to the dedicated external quarantine area using on-site resources only within one hour or less (refer to clause 7.4.5).
- Note:** By example, two waste handlers with 5 m³ bucket capacity taking two minutes per return trip can move a 300 m³ stockpile in an hour (i.e. 2 x 5 m³ x 30 trips).
- 8.5.6 Internal stockpiles should be protected from high or unnecessary ignition risks (e.g. friction/heating from conveyors, waste movers, heaters, chippers, shredders, balers, sorters, other machinery etc.).
 - 8.5.7 Internal stockpiles should be maintained so that all building egress points and required paths of travel are not blocked or impeded at any time,
 - 8.5.8 Internal stockpiles should be maintained so that access to the dedicated external quarantine area is always kept clear and unobstructed (i.e. by waste handlers).

Note: Any door opening (e.g. roller door) providing access to the quarantine area must be able to be readily opened at any time, including when power is lost.

8.6 Operations plan

- 8.6.1 The waste facility should develop and implement a written operations plan outlining the daily operations of the waste facility, including describing the combustible waste materials likely and the method of storage, handling or processing at the facility.
- 8.6.2 The operations plan should include a site plan drawing that identifies the layout of the waste facility and all locations of storage, handling and processing of combustible waste material.
- 8.6.3 The operations plan should identify the expected daily and holding inventory of combustible waste material including daily capacities and maximum stockpile limits.
- 8.6.4 The operations plan should define procedures that ensure maximum stockpile limits are not exceeded by operations at the waste facility.
- 8.6.5 The operations plan site plan should identify separate and clearly designated areas for materials drop-off, transfer and storage method of combustible waste materials (e.g. internal or external, sorted or unsorted, loose stockpile, bailed stockpile, binned, bundled, bunkered, container etc.).
- 8.6.6 The operations plan should identify all primary and secondary methods of combustible waste material transfer and stockpile movement (e.g. operational and reserve plant and equipment available at the waste facility).
- 8.6.7 The operations plan should include procedures for turnover of stockpiles to dissipate internal heat confinement, with the frequency determined by the combustible waste material, storage environment and ambient conditions.

Note: Turnover may relate to temperature monitoring where provided. Consideration should be given to periods of hot weather and high ambient temperature, where heat generation and self-combustion is more likely,

- 8.6.8 The operations plan should be regularly reviewed and updated (i.e. annually from the date of implementation) upon any change in combustible waste materials, storage, handling, processes or other conditions affecting daily operations,
- 8.6.9 The operations plan should be stored on site at the waste facility and kept in a readily accessible location (e.g. with the emergency plan).
- 8.6.10 A copy of the operations plan should be placed within the ESIP (refer to section 9.4).

Note: If the operations plan is prescribed and daily inventory constant, such details can be directly added to the ESIP rather than a copy of the operations plan.

9 Workplace fire safety

9.1 General

- 9.1.1 This whole section, being '*Workplace fire safety*', applies to any person who conducts the business or undertaking of owning, operating or managing a waste facility.

Note: SafeWork NSW regulate workplace safety under the *WHS Act*.

Unclassified**Fire safety guideline**

Fire and Rescue NSW

Fire safety in waste facilities

9.1.2 This whole section addresses the requirements on the PCBU to operate the waste facility as a safe workplace, especially regarding provision of fire safety.

9.1.3 This whole section does not override any other existing statutory requirement, code of practice or guideline that directly applies to the PCBU.

Note: SafeWork NSW publish a range of documents applicable to all PCBUs,

9.1.4 This whole section is to be addressed by thorough risk management, including identification of hazards, assessment of risks, implementation of controls, and documented review/audit process.

9.2 Risk assessment and mitigation

9.2.1 The PCBU should implement a hierarchy of control measures for the waste facility including providing information, instruction and training to employees and other persons as necessary to ensure health and safety (e.g. an emergency plan).

9.2.2 The PCBU should implement management procedures for general safety including staff induction, safe plant/equipment use, maintenance checks, safety inspections, clear reporting and communication, emergency drills etc.

9.2.3 The PCBU should implement housekeeping procedures to ensure all emergency access, equipment and exits are kept clear, including regular cleaning undertaken to prevent stockpile creep or litter build-up.

9.2.4 The PCBU should implement procedures to control potential ignition sources (e.g. friction, sparks, heating) including 'no open fire' policy, smoking restricted to designated areas or banned, 'hot-works permit' procedures in place.

Note: Plant and equipment such as conveyors, waste movers, heaters, chippers, shredders, balers, sorters etc, should be regularly inspected and maintained.

9.2.5 Vehicles and other machinery (e.g. waste movers) are to have appropriate heat shrouds and spark arrestors fitted and be kept, maintained and refuelled in designated areas away from combustible waste materials.

9.2.6 The PCBU should implement procedures to ensure hazardous materials and highly combustible materials (e.g. gas cylinders, fuels, paints, solvents) are stored in accordance with any relevant statutory requirement, code or standard and away from combustible waste material.

9.2.7 The PCBU should implement appropriate signage and markings, including facility layout plan at main site entry, warning signs (e.g. 'no smoking'), stockpile and clear space markings, emergency and evacuation area signs, fire safety system signs etc.

9.2.8 The PCBU should implement security arrangements (e.g. fencing with locked gate, lighting, alarm system, video surveillance, 24/7 security) to restrict unauthorised access and deter arson, including after-hours when staff have left the facility.

Note: Firefighter access must not be prevented (e.g. non-hardened metal chain and lock with key deposited at two nearest fire brigade stations or 24/7 security).

9.3 Emergency plan

- 9.3.1 The PCBU is required to develop an emergency plan for the waste facility, which is done in accordance with *AS 3745–2010 Planning for emergencies in facilities*.

Note: The emergency plan is developed for staff and occupants in the workplace. An external consultant should be engaged to provide specialist advice and services in relation to fire safety planning and developing an emergency plan.

- 9.3.2 The emergency plan is to assess fire safety risks and identify appropriate responses and controls (i.e. a fire safety management plan) and include emergency response procedures for staff and other persons at the waste facility in the event of fire,

- 9.3.3 The emergency plan is to identify an emergency control organisation for the facility including staff nominated as fire wardens in the emergency response procedures.

- 9.3.4 The emergency plan is to identify safe evacuation routes and assembly area (and alternates), shutdown processes, firefighting team activation, removal of uninvolved vehicles, activation of pollution control measure etc.

- 9.3.5 The PCBU is to ensure all staff receive appropriate training in fire safety including emergency response procedures, use of first attack firefighting equipment (e.g. fire hose reels, fire extinguishers), evacuation drills etc,

Note: Training in the use of first attack firefighting equipment must include education of fire awareness, including when to cease firefighting and to evacuate.

- 9.3.6 The emergency plan is to identify a process of regular fire safety audits to ensure fire safety requirements are being met, including reviewing stockpile limits, safe work practices, clear access, firefighting and emergency equipment.

Note: The PCBU should nominate a responsible person to conduct the fire safety audit, including check first attack firefighting equipment, stockpiles, access are kept clear and free of obstructions.

9.4 Emergency services information package (ESIP)

- 9.4.1 An ESIP, as detailed in FRNSW guideline *Emergency services information package and tactical fire plans*, should be developed and provided by the PCBU,

Note: The ESIP is intended for use by emergency service personnel only and supplements the emergency plan.

- 9.4.2 The ESIP should provide firefighters with specific information that can be used to develop strategies and tactics for firefighting intervention, including:

- the operations plan (refer to section 8.6)
- facility processes and systems including emergency shutdown procedures
- facility evacuation plan including ward areas and safe assembly area/s
- fire safety systems including on-site fixed fire monitors, deluge or drenchers static water supplies, special extinguishing agents or systems
- firewater containment system including secondary/tertiary facilities
- pollution control equipment including location and procedures, and
- machinery available for waste removal (e.g. waste movers) and location of designated quarantine area/s,

APPENDIX L

**Material and Correspondence
Biodiversity Waiver**



Prestons Recycling Centre Flora and fauna assessment

FINAL REPORT

Prepared for Golder Associates

3 September 2020

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Document information

Report to: Golder Associates

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Biosis project no.: 31884

File name: 31884.PrestonsRecyclingCentre.BDAR
Waiver.DFT01.20200630

Citation: Biosis 2020. Prestons Recycling Centre BDAR Waiver. Report for Golder Associates. Trulock, N, Dwyer, R. Biosis Pty Ltd. Emu Plains, NSW. Project no. 31884

Document control

Version	Internal reviewer	Date issued
Draft version 01	Callan Wharfe	30/06/2020
Final version 01	Rebecca Dwyer	02/06/2020

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- CLIENT: Golder Associates
- Department of Agriculture, Water, and the Environment for access to the Protected Matters Search Tool of the Australian Government
- NSW Environment, Energy and Science Group for access to the BioNet Atlas of NSW Wildlife.
- NSW Department of Primary Industries Fisheries for access to the predicted distribution maps for threatened species and fish communities.

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1 Introduction

Biosis Pty Ltd was commissioned by Golder Associates to complete an ecological assessment to describe the biodiversity values associated with the proposed construction of a Waste Treatment Facility (the project) to be located at 9-13 Whyalla Place, Prestons NSW 2170 (the study area).

Hi Quality Waste Treatment Services Pty Ltd (Hi-Quality) proposes to utilise technologies for treating solid and liquid wastes to a level suitable for reuse, disposal to landfill or disposal to sewer.

The Waste Treatment Facility would process up to 270,000 tonnes of solid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated Soils.
- Contaminated sludges.
- Liquid Wastes.
- New ancillary infrastructure would be constructed as part of the Project including:
 - Weighbridges and weighbridge office.
 - Warehouse extension.
 - New driveway.
 - Parking.
 - Wheel wash and truck wash down bay.

Hi-Quality would also site some corporate office functions at this location, utilising existing office space.

The Project will be assessed as State Significant Development (SSD) by the NSW Department of Planning, Industry, and Environment (DPIE) under Part 4 of the *Environmental Planning and Assessment Act 1979*.

This ecological assessment will support an application for a Biodiversity Development Assessment Report (BDAR) waiver, as part of the application for Secretary's Environmental Assessment Requirements (SEARs). The objective of this assessment is to determine the presence of biodiversity values within the study area and address the requirements of a BDAR waiver application (DPIE 2019).

1.1 Project background

The study area is located in the north-east sector of the suburb of Prestons and is approximately 31 kilometres west-south-west of the Sydney Central Business District (CBD) (Figure 1). The study area covers approximately 0.91 hectares and is defined as Lot 103 DP 866530 (Figure 2).

The study area is within the Liverpool City Council Local Government Area (LGA) and is zoned IN3 – Heavy Industrial under the Liverpool Local Environmental Plan 2008 (LEP). The surrounding area includes industrial and agricultural land use with remnant vegetation conserved in nearby riparian corridors. Land surrounding the area is predominantly zoned IN2 – Light Industrial, B6 – Enterprise Corridor, RE1 – Public Recreation and SP2 – Infrastructure under the LEP. Vegetation in the surrounding area is predominantly cleared, with planted native and exotic ornamental trees in the urban landscapes of the industrial areas, isolated remnant trees in agricultural land to the west and densely vegetated riparian zone to the south-east along Maxwell's Creek

near the M7 Motorway. The vegetated riparian corridor of Maxwell's Creek continues southward and connects with areas of conserved vegetation within adjacent privately owned lots.

The study area is not located within the Biodiversity Values Map (BV Map) (EES 2020a). Vegetation within the study area is regulated under SEPP (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP). Vegetation within the study area has been previously cleared for development of the existing factory structure interspersed along the Whyalla Place frontage with landscaped areas containing planted native and exotic ornamental vegetation. This report outlines the ecological features of the study area, demonstrates the avoidance of impacts to these features and therefore avoidance of impacts to threatened biota.

2 Method

2.1 Database and literature review

Prior to completing the field investigation, information provided by Golder Associates as well as other key information was reviewed, including:

- Commonwealth Department of Agriculture, Water and Environment (DAWE) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Environment, Energy and Science (EES) BioNet Atlas of NSW Wildlife, for items listed under the BC Act.
- NSW DPI WeedWise database for *Biosecurity Act 2015* (Biosecurity Act) listed priority weeds for the Greater Sydney Local Land Services (LLS) area within the Liverpool City Council LGA.
- Vegetation mapping:
 - *The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 - VIS_ID 4489* (OEH 2016).
- NSW Department of Planning, Industry and Environment (DPIE) ePlanning Spatial Viewer to review relevant State and Local Government legislative requirements and planning provisions.

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Biodiversity Conservation Act 2016* (BC Act).
- *Biosecurity Act 2015* (Biosecurity Act).
- SEPP (Vegetation in Non-Rural Areas) 2017.
- *Liverpool Local Environmental Plan 2008*.
- *Liverpool Development Control Plan 2008*.

2.2 Field investigation

A field investigation of the study area was undertaken on 10 June 2020 by Nicola Trulock (Consultant Botanist). Vegetation within the study area was surveyed using the random meander technique (Cropper 1993) over three person hours.

A habitat-based assessment was completed to determine the presence of suitable habitat for threatened species previously recorded (EES 2020) or predicted to occur (Commonwealth of Australia 2020) within 5 kilometres.

3 Results

Regional soil landscape mapping indicates that the study area occurs on the Disturbed Terrain soil landscape of the *Soil Landscapes of the Penrith 1:100 000 Sheet Map and Report* (Bannerman & Hazelton 1990).

The study area is predominantly cleared, comprising an operational factory and surrounding concreted parking facility and driveways. The study area contains 0.03 hectares of mown lawn dominated by exotic perennial grasses and approximately 0.04 hectares of ornamental native and exotic trees and shrubs restricted to landscaped areas along the frontage of Whyalla Place. The landscaped garden area directly adjacent to the facility parking lot contains 14 planted Magenta Lilly Pilly *Syzygium paniculatum* (Vulnerable, EPBC Act and Endangered, BC Act) propagated from nursery stock of unknown genetic origin and approximately 10 years in age.

The majority of exotic species within the study area are associated with built up suburban areas via introduction through human activity, mowing and vehicular movement. One priority weed, a mature African Olive *Olea europaea* subsp. *cuspidata* occurs within the planted garden bed near the western boundary of the study area.

No fauna species were observed utilising the study area at the time of survey. Birds observed adjacent to the study area consist of generalist avifauna known to utilise the urban matrix such as Magpie-Lark *Grallina cyanoleuca*, Noisy Miner *Manorina melanocephala* and Masked Lapwing *Vanellus miles*.

3.1 Vegetation communities

Prior to the field investigation, Biosis confirmed that four various native vegetation communities, all of which are threatened ecological communities (TECs), have been mapped in the broader landscape (OEH 2016), these include:

- PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion forming *Shale Gravel Transition Forest in the Sydney Basin Bioregion* (Critically Endangered Ecological Community [CEEC], EPBC Act and Endangered Ecological Community [EEC], BC Act).
- PCT 725: *Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion* forming *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion* (CEEC, EPBC Act and EEC, BC Act).
- PCT 781: *Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion* forming *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (EEC, BC Act).
- PCT 835: *Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion* forming *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (EEC, BC Act).

A key focus of the field investigation was to assess the vegetation of the study area against the final determinations for the above listed TECs to determine presence or absence.

The vegetation of the study area comprises two communities, Urban native and exotic vegetation and Exotic grassland. The structure, floristic composition and condition of these communities are described in Table 1. A

list of flora and fauna recorded within the study area as well as associated photos are provided in Appendix 2 and Appendix 3.

Table 1 Vegetation communities within the study area

Community	Description
<p>Urban native and exotic vegetation</p>	<p>Urban native and exotic vegetation occurs within the planted landscaped areas along the Whyalla Place frontage on the western boundary of the study area (Figure 3; Appendix 2; Photo 1).</p> <p>This vegetation comprised a layer of planted small and juvenile canopy tree species over an understorey of ornamental groundcovers in a bed of deep mulch.</p> <p>Non indigenous native species within the mid-storey consist of 14 mature Magenta Lilly Pilly, three Crimson Bottlebrush, one juvenile Spotted Gum <i>Corymbia maculata</i> and one Tuckaroo <i>Cupaniopsis anacardioides</i>. Exotic mid-storey tree species are restricted to approximately three Spanish Bayonet <i>Yucca aloifolia</i> and one African Olive.</p> <p>Native species within the understorey are restricted to two <i>Grevillea</i> 'Robyn Gordon' and one Native Sarsaparilla <i>Hardenbergia violacea</i>. Exotic species within the understorey consist of three New Zealand Christmas Bush <i>Metrosideros excelsa</i>, Large Wild Iris <i>Dietes grandiflora</i>, Cobbler's Pegs <i>Bidens pilosa</i>, Common Sowthistle <i>Sonchus oleraceus</i>, Prairie Grass <i>Bromus catharticus</i> and Catsear <i>Hypochaeris radicata</i>.</p> <p>Urban Native and exotic vegetation within the study area is not considered to conform to any NSW PCTs, due to the floristic composition of the vegetation as well as the lack of original soil profile, no evidence of successful reproduction and altered structural integrity.</p>
<p>Exotic grassland</p>	<p>Exotic grassland occurs as a strip between the public footpath and the outer wall of the existing facility directly adjacent to the western boundary of the study area (Figure 3; Appendix 2, Photo 2).</p> <p>Exotic grassland within the study area is characterised by a highly modified understorey layer dominated by exotic species including Buffalo Grass <i>Stenotaphrum secundatum</i>, Red-flowered Mallow <i>Modiola caroliniana</i>, White Clover <i>Trifolium repens</i>, Common Sowthistle and Catsear.</p> <p>Exotic grassland does not conform to any NSW PCTs.</p>

3.2 Priority weeds

One priority weed for the Greater Sydney LLS region, which includes the Liverpool City Council LGA, has been recorded in the study area and is listed in Table 2, along with its associated Duty (where relevant to the project).

Table 2 Priority weeds within the study area

Scientific name	Common name	General biosecurity duty
<i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive	<p>Regional Recommended Measure</p> <p>An exclusion zone is established for all lands in Blue Mountains City Council local government area and in Penrith local government area west of the Nepean River. The remainder of the region is classified as the core infestation area.</p> <p>Whole region: The plant or parts of the plant are not traded, carried, grown or released into the environment.</p> <p>Core infestation area: Land managers prevent spread from their land where feasible. Land managers reduce impacts from the plant on priority assets.</p>

To prevent biosecurity impacts from occurring as a result of the presence of the above listed priority weed within the study area, all practical steps should be taken to control and eradicate the weed from the study area prior to or during vegetation removal.

3.3 Threatened species

Background searches identified 21 threatened flora species and 45 threatened fauna species recorded ((EES 2020) or predicted to occur (Commonwealth of Australia 2020) within 5 kilometres of the study area. Those species considered most likely to have habitat within the study area based on the background research are as follows:

3.3.1 Flora

- Magenta Lilly Pilly *Syzygium paniculatum* (Vulnerable, EPBC Act and Endangered, BC Act).

3.3.2 Fauna

- Eastern False Pipistrelle *Falsistrellus tasmaniensis* (Vulnerable, BC Act).
- Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act).
- Grey-headed Flying-fox *Pteropus poliocephalus* (Vulnerable, EPBC Act and BC Act).
- Little Eagle *Hieraetus morphnoides* (Vulnerable, BC Act).
- Spotted Harrier *Circus assimilis* (Vulnerable, BC Act).

An assessment of the habitat values of the study area is provided for threatened flora and fauna species in the sections below.

Magenta Lilly Pilly

The study area contains 14 mature Magenta Lilly Pilly specimens approximately 10 years in age. The current design does not require the removal of any Magenta Lilly Pilly individuals. The Magenta Lilly Pilly within the study area are not within their natural distribution range, having originated through planting of the landscaped area within which they are located. As landscape plantings, they have been propagated within a nursery and have an unknown genetic origin. Based on the above, the Magenta Lilly Pilly within the study area do not meet the listing criteria as defined under the EPBC Act or the BC Act and are considered non-indigenous natives species.

The study area does not provide habitat for any further threatened flora species.

Megabats

The study area contains 14 Magenta Lilly Pilly which produce fruit which is believed to form foraging resources for Grey-headed Flying-fox (Eby & Law 2008). Magenta Lilly Pilly individuals within the study area were observed to be fruiting at the time of the investigation, with few fruit produced per tree, possibly the result of suboptimal growing conditions. The foraging habitat within the study area is considered to be low quality based on the paucity of fruit combined with the low number of Magenta Lilly Pilly in the study area. The closest Grey-headed Flying-fox camps are located at Bingara Reserve in Macquarie Fields, approximately 6.3 kilometres south of the study area, and Along Cabramatta Creek adjacent to Irelands Bridge Reserve in Lansdowne, approximately 6.4 kilometres north-east of the study area (Commonwealth of Australia 2015). Given the distance of these camps from the study area, the highly mobile nature of the species which is known to travel up to 50 kilometres whilst foraging (Tidemann & Nelson 2004) and the proximity of moderate quality foraging resources in the riparian corridor of Maxwell's Creek, it is unlikely that the resources within the study area are heavily relied upon by the species. In addition, the Magenta Lilly Pilly are to be retained under the current design. As such the likelihood of impact to this species is considered negligible.

Microbats

No hollow-bearing trees which form potential nesting and roosting habitat for threatened microbats, Eastern False Pipistrelle and Greater Broad-nosed Bat, were recorded in the study area; however, both species are known to utilise man-made structures. Based on proximity of the study area to the Maxwell's Creek riparian corridor and potential for access points into the roof or wall cavities, there is a moderate likelihood of the existing factory structure forming potential breeding and roosting habitat for these threatened microbat species (Churchill 2008). Under the current design, the project will not require the demolition or disturbance of wall and roof cavities for the purposes of refurbishment. Therefore, it is highly unlikely that the proposal will result in impacts to threatened microbat breeding and roosting habitat.

The study area contains foraging habitat for threatened microbats, including Eastern False Pipistrelle and Greater Broad-nosed Bat. These species typically feed on invertebrates above the forest canopy, and in the case of Greater Broad-nosed Bat, other smaller microbat species (Woodside & Long 1984, Churchill 2008). Foraging habitat within the study area is considered to be of negligible quality based on the small amount of vegetation coverage relative to the study area, limited understorey vegetation, limited native species and location within an industrialised area, resulting in low abundance of invertebrates forming prey species for microbats (Luck et al. 2013, Threlfall et al. 2016). Artificial lighting sources are located along Wyalla Place and the driveway entrances to the study area, both of which are directly adjacent to vegetation within the study area and are known inhibitors of microbat foraging activity (Linley 2015). The removal of urban native and exotic vegetation and exotic grassland to facilitate the proposal is not considered to adversely impact Eastern False Pipistrelle or Greater Broad-nosed Bat.

Raptors

Little Eagle preferred breeding habitat consists of large Eucalyptus trees in remnant vegetation on slopes preferably with a southerly aspect (Debus & Ley 2009) whilst the Spotted Harrier will build nests in trees in open or remnant woodland (NSW SC 2010). No breeding habitat in the form of large stick nests or structures capable of supporting breeding habitat for Little Eagle or Spotted Harrier were observed during the field investigation.

Little Eagle and Spotted Harrier preferred prey species consist predominantly of small mammals (including exotic species such as European Rabbit *Oryctolagus cuniculus* and Domestic mouse *Mus musculus*) and supplemented with birds, reptiles and in the case of Spotted Harrier, invertebrates such as Locusts (Debus et

al. 2007, NSW SC 2010). Foraging habitat within the study area for threatened raptors such as Little Eagle and Spotted Harrier, is considered to be of negligible quality due to the lack of harbor for prey species, limited prey species foraging potential and setting within a highly trafficked industrial area. The proposal will not impact upon habitat likely to support these species.

The study area does not provide habitat for any further threatened fauna species.

4 Impact assessment

The proposed works involve the following impacts to remaining ecological features within the study area:

- Removal/modification of up to 0.04 hectares of urban native and exotic vegetation (all 14 Magenta Lilly Pilly are to be retained).
- Removal/modification of up to 0.03 hectares of exotic grassland.

The study area contains limited features of ecological value, restricted to the presence of Magenta Lilly Pilly which forms low quality foraging habitat for Grey-headed Flying-fox. In addition, the factory structure may provide potential breeding and roosting habitat for Eastern False Pipistrelle and Greater Broad-nosed Bat. Under the current design, the Magenta Lilly Pilly individuals are to be retained and the factory structure wall and roof cavities will not be removed or disturbed. Therefore, impacts to Grey-headed Flying-fox foraging habitat and Eastern False Pipistrelle and Greater Broad-nosed Bat will be avoided.

Given the small area of urban native and exotic vegetation and exotic grassland to be removed within the study area, retention of all Magenta Lilly Pilly and no impacts to the integrity of the wall and roof cavities of the existing factory structure, no threatened biota is considered likely to be impacted by the proposed works. Information derived from this assessment to support the BDAR waiver request, as defined in Tables 1 and 2 of the document *How to apply for a biodiversity development assessment report waiver for a major project application* (DPIE 2019) is located in Appendix 5.

5 Conclusion and recommendations

The following recommendations have been made regarding the proposal to minimise indirect impacts to biodiversity values:

- Any trees to be retained should be protected in accordance with Australian Standard AS4970 – 2009 Protection of trees on development sites.
- In the unlikely event that unexpected threatened species are identified during the project, works should cease and an ecologist should be contacted for advice.
- Appropriate erosion and sediment control measures should be installed to avoid impacts to nearby waterways via stormwater collection systems.
- Minimise disturbance to any vegetation to be retained.

It is concluded that if the proposed development is to proceed as planned there will be no significant impacts to biodiversity values and a BDAR waiver should be sought in accordance with s.7.9(2) of the BC Act. further detail is provided in Appendix 5.

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Appendices

Appendix 1 Figures

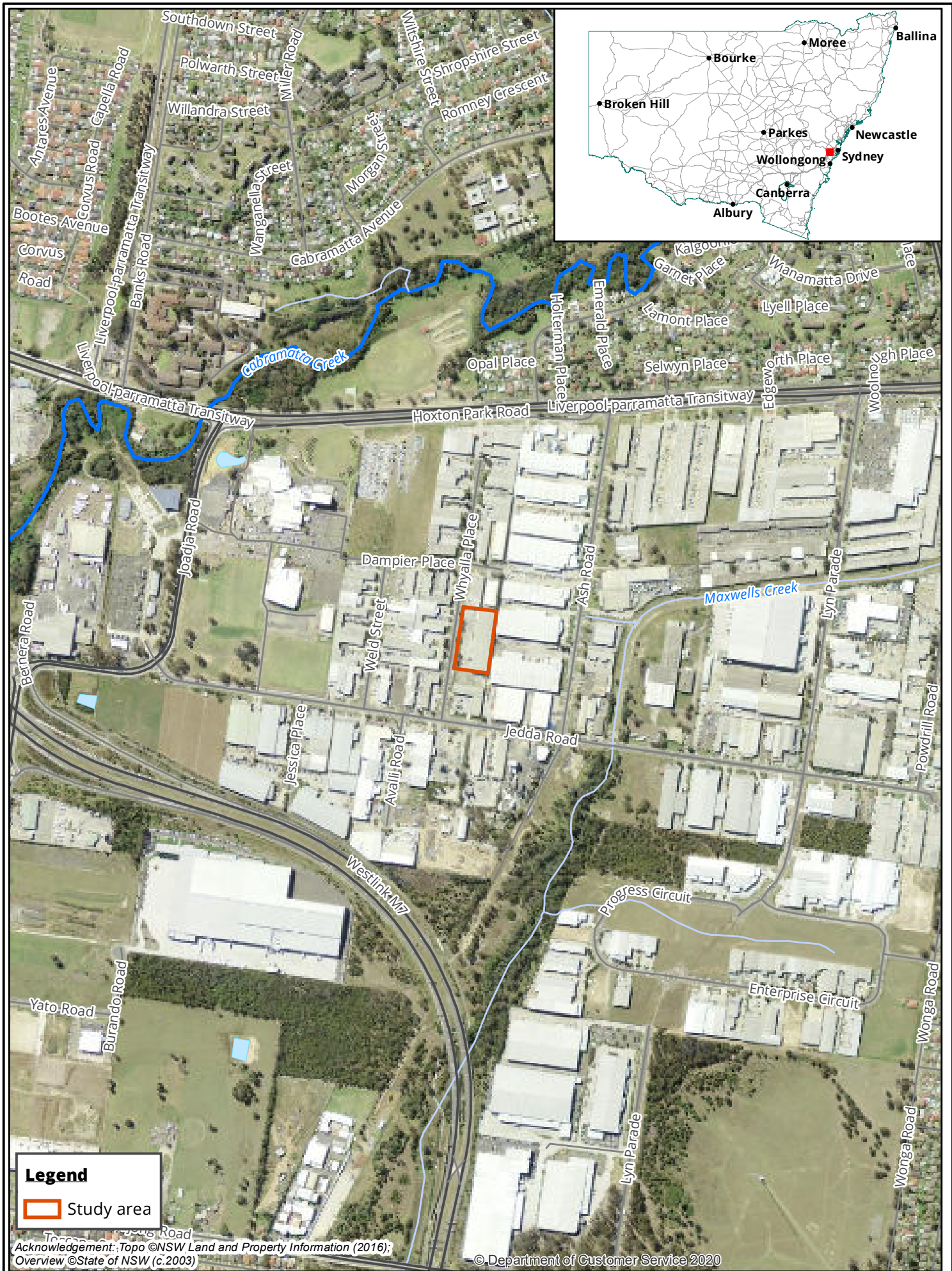
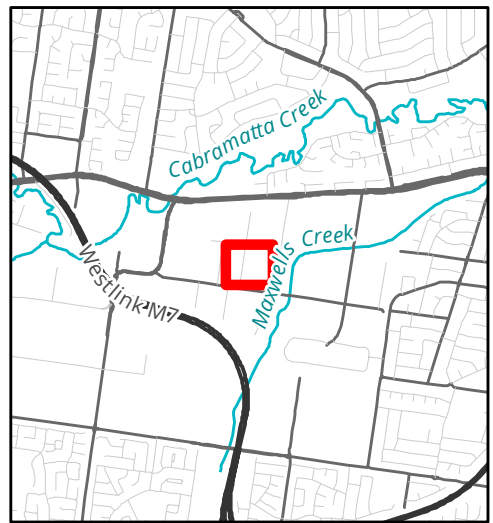


Figure 1 Location of the study area



Legend



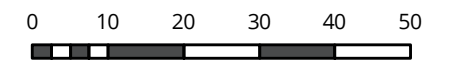
-  Study area
-  Impact area

Figure 2 Study area and Impact area

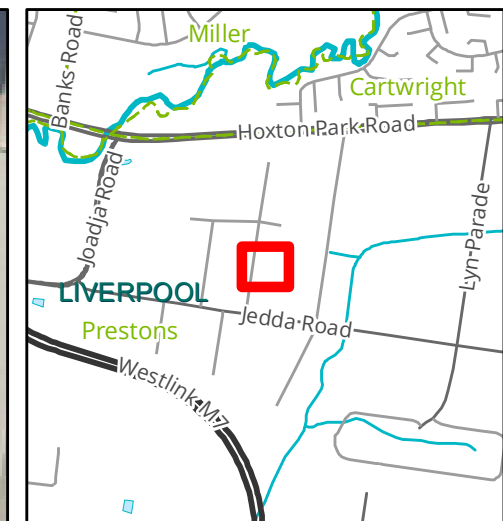


Scale: 1:1,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56



Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 31884
Date: 17 June 2020,
Checked by: NRT, Drawn by: SSK, Last edited by: skumar
Location: P:\31800s\31884\Mapping\
31884_F2_StudyImpactArea



Legend

- Study area
- Impact area

Plant Community Type

- Exotic grassland
- Urban Native/Exotic

Noxious weed

- Olea europaea subsp. cuspidata* - African Olive

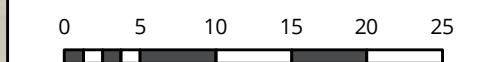
Native tree

- Callistemon citrinus* - Crimson Bottlebrush
- Corymbia maculata* - Spotted Gum
- Cupaniopsis anacardioides* - Tuckeroo
- Grevillea spp* - Grevillea 'Robyn Gordon'

Threatened flora

- Syzygium paniculatum* - Magenta Lilly Pilly

Figure 3 Ecological features of the study area



Metres
 Scale: 1:500 @ A3
 Coordinate System: GDA 1994 MGA Zone 56



Albury, Ballarat, Melbourne,
 Newcastle, Sydney, Wangaratta & Wollongong

Matter: 31884
 Date: 17 June 2020,
 Checked by: NRT, Drawn by: SSK, Last edited by: skumar
 Location: P:\31800s\31884\Mapping\31884_F3_Ecofeatures

Appendix 2 Photos



Photo 1 Urban Native and Exotic vegetation within the study area



Photo 2 Exotic grassland within the study area

Appendix 3 Flora

Flora species recorded from the study area

Table A. 1 Flora species recorded by Biosis, 10/06/2020

Status	Scientific name	Common name
Native species		
	<i>Callistemon citrinus</i>	Crimson Bottlebrush
	<i>Corymbia maculata</i>	Spotted Gum
	<i>Cupaniopsis anacardioides</i>	Tuckaroo
	<i>Grevillea 'Robyn Gordon'</i>	Grevillea 'Robyn Gordon'
	<i>Hardenbergia violacea</i>	False Sarsaparilla
	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly (Planted)
Exotic species		
	<i>Bidens pilosa</i>	Cobbler's Pegs
	<i>Dietes grandiflora</i>	Giant Wild Iris
	<i>Hypochaeris radicata</i>	Catsear
	<i>Metrosideros excelsa</i>	New Zealand Christmas Bush
	<i>Modiola caroliniana</i>	Red-flowered Mallow
**	<i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive
	<i>Sonchus oleraceus</i>	Common Sowthistle
	<i>Stenotaphrum secundatum</i>	Buffalo Grass
	<i>Trifolium repens</i>	White Clover
	<i>Yucca aloifolia</i>	Spanish Bayonet

** = priority weed listed under the NSW *Biosecurity Act 2015* for the Greater Sydney LLS region.

Appendix 4 Fauna

Fauna species recorded adjacent to the study area

Table A. 2 Fauna species recorded adjacent to the study area by Biosis, 10/06/2020

Status	Scientific name	Common name
Birds		
O/W	<i>Grallina cyanoleuca</i>	Magpie-Lark
O/W	<i>Manorina melanocephala</i>	Noisy Miner
O/W	<i>Vanellus miles</i>	Masked Lapwing

O = observed, W = heard call, F = scratchings.

Appendix 5 BDAR waiver information

Table 3 Biodiversity development assessment report waiver request information requirements

Item	Information requirement	Response
Admin	Proponent name and contact details	<p>Company: Hi-Quality Waste Treatment Services Pty Ltd</p> <p>Contact name: Dan Blair</p> <p>Contact address: PO Box 42 Kemps Creek NSW 2178</p> <p>Contact email: dblair@hiquality.com.au Robinson@golder.com.au</p> <p>Contact phone: 0407 603 212</p>
Site details	Street address	9 Whyalla Place, Prestons NSW 2170
	Lot and DP	Lot 103 DP 866530
	Description of development site	The development site is occupied by a large factory structure and ancillary facilities consisting of a concrete carpark area, driveways, a large water tank and shipping containers stored on concreted laydown areas. The development site is walled on all boundaries and gated along the Whyalla Place entrance. Vegetation within the facility is confined to landscaped garden beds. Vegetation outside of the facility consists of mown grassland between the public footpath/walkway area and the walled site boundaries and landscaped garden beds adjacent to the driveway entrances.
	Location Map	Refer to Figure 1.
	Site Map	Refer to Figure 2.
Proposed development	Project description	<p>Hi Quality Waste Treatment Services Pty Ltd (Hi-Quality) proposes to utilise technologies for treating solid and liquid wastes to a level suitable for reuse, disposal to landfill or disposal to sewer.</p> <p>The Waste Treatment Facility would process up to 270,000 tonnes of solid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:</p> <ul style="list-style-type: none"> • Contaminated Soils. • Contaminated sludges. • Liquid Wastes. • New ancillary infrastructure would be constructed as part of the Project including: <ul style="list-style-type: none"> – Weighbridges and weighbridge office.

Item	Information requirement	Response
		<ul style="list-style-type: none"> - Warehouse extension. - New driveway. - Parking. - Wheel wash and truck wash down bay. <p>Hi-Quality would also site some corporate office functions at this location, utilising existing office space</p>
	Proposed site plan	Refer to Appendix 6.
Impacts on biodiversity	Explanation of whether a biodiversity value is or is not relevant to the proposed development. If relevant, describe nature and extent of impacts associated with the proposal.	Refer to Table 4 below.

Table 4 Impacts of the proposed development on biodiversity values

Biodiversity value	Meaning	Occurrence, potential direct, indirect or prescribed impacts
Vegetation abundance 1.4(b) BC Regulation	Occurrence and abundance of vegetation at the development site.	<p>Vegetation within and along the western frontage of the development site consists of 0.04 hectares of urban native and exotic vegetation within landscaped garden beds and 0.03 hectares of mown exotic grassland between the public footpath/walkway and the boundary walls of the existing factory facility.</p> <p>Urban native and exotic vegetation consists of propagated non-indigenous native ornamental mid-storey trees and one juvenile canopy tree over an understorey of exotic herbaceous annuals all planted within a deeply mulched bed. This vegetation community contains 14 planted Magenta Lilly Pilly propagated from a nursery and of unknown genetic origin.</p> <p>Exotic grassland consists entirely of exotic perennial grass and herbaceous annuals. No native species were identified within this vegetation community.</p> <p>The current design requires the removal of up to 0.04 hectares of urban native and exotic vegetation and up to 0.03 hectares of exotic grassland. No vegetation conforming to any NSW PCTs is present within the study area.</p> <p>Refer to Figure 3.</p>
Vegetation integrity 1.5(2)(a) BC Act	Degree to which the composition, structure and function of	The original native vegetation communities within the development site and surrounding area have been completely cleared as a result of the construction of the Preston industrial area.

Biodiversity value	Meaning	Occurrence, potential direct, indirect or prescribed impacts
	<p>vegetation at a particular site and the surrounding landscape has been altered from a near-natural state.</p>	<p>Vegetation currently covering the development site and surrounding area consists entirely of non-indigenous planted natives, planted exotic ornamentals, exotic turf and opportunistic weeds (exotic perennial grasses and herbaceous annuals).</p> <p>The structural integrity of extant vegetation within the development site and surrounding area is considered to be low, consisting of one stratum for exotic grassland and two strata for urban native and exotic vegetation. Vegetation cover within the development site is extremely low, being 7.3 % of the total area of the site.</p> <p>The development site is subject to a high degree of historical and current disturbance, the only regeneration observed was limited to weeds within the ornamental garden beds, some of which had been treated via herbicide application.</p> <p>Vegetation function is considered to be low, as garden beds containing vegetation occupying more than one stratum are small in size, widely separated and are underlain with deep mulch. Extant vegetation performs limited functions, mainly in the form of minor uptake of rainfall, carbon sequestration and oxygen production in addition to low production of foraging resources for frugivorous fauna.</p>
<p>Habitat suitability 1.5(2)(b) BC Act</p>	<p>Degree to which the habitat needs of threatened species are present at the development site.</p>	<p>There is no naturally occurring habitat for Magenta Lilly Pilly in the development site or surrounding area. Current habitat for this species is derived from a mulched garden bed over disturbed terrain consisting of imported soil and fill.</p> <p>The following threatened microbat species were identified as having potential breeding and roosting habitat within the wall and roof cavities of the existing factory structure in the development site:</p> <ul style="list-style-type: none"> • Eastern False Pipistrelle • Greater Broad-nosed Bat. <p>The wall and roof cavities of the factory structure will not be removed or disturbed, avoiding all impacts to threatened microbat breeding and roosting habitat.</p> <p>The development site contains low quality foraging habitat (in the form of fruit or harbor/foraging habitat for prey species) within urban native and exotic vegetation and exotic grassland for the following species:</p> <ul style="list-style-type: none"> • Eastern False Pipistrelle • Greater Broad-nosed Bat • Grey-headed Flying-fox • Little Eagle. • Spotted Harrier. <p>Impacts of the proposal to the highly limited habitat available to the above listed species is considered negligible with details provided above in the body of the report.</p> <p>The development site is a functioning factory set within an industrial area serviced by heavy, medium and light vehicular traffic. The proposal will not result in any significant changes to the functioning of the</p>

Biodiversity value	Meaning	Occurrence, potential direct, indirect or prescribed impacts
		<p>development site or the amount or type of vehicular traffic using the area. The proposal will not result in any significant changes to current light and noise levels within the development site or surrounding area. Based on the above, the proposal is considered highly unlikely to result in impacts either direct, indirect or prescribed to the above threatened flora and fauna species.</p> <p>The proposal will not impacts upon karst, caves, crevices, cliffs, other geological features of significance, or rocks.</p>
Threatened species abundance 1.4(a) BC Regulation	Occurrence and abundance of threatened biota or their habitat at the development site.	<p>All 14 Magenta Lilly Pilly identified within the landscaped garden bed located near the western boundary of the development site are to be retained; therefore, impacts will be avoided and abundance will not be diminished (Figure 3).</p> <p>As outlined above threatened microbat species were identified as having potential breeding and roosting habitat within the wall and roof cavities of the existing factory structure in the development site. However, the proposal will not result in the removal or disturbance to the wall and roof cavities of the factory structure; therefore, impacts will be avoided and species abundance will not be diminished.</p> <p>The development site contains low quality foraging habitat for a number of highly mobile threatened avifauna species, however potential impacts are considered negligible, as outlined above.</p> <p>The development site is a functioning factory set within an industrial area serviced by heavy, medium and light vehicular traffic. The proposal will not result in any significant changes to the functioning of the development site or the amount or type of vehicular traffic, noise or light pollution. Based on the above, the proposal is considered highly unlikely to result in impacts either direct, indirect or prescribed to the above threatened flora and fauna species.</p>
Habitat connectivity 1.4(c) BC Regulation	Degree to which the development site connects different areas of habitat of threatened species to facilitate the movement of those species across their range.	<p>Vegetation within the development site and immediate surrounds consists of discrete patches containing landscaped gardens and mown lawn connected to pockets of vegetation lining the roadside interface of Whyalla Place and subject to high levels of vehicular traffic. Vegetation within the roadside corridor does not provide connectivity to any vegetation within the locality. Therefore it is highly unlikely that sedentary or less mobile threatened species utilise vegetation within the development site when moving through their range. Highly mobile threatened fauna species may potentially utilise the vegetation within the development site as temporary refuge or for foraging; however due to the small amount of available habitat combined with high disturbance resulting from industrial activities and traffic, it is considered highly unlikely that the vegetation would facilitate movement throughout the landscape.</p>
Threatened species movement 1.4(d) BC	Degree to which the development site contributes to the movement of	<p>The development site does not contribute to the movement of sedentary or less mobile threatened fauna species.</p> <p>Vegetation within the development site may potentially allow temporary</p>

Biodiversity value	Meaning	Occurrence, potential direct, indirect or prescribed impacts
Regulation	threatened species to maintain their lifecycle.	refuge to highly mobile, disturbance tolerant threatened avifauna and flying mammals such as Grey-headed Flying-fox; however, the patches are too small, exposed and widely separated to allow permanent refuge or regular use for passage of movement. Tree potentially visited by Grey-headed Flying-fox for foraging purposes (Magenta Lilly Pilly) will not be removed to facilitate the project and therefore, impacts to this species are avoided.
Flight path integrity 1.4(e) BC Regulation	Degree to which the flight paths of protected animals over the development site are free from interference.	The airspace above the development site may potentially allow for movement of Grey-headed Flying-fox, Eastern False Pipistrelle, Greater Broad-nosed Bat, Little Eagle and Spotted Harrier throughout the landscape. The development site is currently occupied by a two story factory facility and associated ancillary structures. The proposal will not result in any increase in height of the facility. Based on this, the flight paths for threatened biota which may utilise the airspace above the development site will not be affected by the proposal.
Water sustainability 1.4(f) BC Regulation	Degree to which the water quality, water bodies and hydrological processes sustain threatened biota at the development site.	No waterways, water bodies or water sources that have the potential to sustain threatened species are present within the development site or immediate surrounds. Mitigation measures recommended in this report, if followed, will ensure stormwater runoff from the development site entering the stormwater system will not impact receiving waterways via sedimentation.

Appendix 6 Proposed site plan



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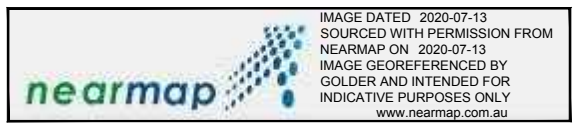
LEGEND			
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	TELSTRA PIT		WATER HYDRANT
	ELECTRIC LIGHT POLE		DRAIN
	POWER POLE		TAP
	SIGN POST		ELECTRICAL BOX
	MANHOLE		CONC. WALL
	SITE BOUNDARY		SERVICE - WATER
	S.W.D		SERVICE - COMS
	SERVICE - SEWER		SERVICE - ELECTRICITY

NOTE(S)

1. LOCATION OF TELECOMMUNICATIONS LINE TAKEN FROM DIAL BEFORE YOU DIG.
2. LOCATION OF SEWER LINE TAKEN FROM DIAL BEFORE YOU DIG.

REFERENCE(S)

BASE SURVEY TAKEN FROM TSS TOTAL SURVEYING SOLUTIONS DRG NO. 20100_A DWG, DATED 2020-06-18.
 EXIT DOORS TAKEN FROM GIROTTO PRECAST PTY LTD DRG NO. GS-A001.DWG, DATED 2011-05-11.
 EXISTING STORMWATER DRAINS TAKEN FROM CENTRUM ARCHITECTS DRG NO. 90127-A01.DWG, DATED 1997-11.
 ELECTRICITY SUBSTATION TAKEN FROM G.R.BUSH & PARTNERS DRG NO. FS001-01.DWG, DATED 2013-10-08.



CLIENT
HI QUALITY GROUP

CONSULTANT	YYYY-MM-DD	2020-08-11
	DESIGNED	
	PREPARED	
	REVIEWED	
	APPROVED	

NOT FOR CONSTRUCTION
DRAFT

0 10 20
1:400 METRES

PROJECT
9 WHYALLA PLACE, PRESTONS

TITLE
**PRESTONS WASTE TREATMENT FACILITY
EXISTING LAYOUT**

PROJECT NO.	CONTROL	REV.	FIGURE
20142192	005	A	F003

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3



Mr Todd Robinson
Golder Associates
Level 5, 450 Hunter Street
PO Box 676
NEWCASTLE NSW 2300

Our ref: SSD 9346594

11 November 2020

Dear Mr Robinson

Request to waive requirement to prepare a Biodiversity Development Assessment Report

I refer to your correspondence received on 3 September 2020 seeking to waive the requirement to prepare a biodiversity development assessment report (BDAR) to be submitted with the state significant development application for the Prestons Waste Treatment Facility.

Description of proposed development

The construction and operation of a Waste Treatment Facility with the capacity to accept, process and store up to 270,000 tonnes per annum of soil, sediment, sludges and liquid waste and packaged waste primarily generated from industrial processes and contaminated sites.

Under section 7.9(2) of the Biodiversity Conservation Act 2016 (BC Act):

“Any such application is to be accompanied by a biodiversity development assessment report unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on the biodiversity values”.

This letter is to confirm that the Secretary of the Department of Planning, Industry and Environment has determined that the proposed development as described above is not likely to have any significant impact on biodiversity values and that a BDAR is therefore not required to accompany any application for development consent for the proposed development.

Evidence that the Delegate of the Secretary within Environment, Energy and Science Division (A/Director Greater Sydney) has made the determination is also attached (dated 28 September 2020).

If there are any amendments to the proposed development, a fresh request for a BDAR waiver determination will be required or a BDAR may need to be prepared.

Should you have any further enquiries, please contact Emma Barnet, Planning and Assessment, at the Department on (02) 9274 6412.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'C. Ritchie'.

Chris Ritchie

Director

Industry Assessment Planning and Assessment Division

As delegate of the Secretary

Determination under section 7.9(2) of the Biodiversity Conservation Act 2016

I, Chris Ritchie, Director Industry Assessments, Planning and Assessment, of the Department of Planning, Industry and Environment, under section 7.9(2) of the *Biodiversity Conservation Act 2016*, determine that the proposed development is not likely to have any significant impact on biodiversity values and therefore a Biodiversity Development Assessment Report is not required

Proposed development means the construction and operation of a Waste Treatment Facility with the capacity to accept, process and store up to 270,000 tonnes of soil, sediment, sludges and liquid waste and packaged waste as detailed in the BDAR waiver application dated 3 September 2020. If the proposed development changes so that it is no longer consistent with this description, a further waiver request is required.

If you do not lodge the development application related to this determination for the proposed development within 2 years of the issue date of this determination, you must either prepare a BDAR or lodge a new request to have the BDAR requirement waived.



11/11/2020

**Director
Industry Assessments
Planning and Assessment
Department of Planning, Industry and Environment**
(as delegate of the Secretary)

Date

Determination under clause 7.9(2) of the Biodiversity Conservation Act 2016

I, Daylan Cameron, Acting/Director Greater Sydney, of the Department of Planning, Industry and Environment, under clause 7.9(2) of the *Biodiversity Conservation Act 2016*, determine that the proposed development is not likely to have any significant impact on biodiversity values and therefore a Biodiversity Development Assessment Report is not required.

Proposed development means the development as described in DOC20/785654 and Schedule 1. If the proposed development changes so that it is no longer consistent with this description, a further waiver request is required.



28/09/2020

Daylan Cameron
A/Director
Greater Sydney
Environment, Energy & Science Group

Date

SCHEDULE 1 – Description of the proposed development

The construction and operation of a Waste Treatment Facility with the capacity to accept, process and store up to 270,000 tonnes of soil, sediment, sludges and liquid waste and packaged waste.

Hi Quality Waste Treatment Services Pty Ltd (Hi-Quality) proposes to utilise technologies for treating solid and liquid wastes to a level suitable for reuse, disposal to landfill or disposal to sewer. The Waste Treatment Facility would process up to 270,000 tonnes of solid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated Soils.
- Contaminated sludges.
- Liquid Wastes.
- New ancillary infrastructure would be constructed as part of the
- Project including:
- Weighbridges and weighbridge office.
- Warehouse extension.
- New driveway.
- Parking.
- Wheel wash and truck wash down bay.
- Hi-Quality would also site some corporate office functions at this location, utilising existing office space

APPENDIX M

**Material and Correspondence
Heritage Assessment Exemption**



9 Whyalla Place, Prestons: Aboriginal Cultural Heritage Due Diligence Assessment

FINAL REPORT

Prepared for Golder Associates Pty Ltd

16 October 2020

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File name: 32092.9Whyalla.Place.Prestons.ADDA.FIN02.20201016

Citation: Biosis (2020). 9 Whyalla Place, Prestons Aboriginal Due Diligence Assessment. Report for Golder Associates Pty Ltd. Keats, S. & Tetlaw, M. Biosis Pty Ltd. Wollongong, NSW. Project no. 32092

Document control

Version	Internal reviewer	Date issued
Draft version 01	Elizabeth Wyatt	23/07/2020
Final version 01	Samantha Keats	08/09/2020
Final version 02	Samantha Keats	16/10/2020

Acknowledgements

Biosis gratefully acknowledges the contributions of the following people and organisations (listed alphabetically) in preparing this report:

- Jacinta McMahon and Todd Robinson, Golder Associates Pty Ltd.

Biosis staff involved in this project were:

- Anne Murray for mapping.
- Mathew Smith for field investigation.

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Glossary

ACHA	Aboriginal Cultural Heritage Assessment
ADDA	Aboriginal Due Diligence Assessment
AHIMS	Aboriginal Heritage Information Management System
Due diligence code	<i>Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales</i>
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
GSV	Ground Surface Visibility
ICOMOS	International Council on Monuments and Sites
LEP	Local Environment Plan
LGA	Local Government Area
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
EES	NSW Environment, Energy and Science Group
Heritage NSW	Heritage NSW, Department of Premier and Cabinet (DPC) – formerly EES
PAD	Potential Archaeological Deposit
SEPP	State Environmental Planning Policy
Study area	9 Whyalla Place, Prestons (Lot 103 DP 866530)
SSI	State Significant Infrastructure
The Code	<i>Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i>

Summary

Biosis Pty Ltd has been commissioned by Golder Associates Pty Ltd to undertake an Aboriginal Cultural Heritage Due Diligence Assessment (ADDA) for the proposed Prestons Waste Treatment Facility at 9-13 Whyalla Place, Prestons New South Wales (NSW) (the study area).

Hi Quality Waste Treatment Services Pty Ltd (Hi-Quality) proposes to utilise technologies for treating solid and liquid wastes to a level suitable for reuse, disposal to landfill or disposal to sewer. The Waste Treatment Facility would process up to 270,000 tonnes of solid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated soils.
- Contaminated sludges.
- Liquid wastes.

New ancillary infrastructure would be constructed as part of the project including:

- Weighbridges and weighbridge office,
- Warehouse extension,
- New driveway,
- Parking,
- Wheel wash and truck wash down bay.

Hi-Quality would also site some corporate office functions at this location, utilising existing office space.

Background research was undertaken for the study area, including a search of the Aboriginal Heritage Information Management System (AHIMS) database and a review of relevant reports. The AHIMS search identified 96 Aboriginal archaeological sites within a 4 by 4 kilometre search area centred on the study area. None of these AHIMS sites are located within the study area.

A field investigation of the study area was conducted on 2 June 2020 by Mathew Smith, Project Archaeologist at Biosis. Overall, the effectiveness of the survey has been deemed to be low, due to the study area being predominantly covered by buildings, concrete drives and carparks. No previously unrecorded Aboriginal sites or objects were located during the field investigation, and it was concluded that the study area had low potential to contain Aboriginal sites.

The following management recommendations have been developed relevant to the study area and influenced by:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practise, widely considered to include:
 - Ethos of the Australia ICOMOS Burra Charter (2013).
 - The Code.

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential.

Recommendation 2: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by Heritage NSW, Department of Premier and Cabinet (Heritage NSW). Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying the Heritage NSW and Aboriginal stakeholders.

Recommendation 3: Discovery of Aboriginal Ancestral Remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

1 Introduction

1.1 Project background

Biosis Pty Ltd has been commissioned by Golder Associates Pty Ltd (client) to undertake an ADDA for the proposed Prestons Waste Treatment Facility at 9-13 Whyalla Place, Prestons, NSW (the project).

Hi Quality Waste Treatment Services Pty Ltd (Hi-Quality) proposes to utilise technologies for treating solid and liquid wastes to a level suitable for reuse, disposal to landfill or disposal to sewer. The Waste Treatment Facility would process up to 270,000 tonnes of solid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated soils.
- Contaminated sludges.
- Liquid wastes.

New ancillary infrastructure would be constructed as part of the project including:

- Weighbridges and weighbridge office,
- Warehouse extension,
- New driveway,
- Parking,
- Wheel wash and truck wash down bay.

Hi-Quality would also site some corporate office functions at this location, utilising existing office space. The project will be assessed as State Significant Development (SSD) by the NSW Department of Planning, Industry, and Environment (DPIE) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

has been undertaken for the study area in order to inform responsibilities with regards to Aboriginal cultural heritage in the area. In addition to the basic tasks required for a due diligence assessment, an extended background review, as well as an archaeological survey in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b) (the Code) was conducted, in order adequately map areas of high, moderate and low archaeological sensitivity.

1.2 Location of the study area

The study area is located within the Liverpool Local Government Area (LGA), Parish of St Luke, County of Cumberland (refer to Figure 1). The study area incorporates Lot 103 DP 866530 and is bounded by Dampier Place to the north, Industrial buildings leading to Jedda Road to the south, Whyalla Place to the east and Industrial buildings leading to Ash Road to the west (refer to Figure 2).

1.3 Planning approvals

The proposed development will be assessed under Part 4 of the EP&A Act as SSD. Other relevant legislation and planning instruments that will inform the assessment include:

- NPW Act.

- *National Parks and Wildlife Amendment Act 2010* (NSW).
- *Liverpool Local Environmental Plan 2008* (LEP).

1.4 Scope of the assessment

The following is a summary of the major objectives of the assessment:

- Conduct background research in order to recognise any identifiable trends in site distribution and location, including a search of AHIMS.
- Undertake archaeological survey as per requirement 5 of the Code, with particular focus on landforms with high potential for heritage places within the study area, as identified through background research.
- Record and assess sites identified during the survey in compliance with the guidelines endorsed by Heritage NSW.
- Determine levels of archaeological and cultural significance of the study area.
- Make recommendations to mitigate and manage any cultural heritage values identified within the study area.

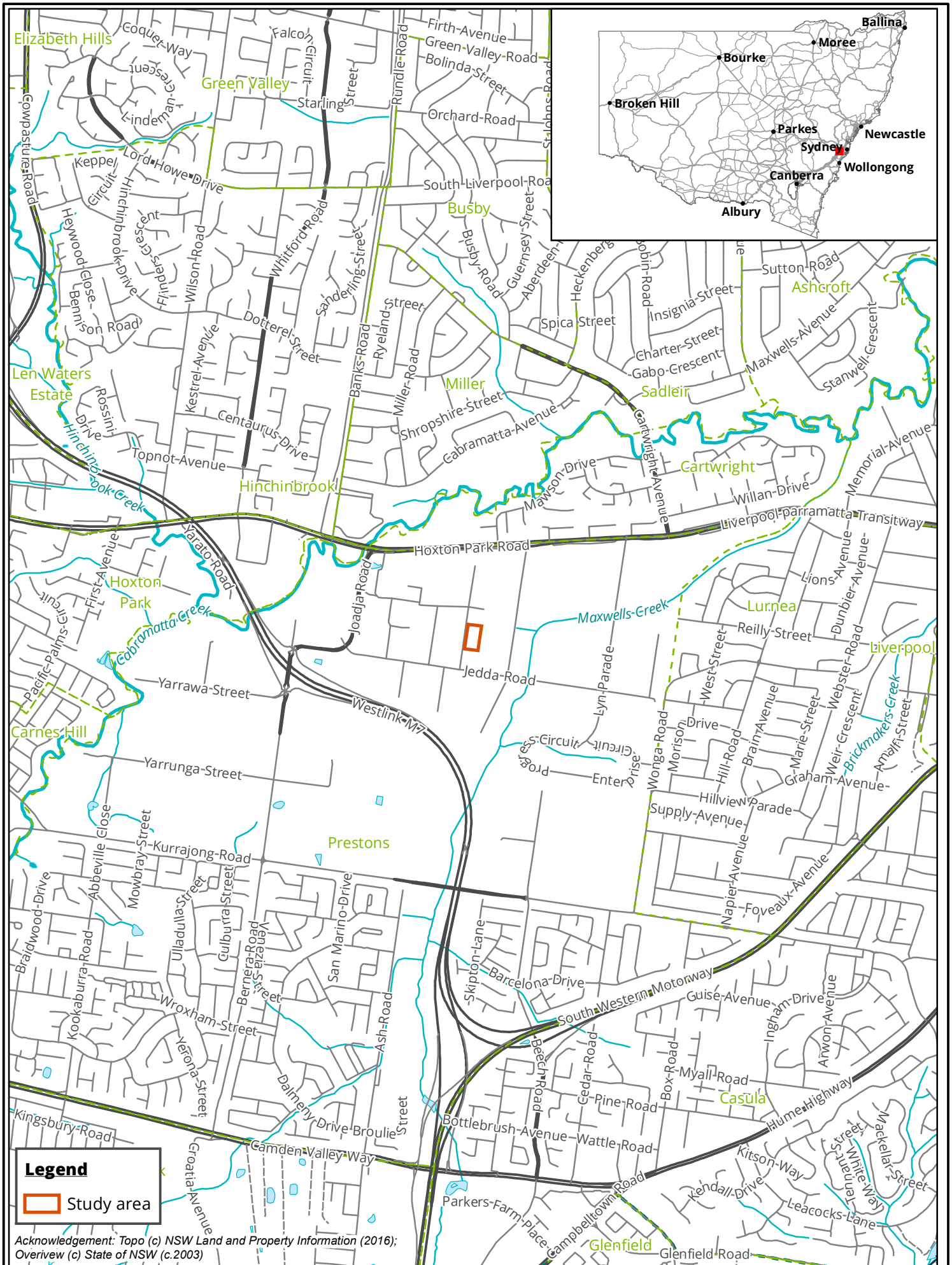


Figure 1 Location of the study area



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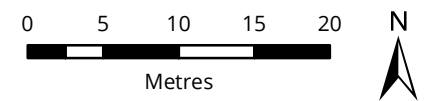
-  Study area
-  Lot

Figure 2 Study area detail

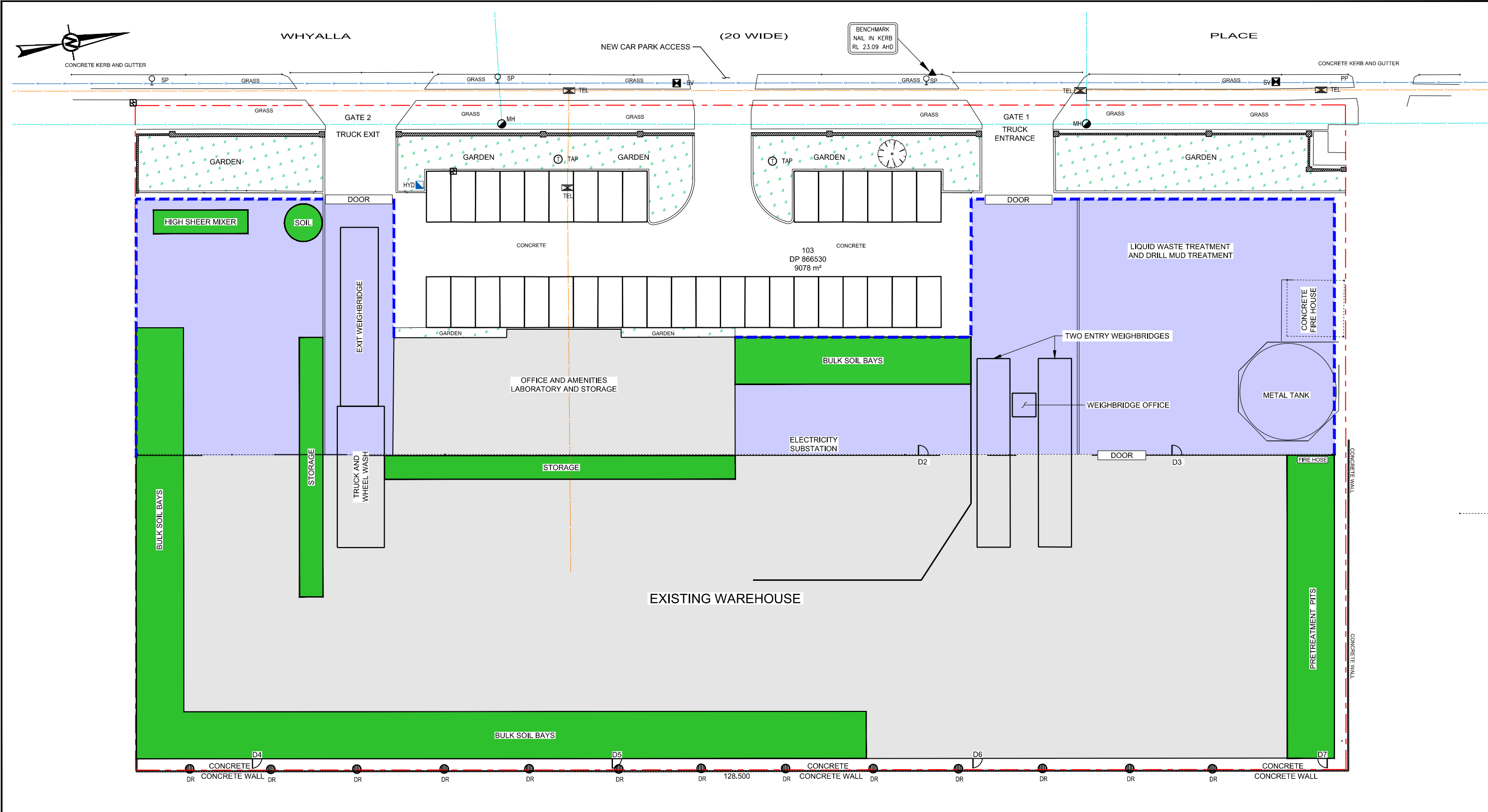


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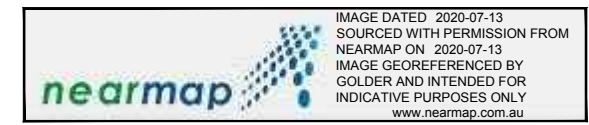
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	TELSTRA PIT		WATER HYDRANT
	ELECTRIC LIGHT POLE		DRAIN
	POWER POLE		TAP
	STOP VALVE		ELECTRICAL BOX
	MANHOLE		KEY INTERNAL INFRASTRUCTURE
	GARDEN		WAREHOUSE - EXISTING
	CONC. WALL		WAREHOUSE - EXTENSION
	SITE BOUNDARY		SERVICE - WATER
	S.W.D		SERVICE - COMS
	SERVICE - SEWER		SERVICE - ELECTRICITY

NOTE(S)

- LOCATION OF TELECOMMUNICATIONS LINE TAKEN FROM DIAL BEFORE YOU DIG .
- LOCATION OF SEWER LINE TAKEN FROM DIAL BEFORE YOU DIG.

REFERENCE(S)

BASE SURVEY TAKEN FROM TSS TOTAL SURVEYING SOLUTIONS DRG NO. 20100_A DWG, DATED 2020-06-18.
 EXIT DOORS TAKEN FROM GIROTTO PRECAST PTY LTD DRG NO. GS-A001.DWG, DATED 2011-05-11.
 EXISTING STORMWATER DRAINS TAKEN FROM CENTRUM ARCHITECTS DRG NO. 90127-A01.DWG, DATED 1997-11.
 ELECTRICITY SUBSTATION TAKEN FROM G.R.BUSH & PARTNERS DRG NO. FS001-01.DWG, DATED 2013-10-08.



CLIENT
HI QUALITY GROUP

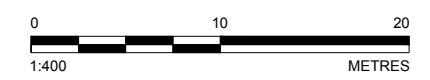
CONSULTANT	YYYY-MM-DD	2020-07-31
	DESIGNED	JM
	PREPARED	JF
	REVIEWED	JM
	APPROVED	JM

PROJECT
9 WHYALLA PLACE, PRESTONS

TITLE
**PRESTONS WASTE TREATMENT FACILITY
CONCEPTUAL LAYOUT**

PROJECT NO.	CONTROL	REV.	FIGURE
20142192	005	0	F004

NOT FOR CONSTRUCTION
DRAFT



25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3

2 Desktop assessment

A brief desktop assessment has been undertaken to review existing archaeological studies for the study area and surrounding region. This information has been synthesised to develop some Aboriginal site predictive statements for the study area and identify known Aboriginal sites and/or places recorded in the study area. This desktop assessment has been prepared in accordance with requirements 1 to 4 of the Code.

2.1 Landscape context

It is important to consider the local environment of the study area in any heritage assessment. The local environmental characteristics can influence human occupation and associated land use and consequently the distribution and character of cultural material. Environmental characteristics and geomorphological processes can affect the preservation of cultural heritage materials to varying degrees or even destroy them completely. Lastly landscape features can contribute to the cultural significance that places can have for people.

Topographically, the study area comprises a relatively flat landform which slopes very slightly in a north-easterly direction towards Maxwell's Creek approximately 300 metres away. The gentle inclination combined with the low relief of the area would put the study area in a system of gently undulating rises to undulating low hills (Speight 2009, pp. 47). The study area has been modified to suit the current land zoning. Land use in the vicinity of the study area is dominated by heavy industry.

2.2 Geology, soils and landforms

The geology within the study area comprises of alluvial valley deposits of silt, clay, (fluvially deposited) lithic to quartz-lithic sand and gravel. Topographically the study area is comprised of a flat landform, slightly sloping down towards Maxwells Creek (Figure 4). The gentle inclination combined with the low relief of the area would put the study area in a system of gently undulating rises to undulating low hills (Speight 2009, p.47). The study area has been modified to suit the current land zoning. Land use in the vicinity of the study area is dominated by heavy industry.

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. They are defined by a combination of soils, topography, vegetation and weathering conditions. Soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure. The study area is situated on alluvial valley flats consisting of consisting of silt, clay, deposited alluvial lithic to quartz-lithic sand and gravel. The study area is located in the Disturbed terrain soil landscape (Figure 5).

The disturbed terrain soil landscape is characterised by level plains to hummocky terrain disturbed by human activity, including complete disturbance, removal or burial of soil. Landfill is often present, comprising rock, soil, building and other waste materials. The local relief is around 10 metres, with slopes comprising 20 percent (Bannerman & Hazelton 1990, pp. 149). The disturbed terrain follows the meander of Maxwells Creek in the east. The soil characteristics of this landscape are described in Table 1 below.

Table 1 Disturbed Terrain soil landscape characteristics (Bannerman & Hazelton 1990, pp. 150–151)

Soil material	Description
xx1- Loose, black sandy loam	This is black loamy sand to loam-fine-sandy with loose apedal single grained structure and sandy fabric. It is used for topsoiling turf and often corresponds to the lowland Nepean River alluvium or Elderslie soil series of Walker (1960). Local sands have also been used for topdressing. This material occurs as topsoil (A1 horizon). The material is brittle when dry and crumbly when moist. The colour ranges from a dark brown to black (10YR 3/3-10YR 2/1) or brown (10YR 4/6). It is often water repellent and a surface crust may be present. The pH ranges from moderately acid (pH 5.0) to neutral (pH 7.5). Roots are common to abundant when turfed and ironstone nodules are occasionally present.
xx2— Compacted, mottled clay	This is a mottled, compacted sandy clay loam to medium clay with an apedal massive to moderately pedal structure. It generally has been compacted to form an impermeable isolating cap over potentially hazardous buried materials. Peds when present are often platy and smooth-faced. Colour is highly variable and mottles are common. The pH is also variable, ranging from extremely acid (pH 3.5) to slightly alkaline (pH 8.0). Platy or concretionary ironstones are occasionally present and roots are absent.
xx3— Variable transported fill	This material is commonly referred to as fill and may consist of any type of soil or regolith material. It often includes demolition rubble and industrial and household wastes. Colour, texture, structure, fabric, degree of compaction, porosity and pH vary markedly.
xx4- Dark dredged muds and sands	This material consists of dark dredged sands, sandy loams to silty clay loams and sandy clays with apedal single-grained to massive structure and sandy fabric. This material occurs as subsoil. Colour varies from black (10YR 2/1) to a yellowish-brown (2.5Y 5/2). Charcoal, shells or shell fragments are commonly present. This material swells, is highly saline and neutral (pH 7.0) to moderately alkaline (pH 9.0) when first dredged, but with drainage and oxidation the salinity levels drop and acidity may increase dramatically.

Stream order is recognised as a factor which helps the development of predictive modelling in Aboriginal archaeology in the Cumberland Plain. Predictive models which have been developed for the region have a tendency to favour permanent water courses as the locations of complex sites that have been continuously occupied, as they would have been more likely to provide a stable source of water and by extension other resources which would have been used by Aboriginal groups (Jo McDonald Cultural Heritage Management 2000, pp. 19).

The stream order system used for this assessment was originally developed by Strahler (1952). It functions by adding two streams of equal order at their confluence to form a higher order stream, as shown in Photo 1. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

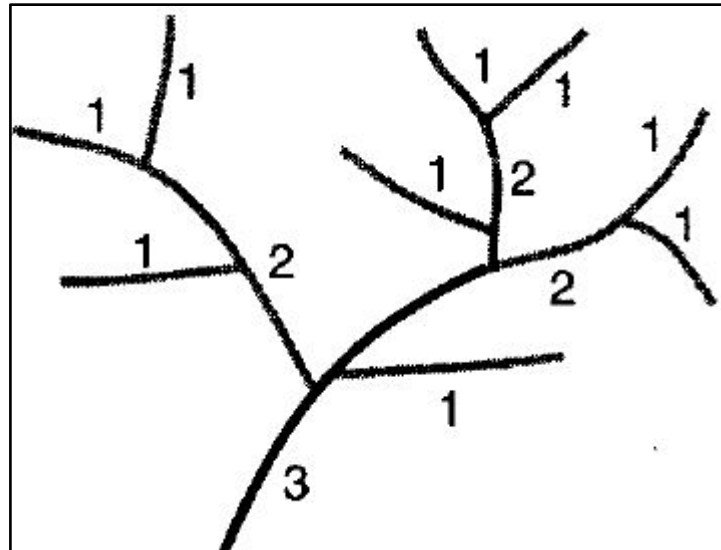
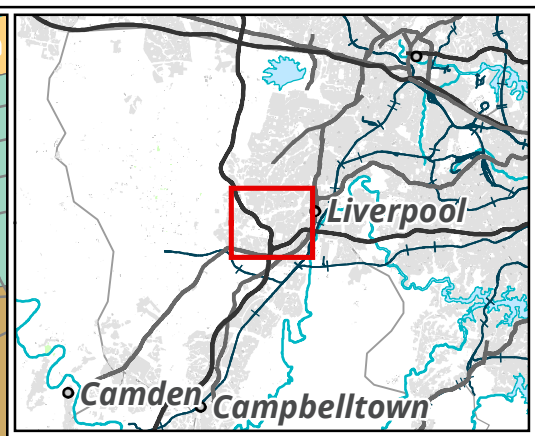
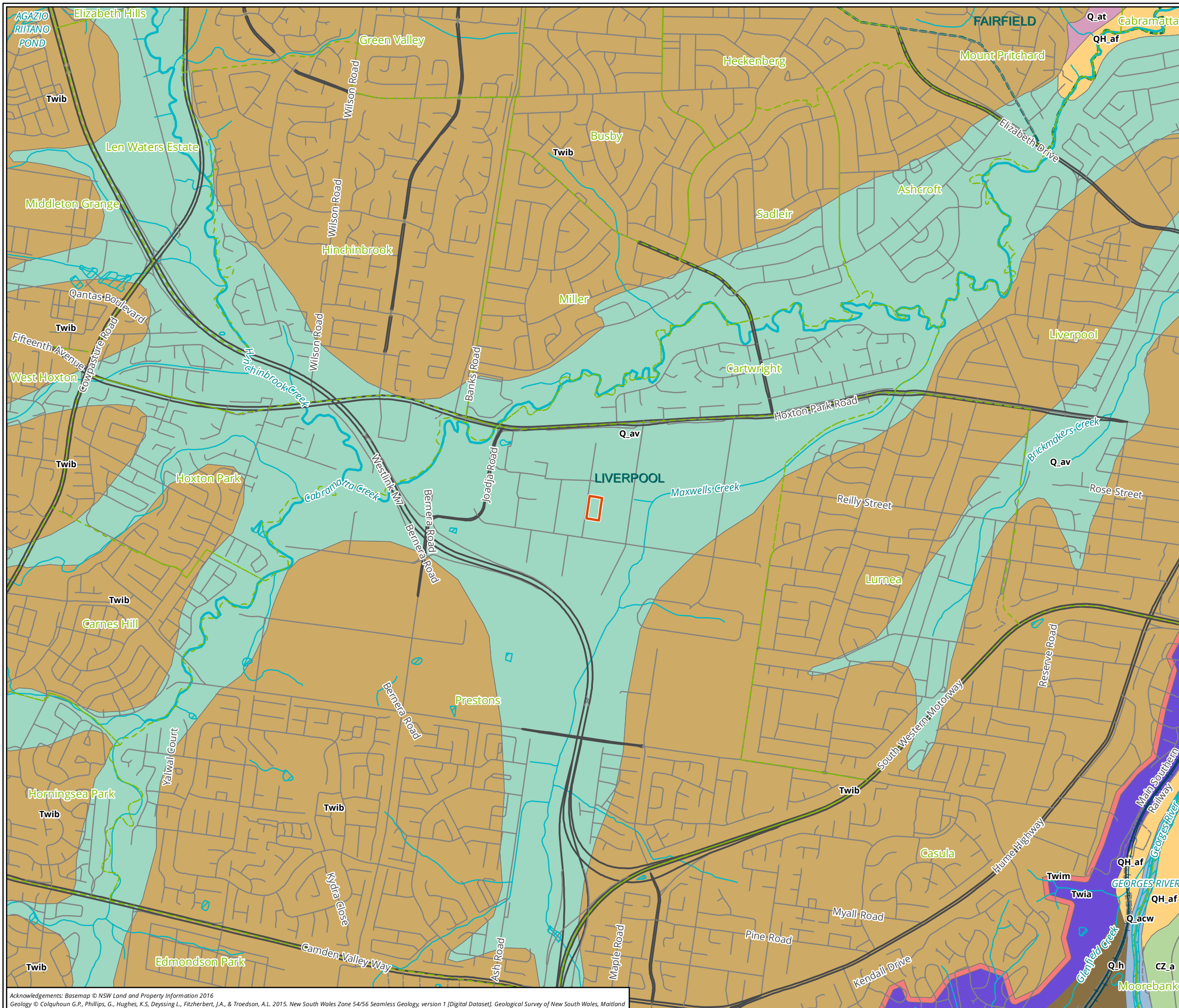


Photo 1 Diagram showing Strahler stream order (Ritter, Kochel, & Miller 1995, pp. 151)

The study area is bracketed by Maxwell's Creek 300 metres to the east and Cabramatta Creek approximately 700 metres to the north (Figure 6). Maxwell's Creek is a non-perennial water source of undefined Strahler hierarchy. It is likely this water source would be used by Aboriginal people only when resources were available. Cabramatta Creek however, is a large perennial creek of undefined Strahler order. It is likely this creek would have provided more abundant and frequent resources for Aboriginal people. As such, the study area may have been utilised by Aboriginal people because it is situated between these two resource zones.



- Legend**
- Study area
 - Geological Units**
 - CZ_a - Alluvium
 - Q_acw - Alluvial channel deposits-
 - Q_at - Alluvial terrace deposits
 - Q_av - Alluvial valley deposits
 - Q_h - Anthropogenic deposits
 - QH_af - Alluvial floodplain deposits
 - Twia - Ashfield Shale
 - Twib - Bringelly Shale
 - Twim - Minchinbury Sandstone

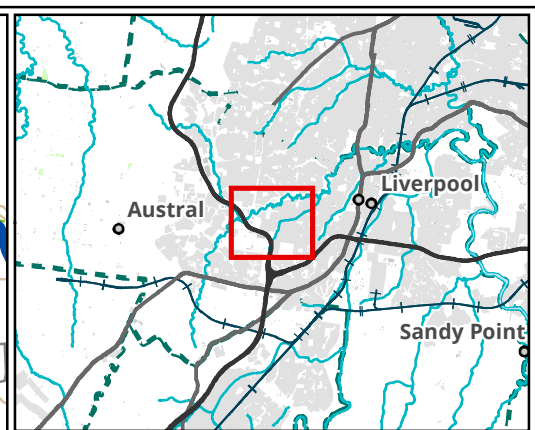
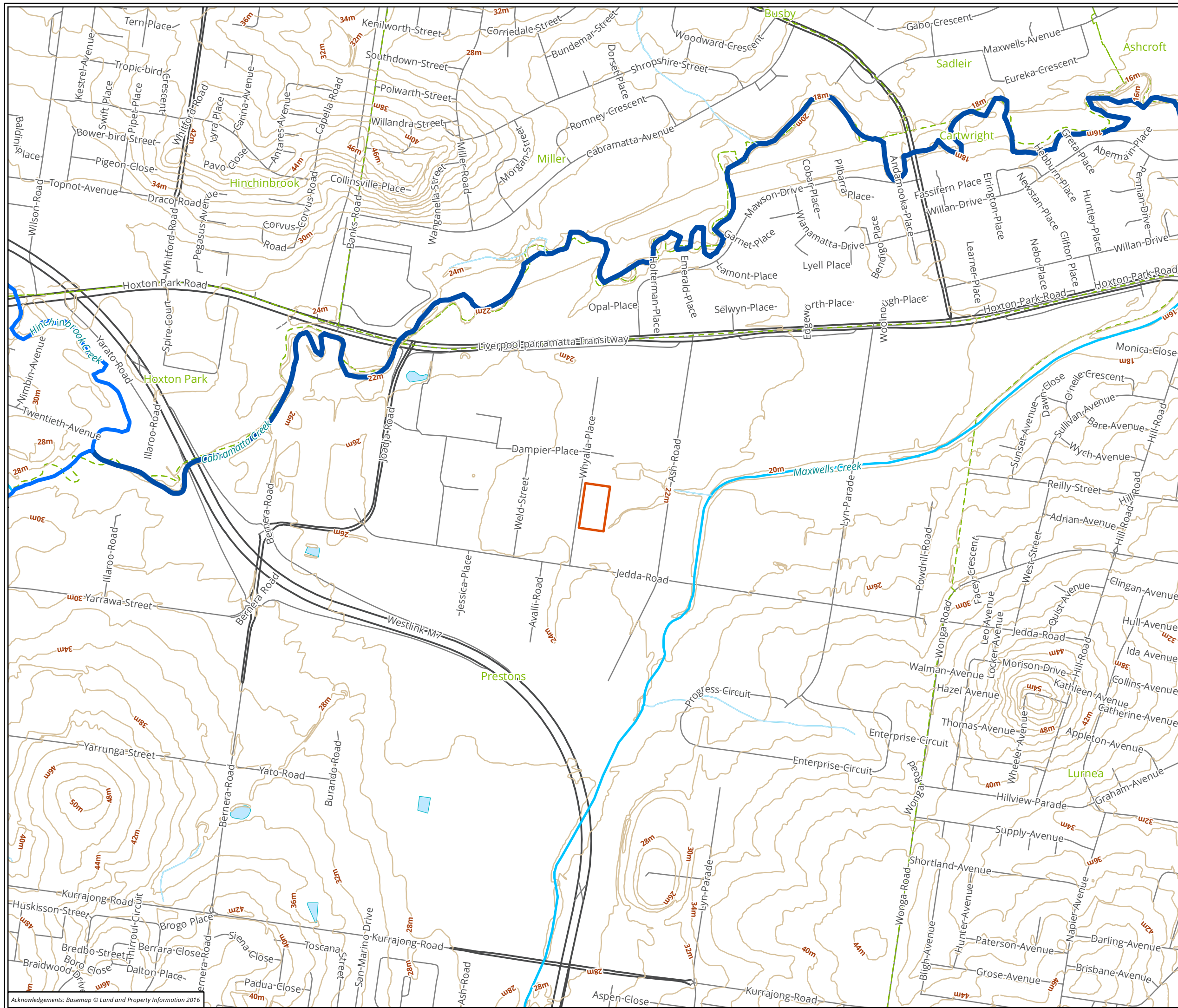
Figure 3 Geological units within the vicinity of the study area

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Metres

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Coordinate System: GDA 1994 MGA Zone 56

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Date: 21 May 2020,
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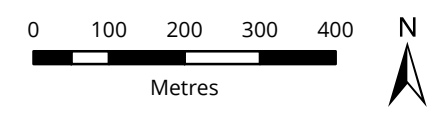
Acknowledgements: Basemap © NSW Land and Property Information 2016
Geology © Colquhoun G.P., Phillips, G., Hughes, K.S, Deyssing L., Fitzherbert, J.A., & Troedson, A.L. 2015. New South Wales Zone 54/56 Seamless Geology, version 1 [Digital Dataset]. Geological Survey of New South Wales, Maitland



Legend

- Study area
- Contour (2m)
- Strahler Order**
- 1
- 3
- 4
- 5

Figure 5 Hydrology and topography in the vicinity of the study area

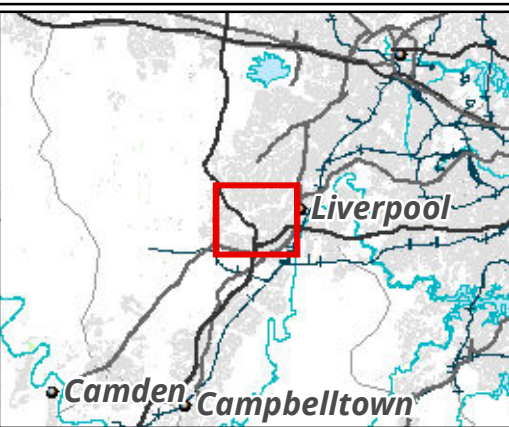
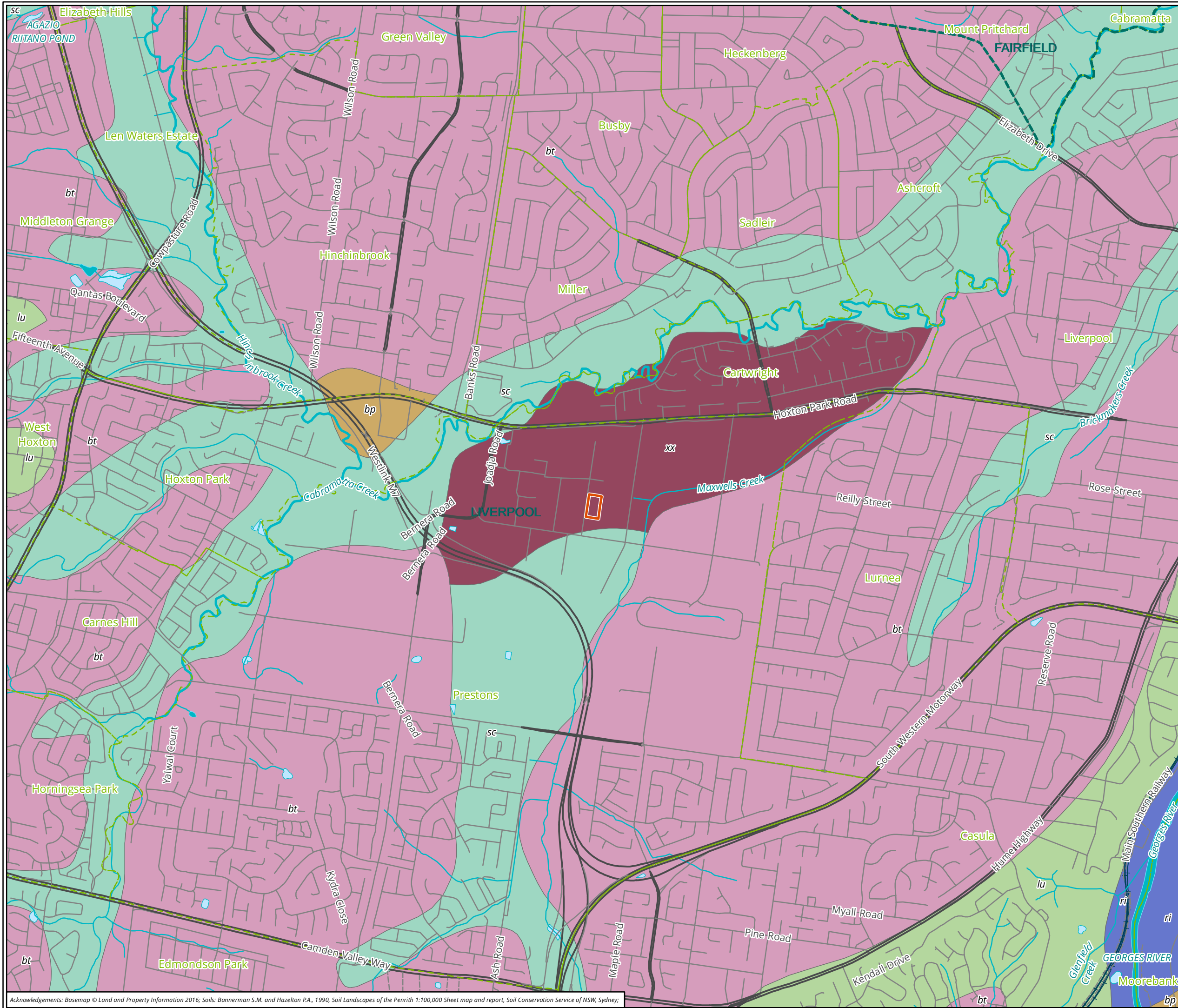


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Acknowledgements: BaseMap © Land and Property Information 2016



Legend

- Study area

Soil Landscape units

- bp - BERKSHIRE PARK
- bt - BLACKTOWN
- lu - LUDDENHAM
- ri - RICHMOND
- sc - SOUTH CREEK
- xx - DISTURBED TERRAIN

Figure 6: Soil landscapes within the vicinity of the study area

0 160 320 480 640 800
Metres

Scale: 1:20,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56

Matter: 32092, Bannerman S.M. and Hazelton P.A., 1990, Soil Landscapes of the Penrith 1:100,000 Sheet map and report, Soil Conservation Service of NSW, Sydney;
Date: 21 May 2020.

Acknowledgements: Basemap © Land and Property Information 2016; Soils: Bannerman S.M. and Hazelton P.A., 1990, Soil Landscapes of the Penrith 1:100,000 Sheet map and report, Soil Conservation Service of NSW, Sydney;

2.3 Flora and fauna

Within the Cumberland subregion of the Sydney Basin Bioregion there are a variety of vegetation types present, with Grey Box *Eucalyptus microcarpa*, Forest Red Gum *E. tereticornis*, Narrow-leaved Ironbark woodland *E. crebra*, and Spotted Gum *Corymbia maculata* present on shale hills. Hard-leaved Scribbly Gum *E. sclerophylla*, Rough-barked Apple *Angophora floribunda*, and Old Man Banksia *Banksia serrata* are present on alluvial sands and gravels. Broad-leaved Apple, Cabbage Gum *E. amplifolia*, Forest Red Gum, and Swamp Oak *Quercus bicolor* are found on river flats. Tall Spike-rush *Eleocharis sphacelata*, and *Juncus* with Parramatta Red Gum *E. parramattensis* are noted around lagoons and swamps (NPWS 2003, pp. 193). The distribution of these plants is determined by soil combinations as well as the movement of seeds and plants between ecotones by Aboriginal people. In other areas of Australia, the repeated seasonal burning of vegetation allowed expedient plant growth.

Plant resources were used in a variety of ways. Fibres were twisted into string and used for many purposes, including the weaving of nets, baskets and fishing lines. String was also used for personal adornment. Bark was used in the provision of shelter; a large sheet of bark being propped against a stick to form a gunyah (Attenbrow 2002).

As well as being important food sources, animal products were also used for tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to have been used to make fastening cord, while 'bone points', which would have functioned as awls or piercers, are sometimes part of the archaeological record. Animals such as Brush-tailed Possums were highly prized for their fur, with possum skin cloaks worn fastened over one shoulder and under the other. Kangaroo teeth were incorporated into decorative items, such as head bands (Attenbrow 2002).

2.4 Land use history of the study area

The study area originally belonged to a 117 acres (47.3 hectares) grant to Reverend Robert Cartwright. Cartwright was born in England in 1771. In his early life he explored Eastern Europe, and eventually married Mary Boardman in 1796. His career as a clergyman was expanded in 1806 when he became an ordained deacon at Bradford. Four years later he was commissioned by Samuel Marsden to serve in New South Wales. He arrived in 1810 along with his wife and six children. On payment from Macquarie, Cartwright would primarily reside in Windsor and oversee chaplaincy facilities there until 1819 when he was transferred to Liverpool. He retained this position until 1836 when he became incumbent of St. James, Sydney. Robert Cartwright died in 1856 in Goulburn. It is likely that Cartwright was granted this land at some point during his career as thanks or payment for his services. Based on subsequent ownership of the land, it is unlikely any major disturbance to the land took place.

Sometime after Cartwright's death the land was subdivided into 5 equal plots, with the study area located in lot 4. Charles Ambrose purchased the portion in 1870 (NSW Land Registry Services n.d.). It was later transferred to James Lewis in 1871. The land and adjacent lots south of Cabramatta Creek and east of Joadja Road were sold to James Lewis, farmer in 1871. It is likely the land was used by Lewis for farming purposes during his ownership. It was transferred to Frederick Biden, draftsman in 1889 and Edward Stevenson in 1893. Biden reacquired the property in the same year (NSW Land Registry Services n.d.). In 1896 the property was subdivided into 5 lots and transferred to William Mitchell. With the Land transferred to the Bank of New South Wales in 1900 with the land being transferred later to William Barkley in 1906. It was finally transferred to Richard Pritchard, estate agent, in 1911 (NSW Land Registry Services n.d.).

An aerial from the 1930s (Photo 2) shows the study area to be somewhat cleared of vegetation. Remnant trees can be seen in the south of the lot, but the area closer to what is now Hoxton Park Road has been

cleared of vegetation. The surrounding properties have similar levels of disturbance. Those in the west have evidence of farming activities.



Photo 2 1930s aerial over the study area (Source: NSW Land Registry Services)

A later 1975 aerial (Photo 3) shows that development is starting to take place surrounding the study area. Fewer trees remain, with the surrounding areas completely cleared of vegetation. A house has been constructed attached to Jedda road in the south. To the east circular vehicular tracks can be seen. Besides these additional clear activities, no major disturbance has taken place.



Photo 3 1975 aerial over prestons (Source: NSW Land Registry Services)



Photo 4 1994 aerial over the study area (Source: NSW Land Registry Services)

By 1994, little change can be seen within the study area or within its vicinity (Photo 4). Some additional vegetation can be seen, however, the areas to the west of Ash Road remain undeveloped. A current aerial over the study area (Figure 2) shows it to be heavily developed and disturbed. A large industrial area now

occupies the study area with roads constructed within the vicinity including Whyalla Place adjacent to the study area. It is likely this extensive development has destroyed or seriously displaced Aboriginal objects within the study area.

3 Aboriginal context

3.1 Ethnohistory and contact history

It is generally accepted that people have inhabited the Australian landmass for the last 50,000 years (Allen & O'Connell 2003, Clarkson et al. 2015), but this date is under continued revision. The timing for the human occupation of the Sydney Basin is still uncertain. While there is some possible evidence for occupation of the region around 40,000 years ago, the earliest known radiocarbon date for the Aboriginal occupation of the Sydney Basin is associated with a cultural / archaeological deposit at Parramatta, which was dated to 30,735 ± 407 BP (JMCHM 2005a, JMCHM 2005b).

Archaeological evidence of Aboriginal occupation of the Cumberland Plains indicates that the area was intensively occupied from approximately 4000 years BP (Dallas 1982). Such 'young' dates are probably more a reflection of the conditions associated with the preservation of this evidence and the areas that have been subject to surface and sub-surface archaeological investigations, rather than actual evidence of the Aboriginal people prior to this time.

Our knowledge of Aboriginal people and their land-use patterns and lifestyles prior to European contact is mainly reliant on documents written by non-Aboriginal people. These documents are affected by the inherent bias of the class and cultures of their authors, who were also often describing a culture that they did not fully understand - a culture that was in a heightened state of disruption given the arrival of settlers and disease. Early written records can however be used in conjunction with archaeological information and surviving oral histories from members of the Aboriginal community in order to gain a picture of Aboriginal life in the region.

Despite a proliferation of Aboriginal heritage sites there is considerable ongoing debate about the nature, territory and range of pre-contact Aboriginal language groups in the greater Sydney region. These debates have arisen largely because, by the time colonial diarists, missionaries and proto-anthropologists began making detailed records of Aboriginal people in the late 19th century, pre-European Aboriginal groups had been broken up and reconfigured by European settlement activity. The following information relating to Aboriginal people on the Cumberland Plains is based on such early records.

There is some confusion relating to group names, which can be explained by the use of differing terminologies in early historical references. Language groups were not the main political or social units in Aboriginal life. Instead, land custodianship and ownership centred on the smaller named groups that comprised the broader language group. There is some variation in the terminology used to categorise these smaller groups; the terms used by Attenbrow (2002) will be used here.

The project area is in the vicinity of three language groups, Dharawal, Gundungurra and the hinterland Darug. Attenbrow (2002, pp. 34) suggests:

- The Gundungurra covered "the southern rim of the Cumberland Plain west of the Georges River, as well as the southern Blue Mountains".
- The Dharawal covered "the south side of Botany Bay, extending as far as the Shoalhaven River; from the coast to the Georges River and Appin, possibly as far west as Camden".
- The hinterland Darug covered the area "from Appin in the south to the Hawkesbury River in the north; west of the Georges River, Parramatta, the Lane Cove River and Berowra Creek".

These areas are considered to be indicative only and would have changed through time.

The first contact many of these groups would have had with Europeans would have been with early explorers and surveyors such as John Hunter and Watkin Tench. The written accounts from these explorers provides useful information into the lifeways of Aboriginal peoples of the region despite a lack of formal anthropological training of the commentators.

Accounts from Tench (1793) describe equipment and shelter use in the western Sydney region. Tench noted that the equipment used by Aboriginal peoples included “few stone hatchets very crudely fashioned” as well as small nets and fish hooks made of bone, neither of which were “skilfully executed” according to Tench (1793). Tench also commented on the types of shelter he observed. He described shelters as consisting of “pieces of bark laid together in the form of an oven, open at one end, and very low, though long enough for a man to lie full length in” (1793). These shelters were often grouped together and were often large enough to hold six to eight people (Collins 1789), but Tench noted that these types of shelter were less utilised than rock shelters (Tench 1793).

In addition to the material culture of Aboriginal peoples, Tench also made generalised observations of the language used by Aboriginal peoples at the time. He described an interaction between inland and coastal groups, stating that “they conversed on par and understood each other perfectly, yet spoke different dialects of the same languages” (Tench 1793, pp. 122).

After the arrival of European settlers the movement of Aboriginal groups became increasingly restricted. European expansion along the Cumberland Plain was swift and soon there had been considerable loss of land to agriculture. This led to violence and conflict between Europeans and Aboriginal people as both groups sought to compete for the same resources (Brookes et al. 2003, pp. 16). At the same time diseases such as small pox were having a devastating effect on the Aboriginal population. Two such outbreaks were recorded, one in 1789 and another from 1829 to 1831 (Butlin 1983), with the first outbreak believed to have resulted in the deaths of 50% of the Aboriginal population (Tench 1793). Death, starvation and disease were some of the disrupting factors that led to a reorganisation of the social practices of Aboriginal communities after European contact. The formation of new social groups and alliances were made as Aboriginal people sought to retain some semblance of their previous lifestyle.

3.2 Regional context

JMCHM (2000) undertook a survey in advance of a proposed light industrial subdivision, within Erskine Park. The predictive modelling undertaken primarily identified the potential for sites to be present in association with water sources, with the size and density increasing with stream order. It was also noted that creek junctions provide a focus for activity. Other locations such as ridgetops between drainage lines may provide evidence of occupation (JMCHM 2000, p. 19). The area surveyed contained first and second order creeks, and so it was predicted that background scatters of artefacts may be associated with first order creeks, and that higher density sites may be identified in association with the second order creek. The survey identified nine sites, including six artefact scatters and three isolated finds. Six of the identified sites were located on lower hillslopes, two on creek bank/lower hillslopes, and one on a creek bank/floodplain. The majority of sites were identified between 50 and 200 metres from water sources.

DSCA (2001) carried out an assessment and developed a research design for an archaeological investigation in the same area studied by Dallas (1988). Steele noted the presence of silcrete cobbles (a possible source of raw material for stone artefact production) in the area. It was noted that previous finds on the site were well dispersed, with disturbance having been caused by water and flood action, as well as the presence of stock. The possibility existed that further isolated artefactual material was present along Cosgroves Creek, but given the degree of disturbance, it was unlikely that such material would be substantial, significant or undisturbed (DSCA 2001, pp. 29).

Navin Officer (2005) conducted machine testing at the CSR lands, Erskine Park. A total of 256 test pits were excavated, with 285 artefacts being identified across 88 of these pits. It is noted in JMCHM (2008, pp. 14) that only a sample of the excavated deposit was sieved, and that this may be a contributing factor to the relatively low number of artefacts identified at the site relative to other excavations in the area. The assemblage was primarily comprised of silcrete and silicified tuff, making up about 81% of the total assemblage, and contained a range of artefact types, including microblades, bondi points, and backed artefacts. Based on the results of this testing, Navin Officer characterised the site as having been used as a transient camp, or for peripheral activities in relation to a larger camping area, and stated that it had been subject to low intensity occupation (Navin Officer 2005, pp. ii).

JMCHM (2008) undertook salvage excavations at the proposed light industrial subdivision, within Erskine Park. The salvage excavations retrieved a total of 8,867 lithics from 298 square metres, indicating a density of 29.8 artefacts per square metre. It was identified that the pattern of artefact distribution within the site was typical for the Cumberland Plain and was likely higher due to the presence of second and third order streams (which indicates a permanent or semi-permanent water source). Analysis of the artefacts conducted shows that the dominant artefact types recovered from excavations were flake fragments/flaked piece debitage followed by platform debitage. It is notable that there are a large number of cores and other retouched and backed artefacts. It was concluded that the site patterning in the area was typical of the Cumberland Plain, however artefact density was influenced by a number of landscape and resource features in the area, with it being noted that artefact density decreases with stream order and use of silcrete as raw material decreases with increasing distance from silcrete sources. As a whole, the site displayed a higher than average artefact density, likely due to the presence of nearby sources of silcrete (JMCHM 2008, pp. i).

Biosis (2010) was commissioned by NSW Roads & Traffic Authority to conduct sub-surface investigation of three Aboriginal sites as per Aboriginal Heritage Impact Permit #1113179. RTA proposed to construct a link road between Erskine Park Road and Old Wallgrove Road, Erskine Park. Three Aboriginal sites were previously recorded in the study area and would have been impacted by the proposed works. A total of 113 test pits were excavated across the three sites in order to investigate any Aboriginal cultural heritage that might bear an impact during works. The results of these excavations have shown that all three sites RCIF1 (45-5-3843), EPLR1 (45-5-3842) and EP PAD1 (45-5-3842) contained sub-surface Aboriginal cultural material, although very few Aboriginal artefacts were located on the surface. All three sites showed evidence of ground disturbance casting doubt on the integrity of the archaeological deposit and the security of the spatial deposition of the artefacts.

Biosis (2013) was commissioned by AW Edwards Pty Ltd, on behalf of Penrith City Council to undertake a Due Diligence assessment of the Kurrambee School, Werrington NSW. The study area was situated on Water Street, Werrington which is located within Penrith LGA. Penrith City Council proposed to expand the current Kurrambee School site to the north west of the existing buildings, within Lot 11 DP 802940. During the assessment one isolated artefact, a broken mudstone flake was identified. The proposed works were located in an area that would normally be considered to be of high potential for Aboriginal sites, in particular isolated artefact finds and artefact scatters.

3.3 Local context

A number of Aboriginal cultural heritage investigations have been conducted within the region (within approximately 10 kilometres of the study area). Most of these investigations were undertaken as part of development applications and included surface and sub-surface investigations. These investigations are summarised below.

AMBS (2000) conducted archaeological salvage and monitoring at Prestons, NSW. Three previous surveys of the area identified potential archaeological deposit (PAD) (MC1/#45-5-0778) located approximately 580

metres south-east of the study area on the eastern bank of Maxwells Creek. This site was located within South Creek and Blacktown soil landscapes. Salvage excavations of three areas identified high disturbance from trail biking and rubbish dumping. However, artefacts remained within the deposit. Following this, Gandangara LALC monitored excavations for a sewer route that was not archaeologically excavated.

A total of 151 artefacts were identified, with material types including silcrete, chert, indurated mudstone, tuff, petrified wood, volcanic and quartz, with silcrete being the most common material type. Tool types included backed artefacts, whole flakes, broken flakes, flaked pieces (which was the most common tool type), ground stone axe head and heat shatter. Overall, MC1 was identified to have high archaeological potential and high cultural significance. No further investigation was recommended.

Central West Archaeological & Heritage Services Pty Ltd (2002) conducted archaeological investigations at Hoxton Park for the development of the Western Sydney Orbital Motorway, west of the Hinchinbrook Creek approximately 6.4 kilometres north-west of the study area. Previous studies identified the Hinchinbrook Creek alluvial floodplain to be highly archaeologically sensitive. However due to significant flooding and disturbance the study area was determined to be low in archaeological potential. No sites were identified. No further archaeological assessment was recommended.

Central West Archaeological & Heritage Services Pty Ltd (2003) conducted subsurface testing of PAD (PAD 6 WSO/#45-5-2853), located approximately 2.5 kilometres south-east of the study area, on the western banks of Maxwells Creek. The site was identified during a previous survey for the development of the Western Sydney Orbital Motorway Project, and subsurface testing was recommended. The PAD site was located within an alluvial floodplain. A total of 21 test pits were excavated and identified four red silcrete artefacts, including three flakes and one undiagnostic stone fragment. It was concluded that a low level of archaeological potential and did not recommend further testing.

Therin Archaeological Consulting (2003) undertook an Aboriginal heritage assessment for the upgrade of Kurrajong Road and Bernera Road, Prestons. Previous survey of the site identified two isolated chert and silcrete artefacts KB1(#45-5-3709) and KB2 (#45-5-3710), both located approximately 1.5 kilometres south west of the study area despite low surface visibility. Based on predictive modelling for the area, three areas of PAD were also identified PAD KB1, PAD KB2 and PAD KB3. It was recommended that further testing is required in all areas of PAD.

Australian Museum Business Services (2012) conducted a wide ranging report, assessing the entirety of the Austral and Leppington North precincts for the Urban Form Analysis of the South West Growth Centres. Although surveys were targeted at specific properties which at the time represented accessible properties, the results of the survey were combined with the existing regional model and a review of studies within the local area in order to produce sensitivity mapping for the entirety of the Austral and Leppington North precincts. The predictive model employed by AMBS stated that the most common site type occurring in the area would be stone artefacts scatters, and that undisturbed alluvial soils have the potential to be associated with stratified archaeological deposits (AMBS 2012, pp. 56). The results of the survey largely confirmed this predictive model, with AMBS identifying seven new sites including six isolated finds and one artefact scatter/PAD.

DSCA (2012) carried out an archaeological assessment including survey over an approximately 21.4 hectare area. This was completed on behalf of the WSPT to meet the requirements of an Aboriginal and non-Aboriginal Archaeological and Cultural Heritage Assessment for the construction of the initial stage of the Horsely Drive Business Park approximately 10 kilometres north-west of the study area. They identified "attractive" areas, such as permanent water sources, rises and raw material sources as likely locations for long duration visits, marked by more diverse assemblages. Areas which are not in close proximity to these resources are more likely to yield one off finds. No aboriginal archaeological constraints were identified, with no Aboriginal sites located during the survey. This was attributed to the lack of major water or raw material

resources, suggesting the area would have only been occupied sporadically, as well as poor visibility and widespread disturbance from agricultural. The study area was assessed as having low scientific archaeological significance due to the level of disturbance and as a result it was stated "any finds that would be recovered would likely be largely unexceptional in nature with minimal research potential" (DSCA 2012, pp. 96).

Biosis (2015a) was commissioned by Liverpool City Council to undertake an ADDA for the proposed revitalisation of Bigge Park, Bigge Street, Liverpool NSW approximately 4.5 kilometres from the study area. The project incorporated Lots 701 and 702 DP 1056246, and Lot 394 DP 752060 and approximately 4.6 kilometres north-east of the study area. The project identified a moderate to high potential for the identification of stone artefacts and a moderate potential for the identification of PADs, with 67.01% and 9.28% respectively of the total finds comprised of these archaeological sites. The assessment discerned that due to the level of disturbance over the last 100 years, the area would have a low potential for archaeological sites and therefore no further assessment was recommended.

Biosis (2015b) undertook an ADDA at 50–56 Kelly Street Austral approximately 10 kilometres west of the study area, in advance of the residential subdivision at the site. A portion of this site was within an area marked by AMBS as having moderate sensitivity, although in this case due to its association with a ridgeline. The site survey did not identify any Aboriginal sites or objects, or any areas of potential.

It was determined that the area marked by the previous AMBS (2012) study as being of moderate sensitivity; had low archaeological potential owing to its distance from water sources; the water sources that were closest to it were first order intermittent drainage channels. In addition, there were areas of localised disturbance within the study area.

Biosis (2016a) undertook an ADDA north-east of the current study area at 14–20 Gurner Avenue Austral, approximately 8 kilometres west of the study area, in advance of a residential subdivision at the site. The site contained areas of sensitivity, which included an area of moderate potential associated with a lower order stream. An archaeological survey was undertaken which concluded that, given the distance to reliable water courses, it was unlikely that the area had the potential to contain subsurface archaeological deposits. The survey did not identify any sites within the study area.

Biosis (2016b) conducted an Aboriginal Cultural Heritage Assessment (ACHA), approximately 10 kilometres south-west-west of the current study area, at 230-260 Fifth Avenue, Austral, prior to the proposed residential subdivision of the site. A series of predictive statements were prepared based on site distribution based on landforms within the site, consideration of site type, raw materials and site densities likely to be present, findings of ethnohistorical research, potential use of Aboriginal resources present or once present, and consideration of the temporal and spatial relationships of sites within the study area and surrounding region. It was projected that there was moderate potential for stone artefact sites and PAD within the site, but low potential for other site types such as scarred trees, burials, grinding grooves, rock shelters with art and/or deposits, Aboriginal ceremony or dreaming sites, post-contact sites and Aboriginal places. The results of the test excavations identified one mudstone artefact from a test pit excavated on a gentle slope landform.

Biosis (2018a) undertook an ADDA and historical heritage assessment for school upgrades at Liverpool West Public School, approximately 2.4 kilometres north-east of the study area. The assessment included background research and a site inspection of the study area. The assessment did not identify any areas of either Aboriginal or European archaeological sensitivity and no surface Aboriginal cultural material was discovered during the site survey. The survey results combined with the study areas distance from water, lack of sensitive landforms, known Aboriginal sites and shallow soils identified in background research indicate that Aboriginal sites are unlikely to be present in the study area.

Biosis (2018b) completed an ADDA and historical heritage assessment for school upgrades at Prestons Public School, approximately 2.6 kilometres south-east of the study area. The assessment included background research and a site inspection of the study area. Biosis noted that the surrounding area is heavily urbanised,

and these factors indicate low potential for Aboriginal subsurface material to be present. The assessment did not identify any areas of either Aboriginal or European archaeological sensitivity and no surface Aboriginal cultural material was discovered during the site survey.

3.3.1 Identified Aboriginal archaeological sites

An extensive search of the AHIMS database was conducted on 15/05/2020 (Client service ID: 505262). The search identified 96 Aboriginal archaeological sites within a 4 kilometre search area, centred on the proposed study area (Table 2). None of these registered sites are located *within* the study area (Figure 7). The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports where available. These descriptions and maps were relied where notable discrepancies occurred.

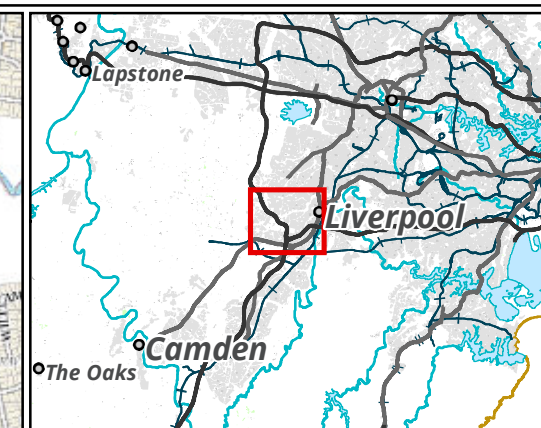
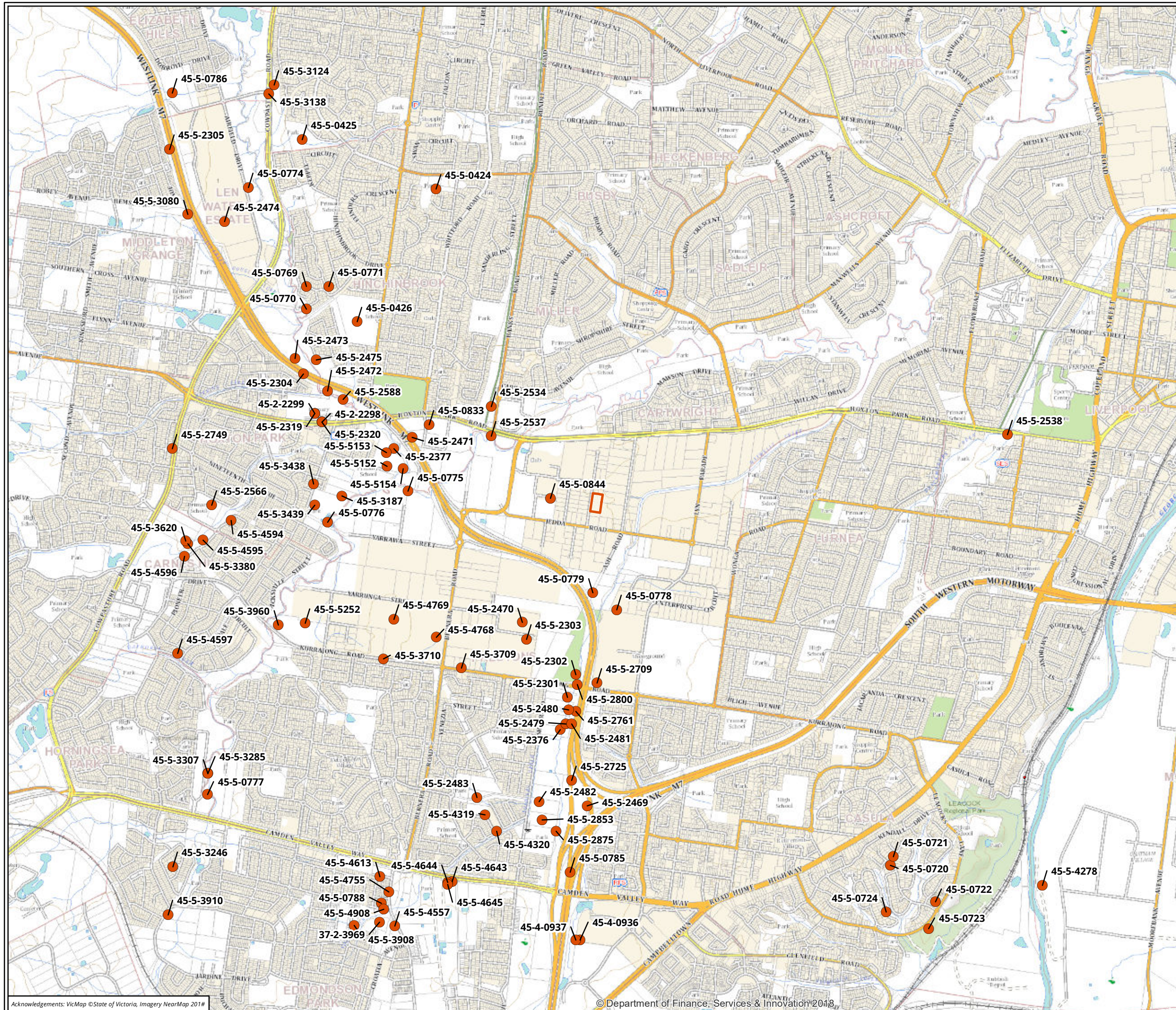
It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area.

Table 2 AHIMS sites within the study area

Site type	Occurrences	Frequency (%)
Artefacts	81	81.0
PAD (Potential archaeological deposit)	9	9.0
Modified Trees (scarred or engraved)	8	8.0
Art (pigment or engraved)	1	1.0
Ochre Quarry	1	1.0
Total	100	100

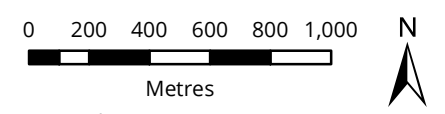
A simple analysis of the Aboriginal cultural heritage sites registered within 4.2 kilometres of the study area indicates that the dominant site type are artefact sites, representing 81% (n=81) of the sample. Other site types were significantly less represented. PAD sites and modified trees accounted for 9% (n=9) and 8% (n=8) respectively, while only one art and ochre quarrying sites were identified, each representing only 1% of the sample. All the sites were located within close proximity to the reliable sources of water, were either exposed by the land clearing works (artefact scatters), in the areas with remnant native vegetation (scarred trees) or within areas of relevant sandstone outcrops for grinding grooves and overhang development (shelters with art/deposit).

The high representation of artefact sites within 4 kilometres of the study area is likely due to its location near Cabramatta creek, which would have likely been an attractive spot for Aboriginal people to utilise. The lack of other site types is likely due to the extensive development of the study area and the surrounding landscape. This development may have destroyed other site types like modified trees and art sites which explains why so few are represented here. A lack of rock outcrops in the region also explains why only a single ochre quarry was recorded.



- Legend**
- Study area
 - AHIMS record

Figure 7 AHIMS sites within the vicinity of the study area



Scale: 1:25,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 56



Matter: 32092,
 Date: 22 May 2020,
 Checked by: MWT, Drawn by: AEDM, Last edited by: amurray
 Location: P:\32000s\32092\mapping\32092_ADDA_F6_AHIMS.mxd

3.3.2 Predictive statements

A series of statements have been formulated to broadly predict the type and character of Aboriginal cultural heritage sites likely to exist throughout the study area and where they are more likely to be located.

These statements are based on:

- Local and regional site distribution in relation to landform features identified within the study area.
- Consideration of site type, raw material types and site densities likely to be present within the study area.
- Findings of the ethnohistorical research on the potential for material traces to present within the study area.
- Potential Aboriginal use of natural resources present or once present within the study area.
- Consideration of the temporal and spatial relationships of sites within the study area and surrounding region.

Based on this information, a series of statements have been developed, indicating the site types most likely to be encountered during the survey and subsequent sub-surface investigations across the present study area (Table 3). The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 3 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	Low: Stone artefact sites have been previously recorded within the vicinity of the study area. However, a high level of disturbance within the study area may have destroyed or significantly displaced Aboriginal artefacts within the area. Therefore, the potential for artefacts to be present within the study area is assessed as low.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Low: Shell midden sites have not been recorded within the vicinity of the study area. There is a very low potential for shell middens to be located in the study area as the first order drainage line is not permanent water source.
Quarries	Raw stone material procurement sites.	Low: There is no record of any quarries being within or surrounding the study area.
Potential Archaeological Deposits (PADs)	Potential sub surface deposits of cultural material.	Low: PADs have been previously recorded in the region across a wide range of landforms. PADs are likely to be present within areas adjacent to water courses or on high points in undisturbed landforms.

Site type	Site description	Potential
Modified trees	Trees with cultural modifications	Low: The study area has been completely cleared of native vegetation.
Grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	Low: No suitable horizontal sandstone rock outcrops could occur within the study area.
Burials	Aboriginal burial sites.	Low: Aboriginal burial sites are generally situated within deep, soft sediments, caves or hollow trees. Areas of deep sandy deposits will have the potential for Aboriginal burials. The soil profiles associated with the study area are not commonly associated with burials.
Rock shelters with art and / or deposit	Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground characterised by cliff lines and escarpments. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	Low: The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist, which are not present in the study area.
Aboriginal Ceremony and Dreaming sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	Low: There are currently no recorded mythological stories for the study area.
Post-contact sites	These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with post-contact Aboriginal use.	Low: There are no post-contact sites previously recorded in the study area and historical sources do not identify one.
Aboriginal places	Aboriginal places may not contain any 'archaeological' indicators of a site, but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings.	Low: There are currently no recorded Aboriginal historical associations for the study area.

4 Archaeological investigation

An archaeological investigation of the study area was undertaken on 2 June 2020 by Mathew Smith, Project Archaeologist at Biosis. The survey sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological survey aims

The principle aims of the survey were to:

- Undertake a survey of the study area targeting areas with the potential for Aboriginal heritage.
- Identify and record Aboriginal archaeological sites visible on the ground surface.
- Identify and record areas of Aboriginal archaeological and cultural sensitivity.

4.2 Survey methods

The survey was conducted on foot. Recording during the survey followed the archaeological survey requirements of the Code and industry best practice methodology. Information that recorded during the survey included:

- Aboriginal objects or sites present in the study area during the survey.
- Survey coverage.
- Any resources that may have potentially have been exploited by Aboriginal people.
- Landform elements, distinguishable areas of land approximately 40m across or with a 20m radius (CSIRO 2009).
- Photographs of the site indicating landform.
- Ground surface visibility (GSV) and areas of exposure.
- Observable past or present disturbances to the landscape from human or animal activities.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.

Where possible, the identification of natural soil deposits within the study area was undertaken. Photographs and recording techniques were incorporated into the survey including representative photographs of survey units, landform, vegetation coverage, GSV and the recording of soil information for each survey unit where possible. Any potential Aboriginal objects observed during the survey were documented and photographed. The location of Aboriginal cultural heritage and points marking the boundary of the landform elements were recorded using a hand-held Global Positioning System and the Map Grid of Australia (94) coordinate system.

4.3 Constraints to the survey

With any archaeological survey there are several factors that influence the effectiveness (the likelihood of finding sites) of the survey. The factor that contributed most to the effectiveness of the survey was low GSV across the majority of the study area due to industrial buildings and carparks. Access to some portions of the study area was not possible due to locked gates, but these areas were assessed as being subject to extensive

disturbance due to the subsurface impacts associated with the construction of industrial structures, associated utilities and landscaping.

4.4 Visibility

In most archaeological reports and guidelines visibility refers to GSV, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (DECCW 2010b). Visibility was broadly consistent throughout the study area, approaching nil to 5% in most areas due to asphalt, concrete and buildings covering most of the lot (Photo 5). Along the western boundaries of the study area, visibility was slightly higher due to strips of garden, or areas of grass verge adjacent to Whyalla Place (Photo 6).



Photo 5 Visibility across the western part of the study area



Photo 6 Visibility within garden beds along the western boundary of the study area

4.5 Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed, and attempts to describe the relationship between those conditions and the likelihood the prevailing conditions provide for the exposure of (buried) archaeological materials. Whilst also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke & Smith 2004, pp. 79, DECCW 2010b). Overall, the study area displayed areas of exposure in cultivated garden beds areas.

4.6 Disturbances

Disturbance in the study area is associated with natural and human agents. Natural agents generally affect small areas and include the burrowing and scratching in soil by animals, such as wombats, foxes, rabbits and wallabies, and sometimes exposure from slumping or scouring. Disturbances associated with recent human action are prevalent in the study area and cover large sections of the land surface. The agents include industrial development such as the construction of warehouses, offices, asphalt driveways and parking areas, concrete paths and drains (Photo 7 and Photo 8).

The majority of the study area is occupied by a large warehouse structure and associated car parks and driveways. These structures severely limit the potential for intact subsurface deposits to occur across the entirety of study area. Disturbances associated with the construction of industrial warehouses significantly lowers the potential for Aboriginal sites or objects to be identified in these areas.



Photo 7 Disturbances associated with the construction of a warehouse



Photo 8 Disturbances associated with the construction of a footpaths and driveways

4.7 Investigation results and discussion

The study area is a relatively flat landscape, only sloping slightly towards Maxwells Creek in the east. Under Speight's assessment, this constitutes a system of gently undulating rises to undulating low hills. (Speight 2009, pp. 47). This topography overlies a geological profile of alluvial valley flats consisting of silt, clay, deposited alluvial lithic to quartz-lithic sand and gravel. It is situated in proximity to two water sources: Maxwells Creek, a non-perennial water source 300 metres to the east, and Cabramatta Creek, a larger perennial water source 700 metres to the north.

The soil profile of the study area is defined as disturbed terrain by Bannerman and Hazelton (1990, pp. 149). This material consists of fill, rock, construction and waste material from modern development. Topsoil horizons include a loose black sandy loam followed by mottled clay with a fill consisting of waste and construction material below that. Subsoil deposits occur as dark dredged muds and sands. This level of destruction both to stratified geological and archaeological deposits is likely to significantly reduce the potential for archaeological deposits within such a landscape.

Broad archaeological research within the region suggests that the volume and spatial extent of archaeological deposits is related to distance from water sources and the presence of elevated landforms surrounding these water sources. JMCHM (2000) located six sites on lower hillslopes, two on creek bank/lower hillslopes, and one on a creek bank/floodplain. The majority of these sites were identified between 50 and 200 metres from water sources. The closest water source is 300 metres, which would suggest that the potential for Aboriginal artefacts to be present within the study area is low. Additional research within Erksine Park (JMCHM 2008) uncovered 8,867 lithics from 298 square metres, indicating a density of 29.8 artefacts per square metre. This was suggested by JMCHM to be related to distance from second and third tier water sources surrounding the excavation area. Despite being a largely disturbed region, Biosis' (2010) investigations between Erskine Park Road and Old Wallgrove Road, Erskine Park found that subsurface artefacts could still be uncovered despite few being located on the surface. A larger study by AMBS (2012) in the Austral and North-Leppington precinct suggested that undisturbed alluvial soils would contain stratified deposits. This was confirmed by their subsequent investigation of the area. The disturbed terrain defined by Bannerman and Hazelton (1990, pp. 149) would have removed or destroyed any archaeological potential within the study area. Biosis (2015b) (2016a) added to this suggesting that archaeological potential recedes with distance away from water sources and associated landforms.

Past archaeological research in the region prioritises distance to streams, elevated landform and low levels of distance as predictors of archaeological potential. The distance of the study area to either close sources of water is beyond that recognised by JMCHM (2000, 2008) as having potential for Aboriginal usage in the past. This is characteristic of the entire study area being disturbance both above and below the surface, which has probably destroyed and significantly displaced archaeological material within the study area. Despite some studies uncovering small amounts of lithic material in disturbed contexts, the totality of development within the study area suggests it is unlikely any archaeological material would be present.

An archaeological survey of the study area confirmed that the lot is predominantly covered by warehouses, concrete driveways and footpaths and asphalt carparks. A smaller portion of the study area comprises landscaped gardens planted with both native and exotic species. Low GSV and exposures were encountered during the survey and the areas of highest visibility were found in landscaped garden areas. No Aboriginal objects or areas of PAD were identified during the survey. Overall, the effectiveness of the survey has been deemed to be low, due to the study area being predominantly covered by buildings, concrete drives and carparks (Figure 7).

5 Conclusions and recommendations

5.1 Conclusions

The study area comprises a relatively flat landform, which slopes very slightly in a north-easterly direction towards Maxwell's Creek. Broad archaeological research within the region suggests that the volume and spatial extent of archaeological deposits is related to distance from water sources and the presence of elevated landforms surrounding these water sources. The closest water source is 300 metres, which would suggest that the potential for Aboriginal artefacts to be present within the study area is low.

Land use in the vicinity of the study area is dominated by heavy industry and the soil profile of the study area is defined as disturbed terrain, which consists of fill, rock, construction and waste material from modern development. Topsoil horizons include a loose black sandy loam followed by mottled clay with a fill consisting of waste and construction material below that. Subsoil deposits occur as dark dredged muds and sands. This level of impact both to stratified geological and archaeological deposits is likely to significantly reduce the potential for archaeological deposits within such a landscape.

The archaeological survey confirmed that the lot is predominantly covered by warehouses, concrete driveways and footpaths and asphalt carparks. No Aboriginal objects or areas of PAD were identified during the survey. Overall, the effectiveness of the survey has been deemed to be low, due to the study area being predominantly covered by buildings, concrete drives and carparks. This assessment has determined that there is low potential for Aboriginal sites to be located within the study area. The results of this assessment are also demonstrated in the due diligence flow chart provided by the Code (Figure 8).

5.2 Recommendations

The following management recommendations have been developed relevant to the study area and influenced by:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practise, widely considered to include:
 - Ethos of the Australia ICOMOS Burra Charter (2013).
 - The code.

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential.

Recommendation 2: Discovery of Unanticipated Aboriginal Objects

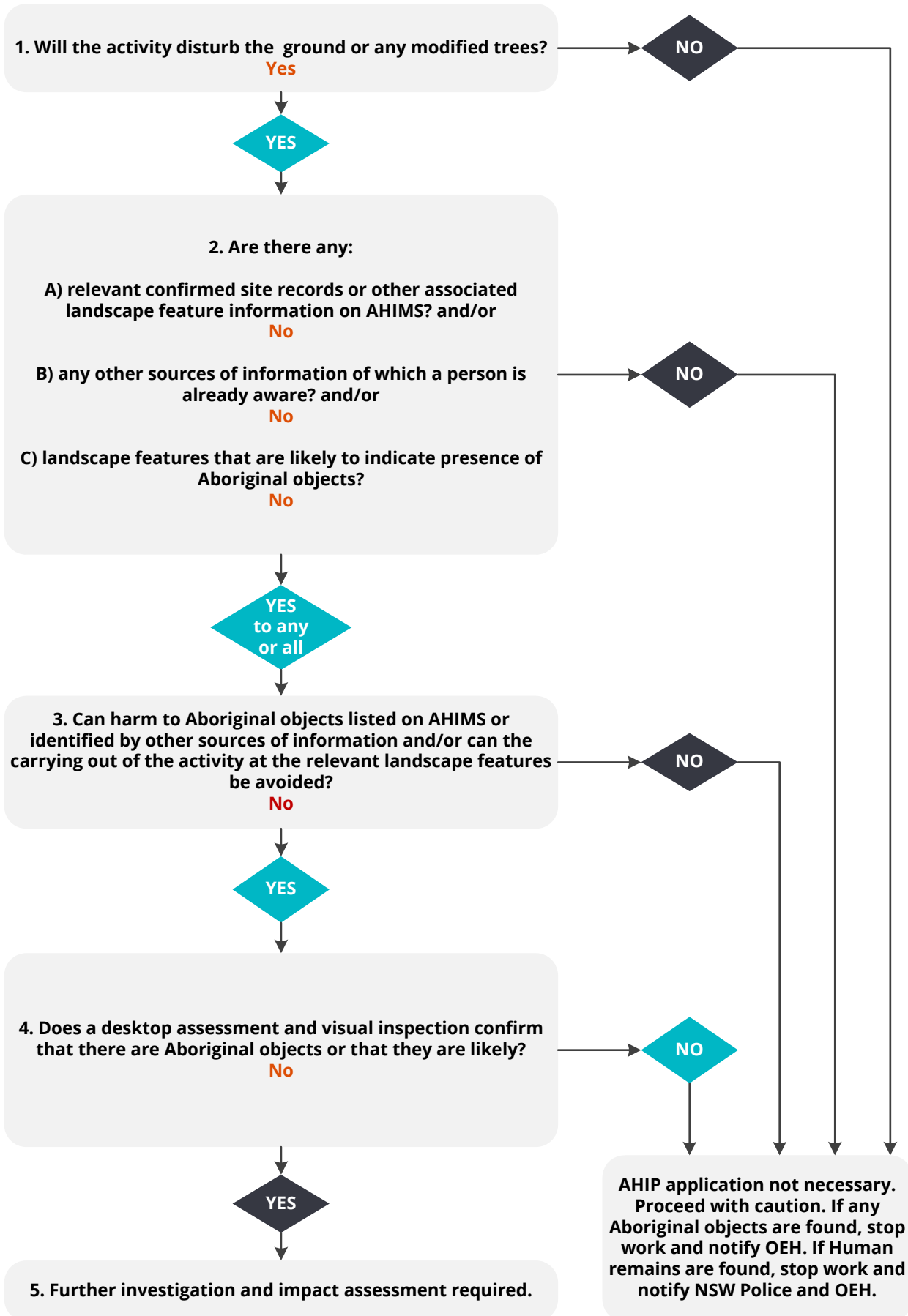
All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object

the archaeologist will provide further recommendations. These may include notifying the Heritage NSW and Aboriginal stakeholders.

Recommendation 3: Discovery of Aboriginal Ancestral Remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.



AHIP application not necessary.
 Proceed with caution. If any Aboriginal objects are found, stop work and notify OEH. If Human remains are found, stop work and notify NSW Police and OEH.

5. Further investigation and impact assessment required.

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Appendices

Appendix 1 AHIMS search results

This Appendix is not to be made public.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2725	PAD-OS-1	AGD	56	303720	6241200	Open site	Valid	Artefact : -		98369,98370,9 8371,98443,98 739
	Contact								Permits	1396
45-5-2800	MC9	AGD	56	303760	6241880	Open site	Valid	Art (Pigment or Engraved) : -		98369,98370,9 8371,98443,98 739
	Contact								Permits	
45-5-2709	P-CP16	AGD	56	303900	6241890	Open site	Valid	Artefact : -		3726,98369,98 370,98371,984 43,98739
	Contact								Permits	1637
45-5-2761	P-CP15	AGD	56	303750	6241690	Open site	Valid	Artefact : -		3726,98369,98 370,98371,984 43,98739
	Contact								Permits	1398
45-5-2749	CR-IF-1	AGD	56	300890	6243550	Open site	Valid	Artefact : -		98369,98370,9 8371,98443,98 739
	Contact								Permits	1990
45-5-2875	PAD 6 Open Campsite	AGD	56	303610	6240840	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact								Permits	1737
45-5-3307	Horningsea Park Arhcaeological Deposit 1 (HSP AP1)	AGD	56	301142	6241249	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102442
	Contact	T Russell							Permits	
45-5-3380	Hoxton Park PAD 2	AGD	56	301000	6242878	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1, Artefact : -		102442,10269 5,104174,1041 75
	Contact	Searle							Permits	2871,3034,3927
45-5-2304	P-CP4	AGD	56	301820	6244080	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,9 8371,98443,98 739
	Contact								Permits	
45-5-2480	Maxwells Creek 12 (MC12)	AGD	56	303700	6241700	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,9 8371,98443,98 739

Report generated by AHIMS Web Service on 15/05/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 301156 - 306990, Northings : 6240434 - 6246176 with a Buffer of 200 meters. Additional Info : ADDA. Number of Aboriginal sites and Aboriginal objects found is 96

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Ms.Elizabeth White					Permits		
45-5-3960	Isolated find KB3	GDA	56	301745	6242492	Open site	Valid	Artefact : -		102442
	Contact	Recorders	Doctor.Sandra Wallace					Permits	3359	
45-5-3908	EPCS 1	AGD	56	302179	6240173	Open site	Valid	Artefact : 1		102442
	Contact	Recorders	Megan Mebberson					Permits		
45-5-3910	EPCS 6	AGD	56	300860	6240248	Open site	Valid	Artefact : 1		102442
	Contact	Recorders	Australian Museum Consulting (AM Consulting)					Permits		
37-2-3969	EPCS 2	GDA	56	302464	6240386	Open site	Partially Destroyed	Artefact : 9, Potential Archaeological Deposit (PAD) : -		102184
	Contact	Recorders	Australian Museum Consulting (AM Consulting),Ms.Ngaire Richards,					Permits	4009,4150,4271	
45-5-4643	2102CVW IF1	GDA	56	302979	6240675	Open site	Valid	Artefact : -		
	Contact	Recorders	Ms.Fenella Atkinson					Permits	4344	
45-5-4644	2102CVW IF2	GDA	56	302947	6240669	Open site	Valid	Artefact : -		
	Contact	Recorders	Ms.Fenella Atkinson					Permits	4343,4344	
45-5-4645	2102 CVW IF3	GDA	56	302946	6240653	Open site	Valid	Artefact : -		
	Contact	Recorders	Ms.Fenella Atkinson					Permits	4344	
45-5-5252	Kurrajong Road IF1	GDA	56	301936	6242503	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Paul Irish,Coast History & Heritage					Permits		
45-5-2588	HB1	AGD	56	302100	6243900	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	Recorders	Unknown Author					Permits		
45-5-2566	HPPS1	AGD	56	301170	6243150	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
	Contact	Recorders	Michael Therin					Permits		
45-5-2537	HPR-OS-1	AGD	56	303150	6243640	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	Recorders	Mrs.Robynne Mills					Permits	1431	
45-5-2538	HPR-ST-1	AGD	56	306810	6243650	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	98443
	Contact	Recorders	Mrs.Robynne Mills					Permits		
45-5-2534	BR_IF_1	AGD	56	303150	6243850	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2301	P-CP1	AGD	56	303690	6241790	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	<u>Contact</u>	<u>Recorders</u>	Mrs.Robynne Mills					<u>Permits</u>		
45-5-2302	GP-CP2;	AGD	56	303750	6241950	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443
	<u>Contact</u>	<u>Recorders</u>	Helen Brayshaw					<u>Permits</u>	850	
45-5-2303	P-CP3	AGD	56	303400	6242200	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	<u>Contact</u>	<u>Recorders</u>	Helen Brayshaw					<u>Permits</u>		
45-5-2305	P-CP5	AGD	56	300870	6245670	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443
	<u>Contact</u>	<u>Recorders</u>	Helen Brayshaw					<u>Permits</u>	1398	
45-5-2319	HPC 1;	AGD	56	301900	6243800	Open site	Valid	Artefact : -	Isolated Find	3374,3529,98369,98370,98371,98443,98739
	<u>Contact</u>	<u>Recorders</u>	Mr.Neville Baker					<u>Permits</u>	846,1053	
45-5-2320	HPC 2; HPR1	AGD	56	301950	6243740	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) :-	Open Camp Site	3374,98369,98370,98371,98443,98739
	<u>Contact</u>	<u>Recorders</u>	Mr.Neville Baker					<u>Permits</u>	846,2897,3007	
45-5-0844	Prestons 1;	AGD	56	303570	6243200	Open site	Valid	Artefact : -	Open Camp Site	2165,98369,98370,98371,98443,98739
	<u>Contact</u>	<u>Recorders</u>	Kerry Navin					<u>Permits</u>	311	
45-5-2376	P-CP10	AGD	56	303640	6241560	Open site	Valid	Artefact : -	Open Camp Site	3726,98369,98370,98371,98443,98739
	<u>Contact</u>	<u>Recorders</u>	Helen Brayshaw,Elizabeth Rich					<u>Permits</u>	1564	
45-5-2377	P-CP11	AGD	56	302460	6243550	Open site	Valid	Artefact : -	Open Camp Site	3726,98369,98370,98371,98443,98739
	<u>Contact</u>	<u>Recorders</u>	Helen Brayshaw,Elizabeth Rich					<u>Permits</u>		
45-5-0720	Kiawaka 3	AGD	56	305980	6240600	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1360
	<u>Contact</u>	<u>Recorders</u>	Mary Dallas Consulting Archaeologists (MDCA)					<u>Permits</u>	264	

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-0721	Kiawaka 4	AGD	56	306000	6240660	Open site	Valid	Modified Tree (Carved or Scarred) :	Scarred Tree	1360
	Contact							Permits		
45-5-0722	Kiawaka 5	AGD	56	306300	6240340	Open site	Valid	Modified Tree (Carved or Scarred) :	Scarred Tree	1360
	Contact							Permits	2521	
45-5-0723	Kiawaka 2	AGD	56	306250	6240150	Open site	Valid	Artefact : -	Open Camp Site	1360
	Contact							Permits		
45-5-0724	Kiawaka 1	AGD	56	305950	6240270	Open site	Valid	Artefact : -	Open Camp Site	1360
	Contact							Permits		
45-5-0425	Cowpasture Road 2	AGD	56	301810	6245740	Open site	Valid	Artefact : -	Open Camp Site	371,521,1018,9 8369,98370,98 443
	Contact							Permits		
45-5-0426	Cowpasture Road 1	AGD	56	302200	6244450	Open site	Valid	Artefact : -	Open Camp Site	371,521,1018,9 8369,98370,98 371,98443,987 39
	Contact							Permits	638	
45-2-2298	HPC2;	AGD	56	301950	6243740	Open site	Valid	Artefact : -	Open Camp Site	3374,98369,98 370,98371,984 43,98739
	Contact							Permits		
45-2-2299	HPC1	AGD	56	301900	6243800	Open site	Valid	Artefact : -	Isolated Find	3374,98369,98 370,98371,984 43,98739
	Contact							Permits	1316	
45-5-0833	Hoxton Park 2;	AGD	56	302710	6243720	Open site	Valid	Artefact : -	Open Camp Site	2118,98369,98 370,98371,984 43,98739
	Contact							Permits		
45-5-0769	HC-1 (Hinchinbrook Creek)	AGD	56	301840	6244700	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98 370,98371,984 43,98739
	Contact							Permits	638	
45-5-0770	HC-2 (Hinchinbrook Creek)	AGD	56	301840	6244540	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98 370,98371,984 43,98739

Report generated by AHIMS Web Service on 15/05/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 301156 - 306990, Northings : 6240434 - 6246176 with a Buffer of 200 meters. Additional Info : ADDA. Number of Aboriginal sites and Aboriginal objects found is 96

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits	638	
45-5-0771	HC-3 (Hinchinbrook Creek)	AGD	56	302000	6244700	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98 370,98371,984 43,98739
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits	638	
45-5-0774	HC-6 (Hinchinbrook Creek)	AGD	56	301430	6245400	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98 370,98371,984 43
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits		
45-5-0775	CC-1 (Cabramatta Creek)	AGD	56	302560	6243250	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98 370,98371,984 43,98739
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits		
45-5-0776	CC-2 (Cabramatta Creek)	AGD	56	301990	6243030	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1727,98369,98 370,98371,984 43,98739
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits		
45-5-0777	CC-3 (Cabramatta Creek) Site de-registered	AGD	56	301140	6241100	Open site	Not a Site	Modified Tree (Carved or Scarred) : -	Scarred Tree	1727,98369,98 370,98371,984 43,98739,1024 42
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits		
45-5-0778	MC-1 (Maxwells Creek)	AGD	56	304040	6242410	Open site	Valid	Artefact : -	Open Camp Site	1727,97544
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits	1025	
45-5-0779	MC-2 (Maxwells Creek)	AGD	56	303870	6242530	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98 370,98371,984 43,98739
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits		
45-5-0785	MC-8;	AGD	56	303710	6240550	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98 370,98371,984 43,98739
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits		
45-5-0786	HP-1	AGD	56	300890	6246070	Open site	Valid	Artefact : -	Open Camp Site	1727,101066
	Contact	Recorders	Alice Gorman,Laura-Jane Smith					Permits		
45-5-0788	EP-1	GDA	56	302477	6240520	Open site	Destroyed	Artefact : -	Open Camp Site	1727,98369,98 370,98371,984 43,98739,1024 42
	Contact	Recorders	Mary Dallas Consulting Archaeologists (MDCA),Mary Dallas Consulting Archaeolog					Permits	3933	

Report generated by AHIMS Web Service on 15/05/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 301156 - 306990, Northings : 6240434 - 6246176 with a Buffer of 200 meters. Additional Info : ADDA. Number of Aboriginal sites and Aboriginal objects found is 96

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2853	PAD 6 WSO	AGD	56	303510	6240920	Open site	Valid	Potential Archaeological Deposit (PAD) :-		
	Contact	Recorders	Helen Brayshaw					Permits	1638	
45-5-3438	1st Avenue PAD/open camp site	AGD	56	301890	6243300	Open site	Valid	Artefact :-		
	Contact	Recorders	Mary Dallas Consulting Archaeologists (MDCA)					Permits	2981	
45-5-3439	CC4 Hoxton Park	AGD	56	301900	6243150	Open site	Valid	Artefact : 7		
	Contact	Recorders	Mary Dallas Consulting Archaeologists (MDCA)					Permits	2981	
45-5-0424	Whitford Road 1	AGD	56	302760	6245390	Open site	Valid	Artefact :-	Open Camp Site	371,521,1018,9 8369,98370,98 371,98443
	Contact	Recorders	Ms.Bronwyn Conyers					Permits		
45-5-3709	KB1 (Liverpool)	GDA	56	303043	6242186	Open site	Valid	Artefact : 1		99115
	Contact	Recorders	Mary Dallas Consulting Archaeologists (MDCA),Michael Therin,Ms.Tamika Goward					Permits	3194	
45-5-3710	KB2 (Liverpool)	GDA	56	302490	6242252	Open site	Valid	Artefact : 1		102442
	Contact	Recorders	Mary Dallas Consulting Archaeologists (MDCA),Michael Therin,Ms.Tamika Goward					Permits	3194	
45-5-3620	Hoxton Park AD 1 (Liverpool)	GDA	56	301089	6243086	Open site	Valid	Potential Archaeological Deposit (PAD) : 33		101265,10244 2,102695,1041 74,104175
	Contact	Recorders	Austral Expert Services Pty Ltd					Permits	3927	
45-5-4278	MA8A	GDA	56	307162	6240648	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
45-5-4319	SD-AS-001	GDA	56	303211	6241146	Open site	Valid	Artefact : 1		
	Contact	Recorders	Kayandel Archaeological Services,Mr.Lance Syme					Permits		
45-5-4320	SD-IF-001	GDA	56	303293	6241031	Open site	Valid	Artefact : 1		
	Contact	Recorders	Kayandel Archaeological Services,Mr.Lance Syme					Permits		
45-5-4613	Croatia Avenue IF1	GDA	56	302465	6240709	Open site	Destroyed	Artefact :-		
	Contact	Recorders	Mary Dallas Consulting Archaeologists (MDCA),Mary Dallas Consulting Archaeolog					Permits	3933	
45-5-4557	Croatia Ave Artefact Scatter 1	GDA	56	302571	6240359	Open site	Valid	Artefact :-		
	Contact	Recorders	Ms.Tamika Goward					Permits	4271	
45-5-4594	HP1-OS	GDA	56	301412	6243233	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) :-		
	Contact	Recorders	Mr.Lance Syme					Permits		
45-5-4595	HP2-IF	GDA	56	301213	6243093	Open site	Valid	Artefact :-		

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Mr.Lance Syme					Permits		
45-5-4596	HP3-OS	GDA	56	301080	6242979	Open site	Destroyed	Artefact : -		
	Contact	Recorders	Mr.Lance Syme					Permits		
45-5-4597	HP4-OS	GDA	56	301032	6242290	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Lance Syme					Permits		
45-5-5152	HP-AS-001	GDA	56	302516	6243616	Open site	Valid	Artefact : 1		
	Contact	Recorders	Kayandel Archaeological Services, Miss.Meg Walker					Permits		
45-5-5153	HP-IF-001	GDA	56	302513	6243712	Open site	Valid	Artefact : 1		
	Contact	Recorders	Kayandel Archaeological Services, Miss.Meg Walker					Permits		
45-5-5154	HP-IF-002	GDA	56	302631	6243599	Open site	Valid	Artefact : 1		
	Contact	Recorders	Kayandel Archaeological Services, Miss.Meg Walker					Permits		
45-5-2479	IF 1 (isolated find)	AGD	56	303680	6241600	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
	Contact	Recorders	Ms.Elizabeth White					Permits		
45-5-2481	Maxwells Creek 11 (MC11)	AGD	56	303720	6241600	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	Recorders	Ms.Elizabeth White					Permits	1398	
45-5-2482	Maxwells Creek 10 (MC10)	AGD	56	303490	6241050	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	Recorders	Ms.Elizabeth White					Permits	1564	
45-5-2483	Maxwells Creek 9 (MC9)	AGD	56	303050	6241080	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	Recorders	Ms.Elizabeth White					Permits		
45-5-2469	IF1	AGD	56	303830	6241020	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443
	Contact	Recorders	Helen Brayshaw					Permits	1398	
45-5-2470	IF2	AGD	56	303370	6242320	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
	Contact	Recorders	Helen Brayshaw					Permits		
45-5-2471	IF3	AGD	56	302590	6243630	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
	Contact	Recorders	Helen Brayshaw					Permits	1398,1564	

Report generated by AHIMS Web Service on 15/05/2020 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 301156 - 306990, Northings : 6240434 - 6246176 with a Buffer of 200 meters. Additional Info : ADDA. Number of Aboriginal sites and Aboriginal objects found is 96

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2472	IF4	AGD	56	301990	6243960	Open site	Valid	Artefact : -, Ochre Quarry :-	Isolated Find	98369,98370,9 8371,98443,98 739
	Contact								Permits	1633
45-5-2473	IF5	AGD	56	301760	6244190	Open site	Valid	Artefact :-	Isolated Find	98369,98370,9 8443,98739
	Contact								Permits	
45-5-2474	IF6	AGD	56	301260	6245160	Open site	Valid	Artefact :-	Isolated Find	98369,98370,9 8371,98443,10 0509
	Contact								Permits	1600
45-5-2475	IF7&8	AGD	56	301910	6244180	Open site	Valid	Artefact :-	Isolated Find	98369,98370,9 8371,98443,98 739
	Contact								Permits	
45-4-0936	Crossroad 1	AGD	56	303780	6240070	Open site	Valid	Artefact :-	Open Camp Site	98369,98370,9 8371,98443,98 739
	Contact								Permits	987
45-4-0937	Crossroad 2	AGD	56	303750	6240070	Open site	Valid	Artefact :-	Open Camp Site	98369,98370,9 8371,98443,98 739
	Contact								Permits	986
45-5-3080	HPA-IF1	AGD	56	301000	6245210	Open site	Valid	Artefact : 1		
	Contact T Russell								Permits	
45-5-3124	CP10	AGD	56	301612	6246127	Open site	Valid	Artefact : 11		
	Contact T Russell								Permits	
45-5-3138	IF6,	AGD	56	301574	6246063	Open site	Valid	Artefact : 1		
	Contact T Russell								Permits	2636,2974
45-5-3187	Nineteenth Ave Scarred Tree (NA1)	AGD	56	302093	6243215	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact T Russell								Permits	
45-5-3246	EPCS 5	AGD	56	300893	6240589	Open site	Partially Destroyed	Artefact :-		102442,10300 7
	Contact								Permits	2553,2764,3460,3571,3702
45-5-3285	HSP PAD1	AGD	56	301142	6241249	Open site	Valid	Potential Archaeological Deposit (PAD) :-		102442

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	<u>Contact</u>	<u>Recorders</u>								
45-5-4755	EPCS 2 re-recording	GDA	56	302530	6240600	Open site	Valid	Artefact : 1	2599,2745,2771	<u>Permits</u>
	<u>Contact</u>	<u>Recorders</u>								
45-5-4908	Reburial of Croatia Ave IF1 (AHIMS #45-5-4613) and EP-1 (AHIMS #45-5-0788)	GDA	56	302493	6240478	Open site	Valid	Artefact : -		<u>Permits</u>
	<u>Contact</u>	<u>Recorders</u>								
45-5-4768	Prestons Creek Bank Site	GDA	56	302866	6242404	Open site	Valid	Artefact : -		<u>Permits</u>
	<u>Contact</u>	<u>Recorders</u>								
45-5-4769	Prestons OC1	GDA	56	302566	6242532	Open site	Valid	Artefact : -		<u>Permits</u>
	<u>Contact</u>	<u>Recorders</u>								

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Robinson, Todd

Subject: FW: Prestons Waste Treatment Facility SSD-9346594 SEARs Heritage NSW

From: Emma Barnet <Emma.Barnet@planning.nsw.gov.au>
Sent: Wednesday, 2 December 2020 11:44 AM
To: Robinson, Todd <TRobinson@golder.com.au>
Subject: RE: Prestons Waste Treatment Facility SSD-9346594 SEARs Heritage NSW

EXTERNAL EMAIL

Hi Todd,

I don't think we need to reissue the SEARs. Just include the information you have provided to Heritage NSW in the EIS and explain that you have undertaken further consultation with the outcome being an ACHAR is not required.

Regards

Emma Barnet
Senior Environmental Assessment Officer

Tues, Wed, Thurs

Industry Assessments | Department of Planning, Industry and Environment
T 02 9274 6412 | E emma.barnet@planning.nsw.gov.au
4 Parramatta Square, 12 Darcy Street | Locked Bag 5022 Parramatta NSW 2124
www.dpie.nsw.gov.au



**Planning,
Industry &
Environment**

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: Robinson, Todd <TRobinson@golder.com.au>
Sent: Monday, 30 November 2020 9:37 AM
To: Emma Barnet <Emma.Barnet@planning.nsw.gov.au>
Subject: FW: Prestons Waste Treatment Facility SSD-9346594 SEARs Heritage NSW

NOTE: This email chain appears to contain email from outside Golder

Hi Emma,

Based on Kym's email below could you confirm if the SEARs are to be reissued to remove heritage as a key issue for assessment of this project?

Regards,

Todd Robinson (M.Bus, M.Litt, PgD.URP&Heritage, B.Sc, B.A, CPP)
Principal Environmental Planner



Golder Associates Pty Ltd
Level 5, 450 Hunter Street, Newcastle, New South Wales 2300, Australia (PO Box 676, Newcastle NSW 2300)

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Please consider the environment before printing this email.

From: Kym McNamara <Kym.McNamara@environment.nsw.gov.au>
Sent: Friday, 27 November 2020 4:01 PM
To: Robinson, Todd <TRobinson@golder.com.au>
Cc: Emma Barnet <Emma.Barnet@planning.nsw.gov.au>; McMahan, Jacinta <jmcmahan@golder.com.au>
Subject: RE: Prestons Waste Treatment Facility SSD-9346594 SEARs Heritage NSW

EXTERNAL EMAIL

Good afternoon Todd,

Thank you for providing the requested justification in relation to potential. Heritage NSW has reviewed the available supporting documentation and additional information requested and has no recommendations for SEARs for the proposed development in relation to Aboriginal cultural heritage matters based on the information provided.

Kind Regards
Kym

Kym McNamara | Archaeologist, Aboriginal Cultural Heritage Regulation
Heritage NSW, Community Engagement, Department of Premier and Cabinet
Level 3, 11 Farrer Place, Queenbeyan NSW 2620
T: 02 62297028 | M: 0437 418 124 | kym.mcnamara@environment.nsw.gov.au



Premier
& Cabinet

I acknowledge and respect the traditional custodians and ancestors of the lands I work across.

Heritage NSW and coronavirus (COVID-19)

Heritage NSW has taken steps to protect the safety, health and wellbeing of our staff, communities and customers. Whilst our offices remain open, we have put in place flexible working arrangements for our teams across NSW and continue to adapt our working arrangements as necessary. Face-to-face meetings and field work/site visits with our customers are subject to rules on gatherings and social distancing measures. We thank you for your patience and understanding at this time.