



ACT MATERIALS RECOVERY FACILITY

ADDENDUM TO APPENDIX K WATER IMPACT ASSESSMENT REPORT

Prepared for Veolia Environmental Services (Australia) Pty Ltd | 8 August 2025

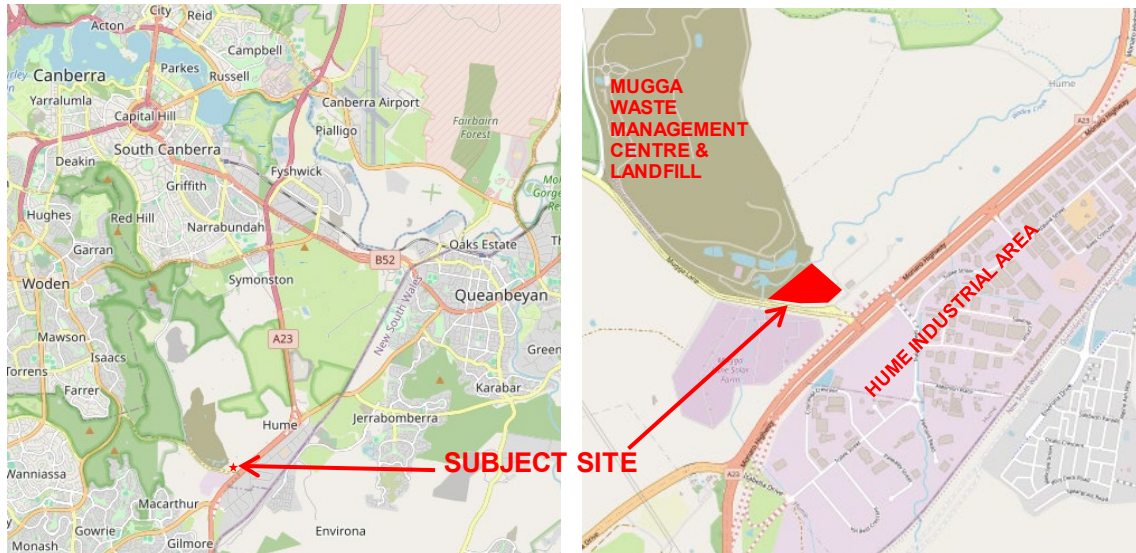


Introduction

This report is prepared as an Addendum to *Appendix K Water Impact Assessment* prepared by GHD for ACT NoWaste in 2023 and submitted with a draft EIS for a new Materials Recovery Facility (MRF) on Block 12 Section 25 Hume, refer Figure 1.

Since that time ACT NoWaste has passed the responsibility to finalise the EIS to Veolia. GHD are not in a position to complete the EIS and as such, Veolia has engaged Element Environment to undertake this work.

Figure 1: Site Location

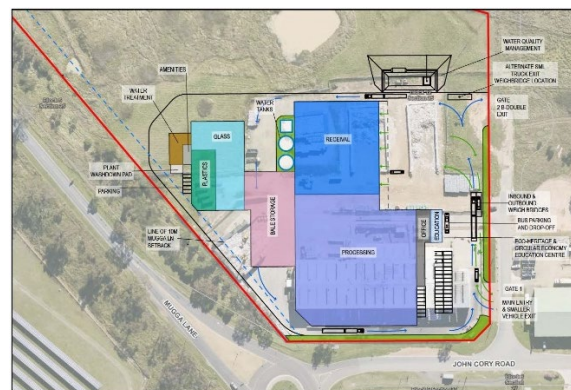


Veolia has made changes to the proposed site layout and design of the MRF to achieve operational efficiencies (refer Figure 2 & 3).

Figure 2: Veolia Revised Site Plan



Figure 3: GHD Concept Plan



Additional Investigations

The GHD Appendix K – Water Impact Assessment Report considered water management based on an initial concept design and specific operations for the facility. The revised layout, removal of the plastics processing and additional glass processing that results in significant increases in water usage and wastewater disposal necessitated a new Water Impact Assessment to be undertaken.

New Water Impact Assessment

Martens Environmental Science and Engineering were engaged to undertake a new Water Impact Assessment (WIA). The scope of the Martens WIA includes:

- Site stormwater management measures.
- Detailed water quantity and quality modelling, to demonstrate compliance with Water Sensitive Urban Design (WSUD) requirements.
- Water balance assessment detailing water requirements and sources, and site stormwater discharge/rainwater tank overflow frequency and volume.
- Proposed onsite wastewater management including details of treatment systems, storages, recycling and discharge to reticulated sewer.
- Sediment and erosion control management measures.

MUSIC modelling results indicates the proposed stormwater treatment requirements of the ACT Industrial Zone Technical Specifications and ACT Municipal Infrastructure Standards - MIS08 will be satisfied by the proposed stormwater quality treatment train. The proposed treatment train is comprised of the following:

- Minimum 406 kilolitre (kL) rainwater tanks with 8 megalitre per year (ML/yr) internal reuse demand to be used for glass washing purposes.
- A gross pollutant trap (GPT) (Atlan Ecoceptor) to treat roof and hardstand areas.

Stormwater detention requirements of the Industrial Zone Technical Specifications are satisfied by the proposed stormwater drainage and on site detention (OSD) strategy. The proposed strategy includes an OSD storage volume of 600 m³ with a controlled slow release discharge outlet to ensure development runoff is discharged over a period greater than 6 hours.

MUSIC model results demonstrating the comparison between pre and post development scenarios with the stream forming flows removed are presented in Table 1.

Table 1: SEI Assessment Results

Description	Value
Pre-development flow volume (ML/yr)	2.5
Post development flow volume (ML/yr)	4.08
SEI	1.63

The Stream Erosion Index (SEI) of 1.63 indicates that the development is unlikely to have a negative impact on the stream morphology downstream from the site. It is noted the SEI assessment does not include the effects of the OSD with regards to controlled discharge. This would further reduce post development flow rates which minimises the possibility of impacts from flow discharge as a result of the development.

Assessment

Operation of the facility, particularly the washing of recycled glass requires significant volumes of water. The water demand for glass washing is estimated at 35m³/hr, which equates to 87ML/yr. About 8ML will come from recycled roof water and about 30% of total water demand will be able to be re-used for glass washing after on-site treatment. The on-site leachate treatment plant would need to discharge wash-water to sewer when water quality diminishes to the point it cannot be used for glass washing.

A stormwater management system will direct surface water to the on-site detention pond (OSD) for treatment of surface stormwater. Overall management of stormwater consists of:

- Rainwater tanks to allow for the collection and re-use of roof-water runoff.

- Fire-fighting water tanks to allow for the storage of water on-site for fire suppression.
- Grading of the hardstand and pad falling to the north-west and to allow drainage around structures and surface water to flow to the OSD.
- Drainage infrastructure (e.g., pits, pipes, and overland flow paths) to convey storm water safely around the site.
- Stormwater retention infrastructure (including tanks and OSD).
- The OSD sized to comply with the following pollutant load reduction targets:
 - 90% reduction of gross pollutants
 - 60% reduction of suspended solids
 - 45% reduction of total phosphorous
 - 40% reduction of total nitrogen
- Operational measures such as not storing waste materials outdoors, would be implemented so that rainfall-derived leachate would not be generated and only stormwater would be generated.

The Martens WIA report findings are summarised below:

1. Water quality and quantity modelling indicates that the proposed stormwater management measures achieve the stormwater management objectives. All measures have been designed to comply with the Industrial Zone Technical Specifications and ACT Municipal Infrastructure Standard MIS08.
2. Water quality management consists of the installation of rainwater tanks with a net minimum volume of 406 kL and an Atlan Ecoceptor 4000 Series (or similar). The rainwater tanks are modelled to have a reuse demand of 8 ML/yr which achieves a reuse supply of approximately 4.64 ML/yr.
3. Water quantity management consists of the construction of a 600m³ OSD basin collecting stormwater runoff from developed areas of the site. The basin is designed to achieve a slow discharge of flows over the course of a minimum of 6 hours after storm events. This is managed through a 110mm orifice and overflow intake pit and weir. A minimum freeboard to the circulation road of 300mm is maintained (design levels are to be finalised at detailed design stage).
4. The SEI assessment indicates that no significant impacts are likely downstream of the discharge location. It is expected that the detailed design of the OSD and energy dissipation structure would further reduce the likelihood of any impacts to the downstream receiving environment (both within Dog Trap Creek generally and in surrounding locations).
5. Site wastewater treatment is proposed to be via an onsite wastewater treatment plant. Site wastewater management includes connection of the wastewater treatment system and all wastewater generating fixtures in staff amenities to reticulated sewer. Future discharge to sewer will be subject to Icon Water's trade waste licence conditions.
6. Sediment and erosion management strategies are proposed to ensure that stormwater runoff during construction from the disturbed area does not adversely impact downstream environments including Dog Trap Creek.

Further Water Impact Assessment

The Conservator of Flora and Fauna of the ACT Government, City and Environment Directorate (the 'Conservator') provided the following comments on the revised EIS:

- *"The proponent should look to maximise stormwater retention on-site for re-use. This would have multiple benefits including reduced potable water demand and reducing stormwater discharge to the receiving environment".*
- *"The stormwater discharge point needs to be designed to ensure that no erosion occurs downstream of the discharge point. Demonstration of this should be a requirement of the Development Application submission".*

Veolia's construction contractor Manteena Commercial Pty Ltd appointed Vital Design Solutions to progress the detailed engineering designs for the MRF including the stormwater management system. These detailed designs (included below in Appendix K) have built on the stormwater design principles and concepts in the original Water Impact Assessment prepared by GHD in 2023 and the new Water Impact Assessment prepared by Martens Environmental Science and Engineering in 2025. The detailed stormwater management system designs have been prepared in accordance with all relevant stormwater design and WSUD standards which generally require:

- A minimum of 1.4 kL of on-site retention per 100m² of impervious area on-site.
- 50% of on-site retention tanks can be allowed as on-site detention.
- Water is to be detained in detention tanks for up to 6 hours and is to be discharged over a period of 6 hours after the storm event.
- Peak flow rate from the site post development must be less than or equal to the peak flow rate from the site pre-development.
- The development is to achieve a minimum 40% reduction in potable water use.
- Developments greater than 2,000m² in area must achieve pollutant load reductions compared with an urban catchment of the same area with no water quality management controls..
- Development is required to meet a minimum target of 20% permeable surface area.

The key components of the stormwater detention, retention and treatment system include:

- 450 kL of on-site detention within three (3) 150kL tanks.
- Ecoceptor stormwater quality improvement device to be installed downstream of the on-site detention tanks to capture gross pollutants, nitrates, phosphates and suspended solids.
- 408 kL stormwater retention tanks.

The detailed stormwater management system designs achieve the following in accordance with the relevant design standards:

On-site retention:

- Stormwater storage (retention) capacity of 1.4 kL per 100m² of total impervious area on-site is provided.
- The total impervious area post development is 29,098m² which requires a minimum of 408 kL of on-site retention.
- 50% of the on-site retention tank has been allowed as on-site detention (i.e. 204kL).

On-site detention:

- Stormwater storage (detention) capacity of 1 kL per 100m² of total impervious area on-site is provided.
- The total impervious area post development is 29,098m² which requires a minimum of 291 kL of on-site detention.
- As 50% of the on-site retention tank has been allowed as on-site detention (i.e. 204 kL), only 87 kL of additional on-site detention is required to meet the ACT WSUD requirements (291 kL of on-site detention – 204 kL of on-site retention to be used as on-site detention).
- However, the 87 kL of on-site detention volume does not meet the peak flow reduction requirement of 450 kL. Therefore, 450 kL of on-site detention has been provided.
- Water will be detained in detention tanks for up to 6 hours and will be discharged over a period of 6 hours after the storm event.
- Peak flow rate from the site post development will be less than the peak flow rate from the site pre-development.

Tie in to existing stormwater infrastructure

- The on-site detention system will discharge into the existing 525 mm stormwater main in Recycling Road via a new manhole.

Mains water use reduction:

- The development achieves a minimum 40% reduction in potable water use through on-site retention of stormwater (52% reduction in potable water use achieved).

Stormwater quality:

- MUSIC modelling results demonstrate that the stormwater management system can achieve the following pollution load reduction including all WSUD targets:
 - 91.6% reduction of gross pollutants (target 90%).
 - 65.3% reduction of suspended solids (target 60%).
 - 63.6% reduction of total phosphorous (target 45%).
 - 53.2% reduction of total nitrogen (target 40%).

Supporting green/living infrastructure in the ACT

- The development meets the minimum target of 20% permeable surface area.
- Of the total 50,622 m² site area, 29,098 m² (57%) is impervious and 21,524 m² (43%) is pervious (permeable).

Conclusions

The changes in site layout and operations, together with the conclusions of the additional water impact assessment undertaken by Martens, result in changes to the matters considered in the draft EIS. This is based on a review of the direct and indirect impacts plus the cumulative impacts.

Progressing the detailed design of the stormwater management system, Veolia has demonstrated that the MRF:

- Complies with all relevant stormwater design and WSUD standards.
- Achieves all on-site detention, on-site retention, peak flow, permeability (porosity) and water quality criteria.
- Maximises stormwater retention on-site for re-use which has:
 - achieved the potable water use reduction targets; and
 - reduced stormwater discharge to the receiving environment.

Note: Veolia have installed the maximum size on site retention tank possible taking space, layout, design and commercial constraints into account.

- Ensures that no erosion occurs at or downstream of the stormwater discharge point as:
 - All stormwater runoff from the impervious areas of the site drain towards and are captured in the on-site detention tanks and no stormwater drains offsite via overland flow.
 - The stormwater discharge point is into the existing 525 mm stormwater main in Recycling Road via a new manhole.
 - Peak flow rate from the site post development will be less than the peak flow rate from the site pre-development, achieved through the proposed on-site detention system.

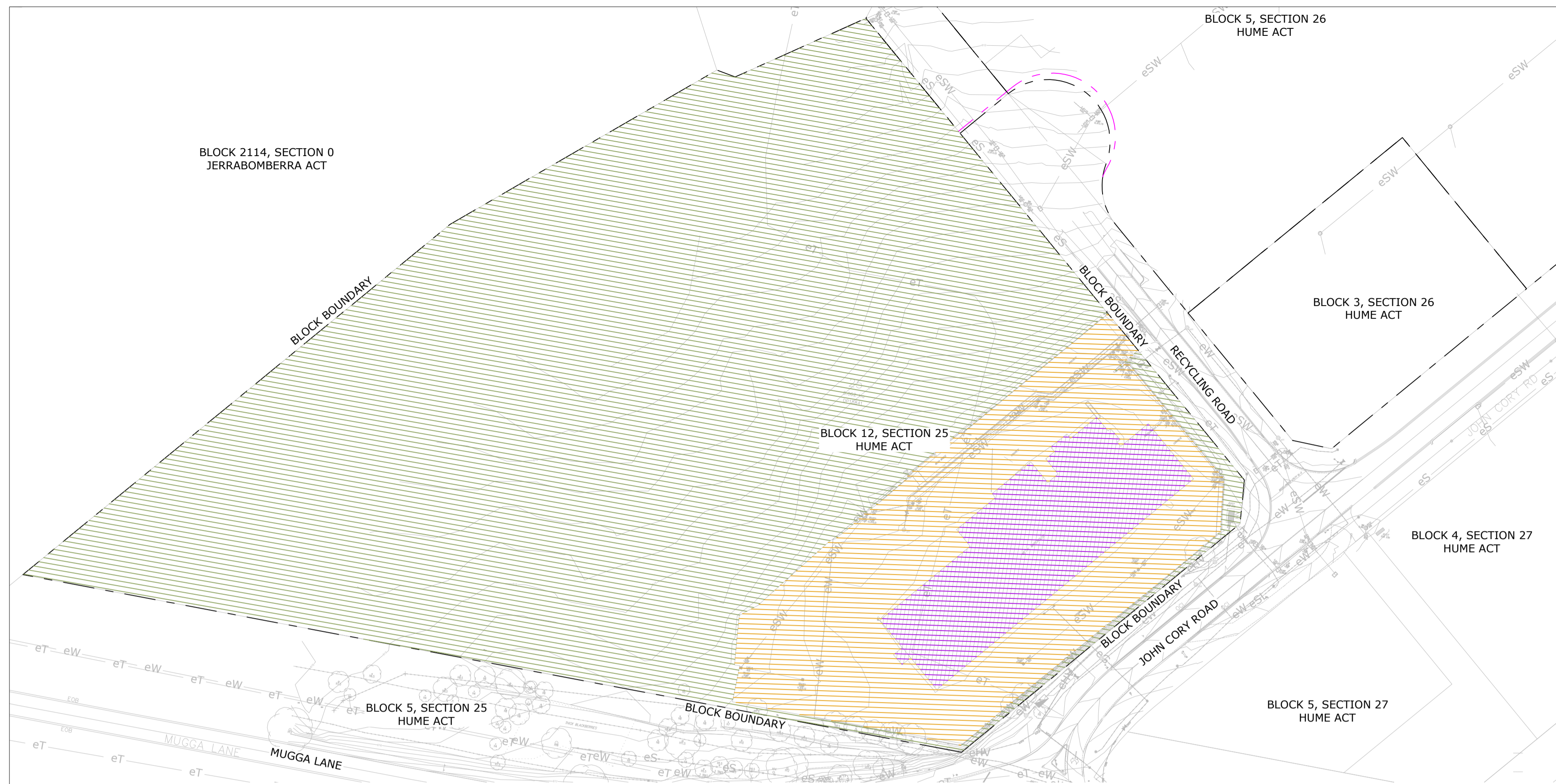
Revised mitigation measures, which are repeated in Table 2 below, are considered relevant for the Veolia MRF development proposal.

Table 2: Mitigation measures to be implemented for the proposal

Potential impact	Measures to reduce impact
Water quality impacts to downstream waterways and associated aquatic ecosystems	A Stormwater Management Plan (SWMP) would be developed that details the following mitigation measures: <ul style="list-style-type: none">▪ Installation and management of on-site detention tanks.

Potential impact	Measures to reduce impact
with regards to suspended solids	<ul style="list-style-type: none"> ▪ Control of upstream run-off movement around the site disturbance area. ▪ Conveyance of site disturbance area run-off to the OSD tanks via dirty water drains. ▪ Water quality monitoring of OSD tanks and discharge. ▪ Rainfall monitoring. ▪ Remedial actions to be taken where water quality value exceedances occur.
Water quality impacts to downstream waterways associated with the operation of the MRF (e.g. littering)	<p>An Operational Water Management Plan (OWMP) would be developed and implemented. Some key features of proposed activities that would be specified and maintained are as follows:</p> <ul style="list-style-type: none"> ▪ Materials inside trucks are not to be removed until truck is fully inside the indoor receiving area. ▪ Products are to be fully repackaged before leaving indoors on instances where they are transferred off-site or between buildings. ▪ Daily visual inspection with any waste located outside to be collected. Inspections would be done by verified and authorised personnel with clearly mandated responsibilities. ▪ Maintenance of the wastewater system, including the containment and conveyance system. ▪ Emergency management procedures, such as management of uncontrolled spills, including where engineered controls of areas containing hazardous materials are required such as bunding or similar to intercept pollutants from the receiving environment. ▪ Suitable storage of fuels and other spill hazards.

Based on the results of the revised WIA and proposed mitigation measures, the residual water quality and hydrology risks associated with the proposal are considered to be low or very low.



WSUD - EXISTING CONDITIONS PLAN
1:1000 @ A1



WSUD - PROPOSED CONDITIONS PLAN
1:1000 @ A1

TOTAL EXISTING SITE CONDITIONS FOR BLOCK 12, SECTION 25 HUME:

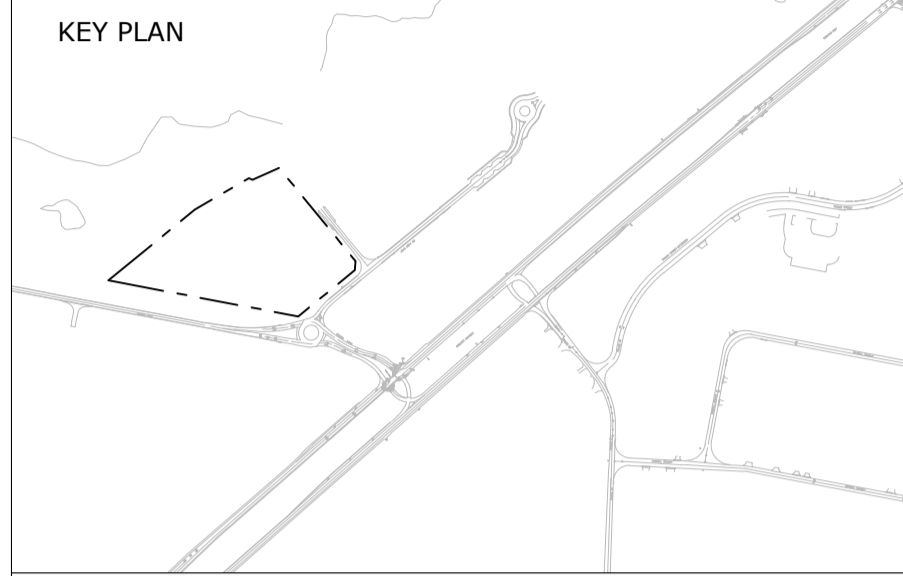
1. TOTAL SITE AREA = 50,622m²
2. TOTAL PERVIOUS AREA = 39,278m² (78%)
- 2.1. LANDSCAPE AREA = 39,278m²
3. TOTAL IMPERVIOUS AREA = 11,344m² (22%)
- 3.1. TOTAL ROOF AREA = 3,424m²
- 3.2. TOTAL PAVEMENT AREA = 7,920m²

TOTAL PROPOSED SITE CONDITIONS FOR BLOCK 12, SECTION 25 HUME:

4. TOTAL SITE AREA = 50,622m²
- 4.1. TOTAL PERVIOUS AREA = 21,524m² (43%)
- 4.1.1. LANDSCAPE AREA (GROUND FLOOR) = 21,524m²
- 4.2. TOTAL IMPERVIOUS AREA = 29,098m² (57%)
- 4.2.1. TOTAL ROOF AREA = 12,036m²
- 4.2.2. TOTAL PAVEMENT AREA = 17,062m²

DISCIPLINE: CIVIL SERVICES				
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B	PRELIMINARY	Z.L.	S.G.	16/07/25
C	DRAFT DEVELOPMENT APPROVAL	S.B.	S.G.	24/07/25

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BLOCK 12 SECTION 25
1 JOHN CORY ROAD
HUME ACT

DRAWING TITLE
WSUD
EXISTING VS PROPOSED
CONDITIONS PLAN

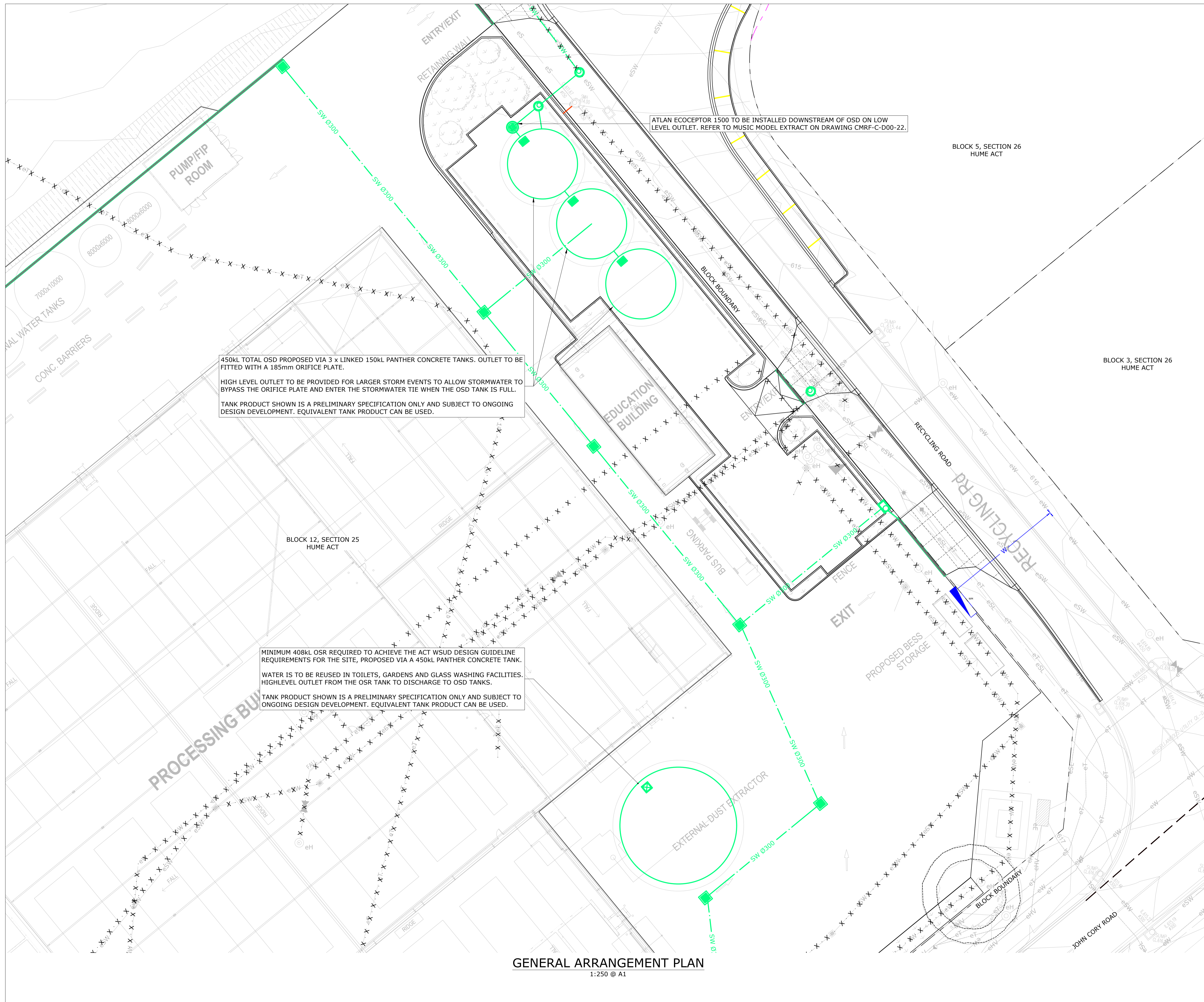
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JOB REFERENCE: VS25017
DRAWING NUMBER: CMRF-C-D00-21

DESIGNED: S.GWYNNE
DRAFTED: S.GWYNNE

SCALE: 0 10.0 20.0 30.0m
SCALE: 1:1,000
SIZE: A1

ISSUE: NOT FOR CONSTRUCTION
REVISION: C



ATLAN ECOCEPTOR 1500 TO BE INSTALLED DOWNSTREAM OF OSD ON LOW LEVEL OUTLET. REFER TO MUSIC MODEL EXTRACT ON DRAWING CMRF-C-D00-22.

450kL TOTAL OSD PROPOSED VIA 3 x LINKED 150kL PANTHER CONCRETE TANKS. OUTLET TO BE FITTED WITH A 185mm ORIFICE PLATE.
 HIGH LEVEL OUTLET TO BE PROVIDED FOR LARGER STORM EVENTS TO ALLOW STORMWATER TO BYPASS THE ORIFICE PLATE AND ENTER THE STORMWATER TIE WHEN THE OSD TANK IS FULL.
 TANK PRODUCT SHOWN IS A PRELIMINARY SPECIFICATION ONLY AND SUBJECT TO ONGOING DESIGN DEVELOPMENT. EQUIVALENT TANK PRODUCT CAN BE USED.

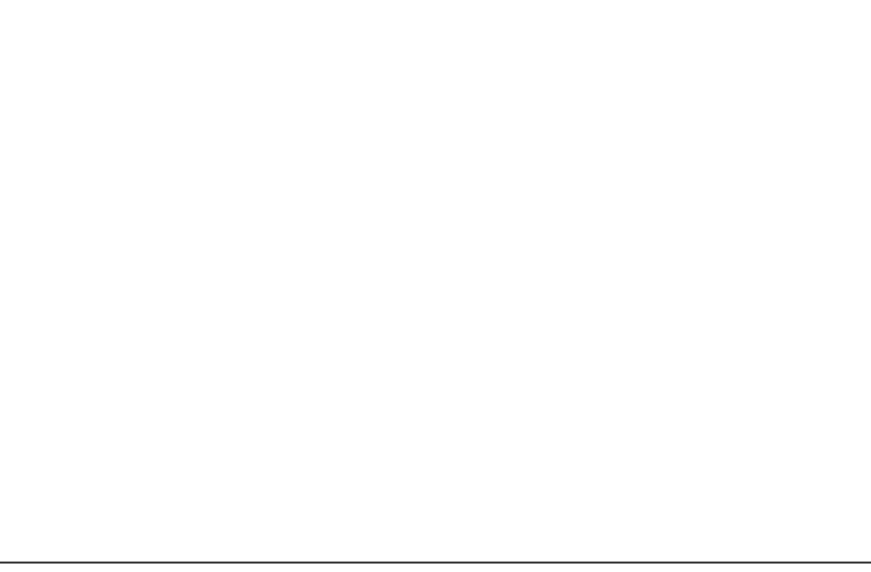
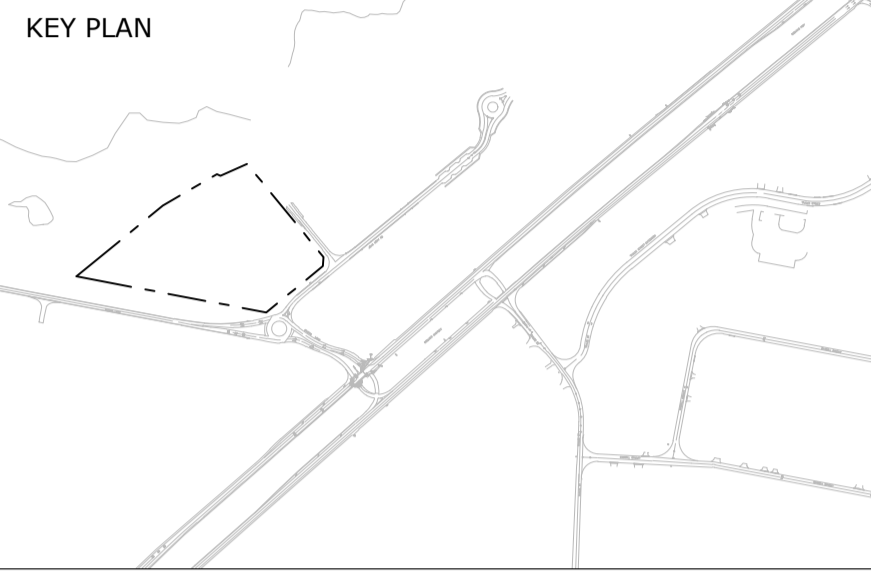
MINIMUM 408kL OSR REQUIRED TO ACHIEVE THE ACT WSUD DESIGN GUIDELINE REQUIREMENTS FOR THE SITE, PROPOSED VIA A 450kL PANTHER CONCRETE TANK.
 WATER IS TO BE REUSED IN TOILETS, GARDENS AND GLASS WASHING FACILITIES. HIGHLEVEL OUTLET FROM THE OSR TANK TO DISCHARGE TO OSD TANKS.
 TANK PRODUCT SHOWN IS A PRELIMINARY SPECIFICATION ONLY AND SUBJECT TO ONGOING DESIGN DEVELOPMENT. EQUIVALENT TANK PRODUCT CAN BE USED.

GENERAL ARRANGEMENT PLAN
 1:250 @ A1

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PROJECT
**MRF MANTEENA
 BLOCK 12 SECTION 25
 1 JOHN CORY ROAD
 HUME ACT**

DRAWING TITLE
**WSUD
 GENERAL ARRANGEMENT PLAN**

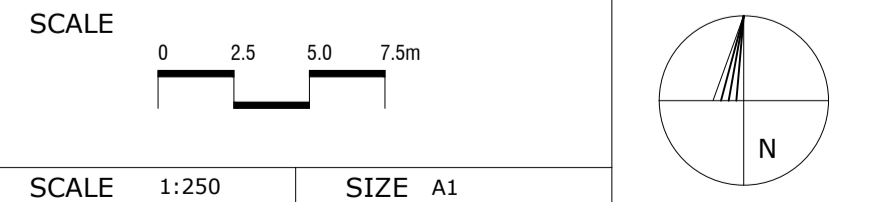
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JOB REFERENCE: **VS25017** DRAWING NUMBER: **CMRF-C-D00-22**

DESIGNED: S.GWYNNE DRAFTED: S.GWYNNE

SCALE: 1:250 SIZE: A1

ISSUE: **NOT FOR CONSTRUCTION** REVISION: **C**



This spread sheet is an online calculator for individuals, designers and developers to gauge possible methods of reducing mains water consumption for commercial, industrial and institutional developments. Please enter ALL the relevant information for your development before using the reduction percentage. This calculator will not be able to cover all water use and water savings for every commercial, industrial and institutional developments. If your development has significant water use or savings that can not be shown in this calculator, then this needs to be disclosed in your Development Application.

Percentage Reduction = 52%

Indoor information

What is the Net Lettable Floor Area (m ²)?	11,485
What is the water rating of the shower head?	3 Star ▼
What is the water rating of the dishwashers?	5 Star ▼
What is the water rating of the sink in the kitchen?	5 Star ▼
What is the water rating of the toilets?	4 Star ▼
What is the water rating of the urinals?	5 Star ▼
What is the water rating of the basins in the bathroom?	5 Star ▼

Site information

Site area (m ²)?	50,622
Roof area (including house and garage or carport) (m ²)?	12,036
Irrigated garden area (m ²)?	528

Other water use

What is the approximate yearly water consumption of the Cooling System (L/yr)?	0
What is the approximate yearly water consumption of the Fire Testing System (L/yr)?	28,300

Rain water tank information

Is there going to be a water tank installed?	Yes ▼
What is the size of the tank (L)?	408,000
What is the approx. roof area flowing into the tank (m ²)?	12,036
What will be the use for the water in the tank?	Garden, Toilet and Urinal ▼
What is the % of Toilets connected to Rain Water?	100%
What is the % of Urinals connected to Rain Water?	100%

Grey water information

What type of grey water system is installed?	None ▼
What is the size of the grey water storage tank (L)?	0
Where will the grey water be collected from?	▼
What will be the use for the grey water?	▼
What is the % of Toilets connected to Grey Water?	0%
Does this treated Grey water supply Toilets that have Rain water supplied to them?	No ▼
What is the % of Urinals connected to Grey Water?	0%
Does this treated Grey water supply Urinals that have Rain water supplied to them?	No ▼

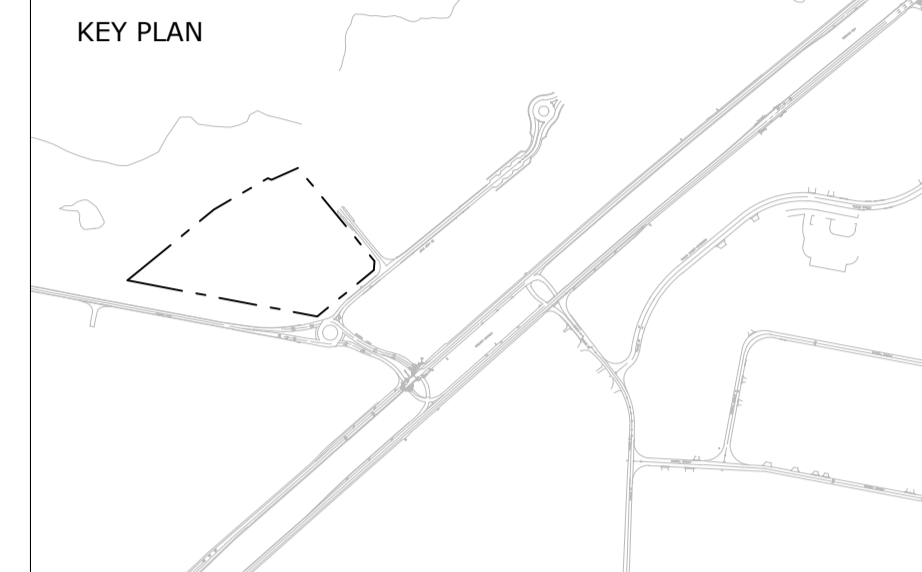
Pool, spa or water feature information

Is there going to be a pool, spa, or water feature?	No ▼
Is there going to be a cover on the pool or water feature?	No ▼
Average depth of the pool, spa or water feature (m)?	0
Average length of the pool, spa or water feature (m)?	0
Average width of the pool, spa or water feature (m)?	0
The volume of the pool, spa or water feature is (L)	0

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B	PRELIMINARY	Z.L.	S.G.	16/07/25
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**MRF MANTEENA
BLOCK 12 SECTION 25
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HUME ACT**

DRAWING TITLE

**WSUD
WATER REDUCTION
CALCULATIONS PLAN**

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JOB REFERENCE	DRAWING NUMBER
VS25017	CMRF-C-D00-23
DESIGNED S.GWYNNE	DRAFTED S.GWYNNE

SCALE	
NTS	
SCALE NTS	SIZE A1

ISSUE	REVISION
NOT FOR CONSTRUCTION	C

WARNING:
THE LOCATION OF EXISTING SERVICES SHOWN ARE ESTIMATES ONLY. THESE ESTIMATES HAVE BEEN DEVELOPED FROM INFORMATION PROVIDED BY SERVICING AUTHORITIES AND PREVIOUS DOCUMENTATION ASSOCIATED WITH THE DEVELOPMENT. THE LOCATIONS SHOWN ON THIS DRAWING ARE NOT TO BE RELIED UPON FOR CONSTRUCTION WORKS. INFORMATION SHOWN IS TO BE CONFIRMED IN THE FIELD BY THE CONTRACTOR.

VITAL DESIGN SOLUTIONS DOES NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN SHOWS MORE THAN PRESENCE OR ABSENCE OF A SERVICE. VITAL DESIGN SOLUTIONS ACCEPTS NO LIABILITIES FOR INACCURACIES SHOWN.

VITAL DESIGN SOLUTIONS DOES NOT HAVE PERFECT INFORMATION IN RELATION TO UNDERGROUND SERVICES INCLUDING ORIENTATION OF CONDUIT BANKS, PIPE THICKNESS, SOCKET LOCATIONS, ETC. THE INFORMATION PROVIDED IS BASED ON A COMPILATION OF EXISTING ASSET DATA, NON INTRUSIVE SITE SURVEY AND EXPOSED SURVEY OF ANY SERVICES WHERE PROVIDED. VITAL DESIGN SOLUTIONS WILL REQUIRE TIME TO CO-ORDINATE ANY DESIGN ELEMENTS AROUND SERVICES FOUND ON SITE NOT TO BE IN ACCORDANCE WITH THE PRELIMINARY INFORMATION PROVIDED.

DEPTH OF SERVICE IS ASSUMED TO BE:
600mm < DEPTH < 1000mm
UNLESS SHOWN OTHERWISE ON PLAN.

CONTRACTOR IS TO LIAISE WITH AUTHORITIES REGARDING SERVICES LOCATION AND UNDERTAKE SAFE POT HOLING TO CONFIRM LOCATION AND DEPTH OF EXISTING SERVICES PRIOR TO CONSTRUCTION.

NOTES:

- DRAWING TO BE READ IN CONJUNCTION WITH [CMRF-C-D00-11](#).
- CONTRACTOR IS TO GAIN APPROVAL TO REMOVE/ADJUST ANY SURVEY MARKS INCLUDING CADASTRAL REFERENCE MARKS, PERMANENT SURVEY MARKS, STATE SURVEY MARKS AND ANY OTHER. PLANS DO NOT SHOW LOCATION OF SURVEY MARKS, CONTRACTOR IS TO UNDERTAKE OWN INVESTIGATION.
- SERVICES IN CLOSE PROXIMITY TO EXCAVATION TO BE POTHOLED AND IDENTIFIED PRIOR TO EXCAVATION. RL'S OF ALL IN GROUND SERVICES TO BE SURVEYED PRIOR TO THE INSTALLATION OF ANY GROUND ANCHORS ASSOCIATED WITH SHORING OF EXCAVATION.

BLOCK 12, SECTION 25 - PROPOSED SERVICES:

WATER:

- THE SITE IS PROPOSED TO BE SERVICED BY SINGLE Ø150mm WATER TIE FROM THE EXISTING Ø150mm RECYCLING ROAD MAIN.
- REFER TO EXTERNAL SERVICES PLAN FOR DETAILS ON PROPOSED WATER CONNECTION.

SEWER:

- THE SITE IS PROPOSED TO BE SERVICED BY 1 x SEWER TIE FROM EXISTING SEWER MAINTENANCE HOLE ON THE Ø150mm MAIN ON RECYCLING ROAD VERGE.
- REFER TO EXTERNAL SERVICES PLAN FOR DETAILS ON PROPOSED SEWER CONNECTIONS.

STORMWATER:

- THE SITE IS PROPOSED TO BE SERVICED BY 1 x Ø525mm STORMWATER TIE FROM PROPOSED STORMWATER R-SUMP ON EXISTING STORMWATER MAIN ON RECYCLING ROAD VERGE.
- REFER TO DRAWING [CMRF-C-D00-20](#) SERIES FOR INFORMATION RELATING TO ON-SITE WSUD MEASURES PROPOSED.

GAS:

- IF GAS IS PROPOSED TO SITE, DETAIL BY OTHERS.

ELECTRICITY:

- ALL ELECTRICAL SERVICING DETAIL BY OTHERS INCLUDING SUPPLY AND SUBSTATION.

COMMUNICATIONS:

- ALL COMMUNICATIONS SERVICING DETAIL BY OTHERS.

SCHEDULE OF WITNESS AND HOLD POINTS - STORMWATER TIE:

HOLD POINTS TO BE ADDRESSED BY CONTRACTOR AND RELEASED BY ENGINEER PRIOR TO CONTINUATION OF WORK.

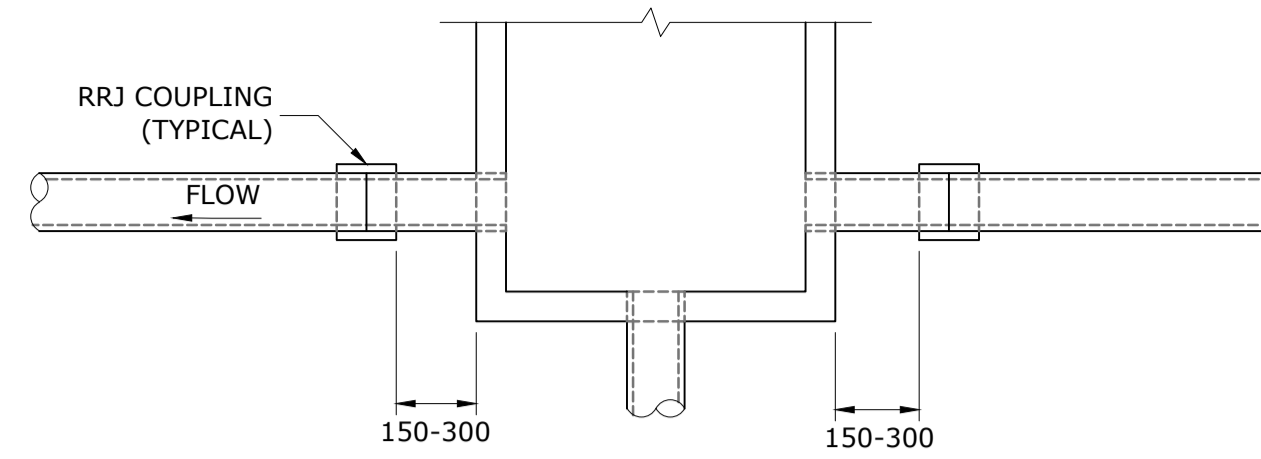
WITNESS POINTS TO BE ADDRESSED AND WRITTEN RELEASE ISSUED BY ENGINEER PRIOR TO CONTINUATION OF WORKS.

ID	Type	Description
1.01	HP	INTEGRITY OF MATERIAL ENGINEER TO VALIDATE SUITABILITY OF MATERIALS PROPOSED TO BE USED TO CONSTRUCT MAIN. CAN BE ACHIEVED THROUGH CONTRACTOR ISSUING DELIVERY DOCKETS RELATING TO BEDDING, BACKFILL AND PIPE MATERIALS
1.02	WP	EXPOSED STORMWATER MAIN ENGINEER TO INSPECT AND CONFIRM SIZE AND MATERIAL OF MAIN TO ENSURE DESIGN IS INLINE WITH DESIGN INTENT AND TCCS STANDARDS.
1.03	WP	PIPE AS LAID - PRIOR TO BACKFILLING ENGINEER TO INSPECT PIPE AS LAID PRIOR TO BACKFILLING.
1.04	WP	AS BUILT

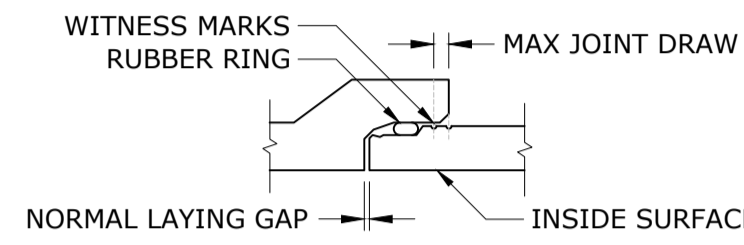
CONTRACTOR IS TO OBTAIN CCTV FOOTAGE OF THE STORMWATER TIE, SUITABLE FOR SUBMISSION TO TAMS AND APPROVAL. CCTV FOOTAGE TO BE ISSUED TO TAMS COORDINATOR FOR REVIEW AND INCLUSION IN THE OPERATIONAL ACCEPTANCE SUBMISSION.

LEGEND SERVICE	EXISTING	PROPOSED	INFRASTRUCTURE	EXISTING	PROPOSED
WATER MAIN	eW	W	WATER METER	⊙ _{W/M}	
SEWER MAIN	eS	S	WATER VALVE	⊙ _{W/V}	
STORMWATER MAIN	eSW	SW	GAS METER	⊙ _{G/M}	
SUBSOIL DRAIN		SSD	GAS VALVE	⊙ _{G/V}	
GAS MAIN	eG		SEWER MANHOLE	⊙ _{S/M}	
ELECTRICITY	eE		STORMWATER MANHOLE	⊙ _{S/W/M}	
ELECTRICITY UG/HV	eUG/HV		STORMWATER GRATED PIT	⊙ _{S/W/G/P}	
ELECTRICITY UG/LV	eUG/LV		STORMWATER R-SUMP	⊙ _{S/W/R/S}	
STREETLIGHT MAIN	eSL		EXISTING SURFACE PROFILE	— — — — —	
OPTUS MAIN	eOP		SSD HIGH END RISER (HER)	⊙ _{HER}	
TELSTRA MAIN	eT				
TRANSACT MAIN	eTA				
COMMUNICATIONS	eC		PIPE GRADING BOX	⊙ _{P/G/B}	
ABANDONED SERVICE	-X-X eWK-X-				
BLOCK BOUNDARY	- - - - -				
SERVICE TO BE REMOVED	-x-x-x/x/x-x-				

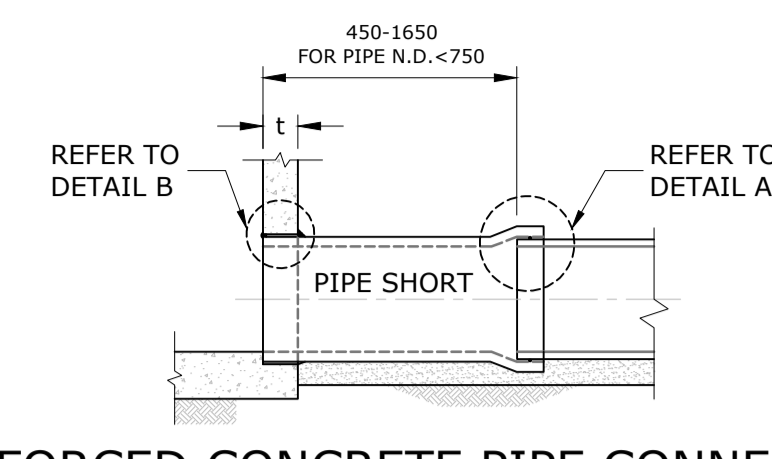
U/L	000.000	UPSTREAM INVERT LEVEL
L	00.00m	PIPE LENGTH
Ø		PIPE SIZE (DIAMETER)
RCP	CLASS 4	PIPE MATERIAL PIPE CLASS
	0.0%	PIPE GRADE/SLOPE
D/L	000.000	DOWNSTREAM INVERT LEVEL



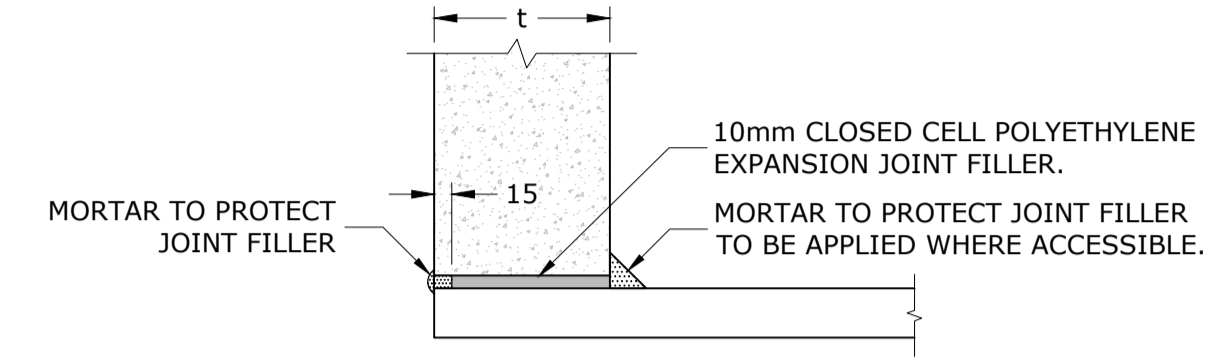
FRC & UPVC CONNECTIONS TO STRUCTURES
NTS



SPIGOT AND SOCKET JOINT - DETAIL A
NTS



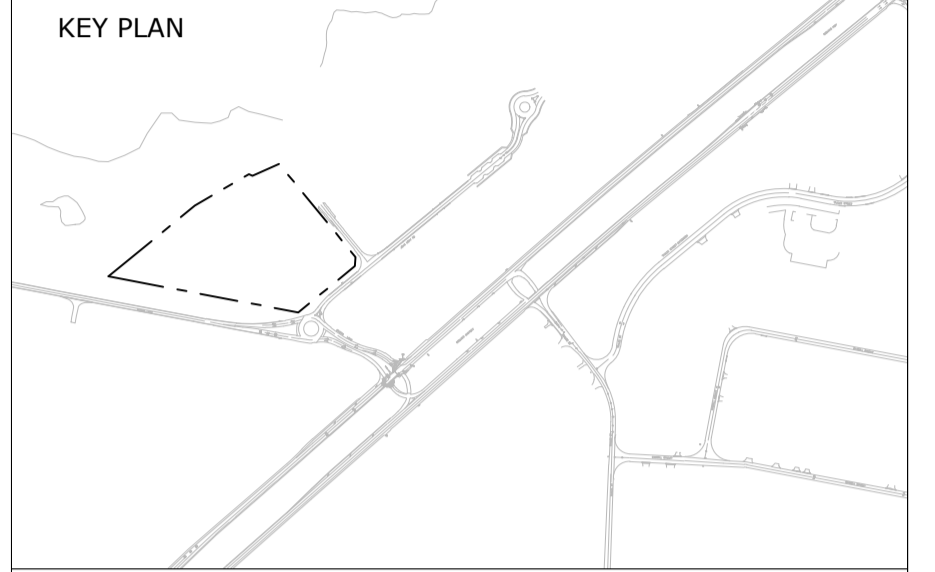
REINFORCED CONCRETE PIPE CONNECTIONS TO STRUCTURES - ELEVATION
NTS



RCP & STRUCTURE WALL CONNECTION JOINT - DETAIL B
NTS

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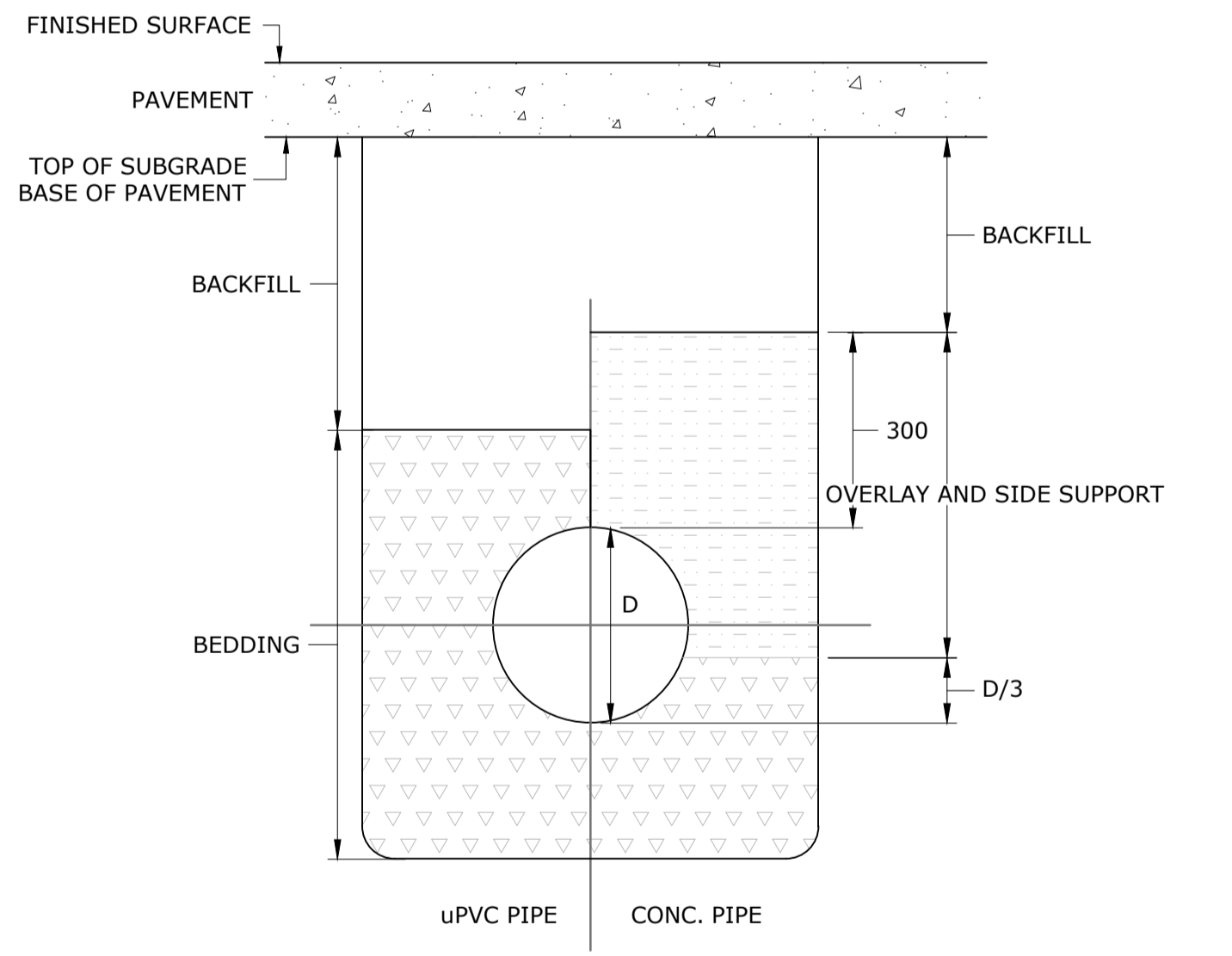
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SCALE	NTS	SIZE	A1

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	MATERIALS	COMPACTION
BACKFILL	TRAFFICABLE AREAS: DGB-20 NON-TRAFFICABLE AREAS: MATERIALS FROM EXCAVATION OF TRENCH OR OTHER PROVIDING NO STONES LARGER THAN 150mm AND STONES BETWEEN 75mm AND 150mm MAKE UP NO MORE THAN 20% OF THE MIX BY MASS.	PLATE COMPACTOR APPLIED TO MAX. 150mm THICK LAYERS. TRAFFICABLE AREAS: MMDD > 95% NON TRAFFICABLE AREAS: MMDD > 90%
OVERLAY AND SIDE SUPPORT	TRAFFICABLE AREAS: DGB-20 NON-TRAFFICABLE AREAS: MATERIALS FROM EXCAVATION OF PIPE TRENCH OR OTHER PROVIDING NO ORGANIC MATTER, CLAY > 75mm & STONES > 26.5mm ARE INCLUDED IN THE MIX.	TO BE COMPACTED AND THOROUGHLY TAMPED BY HAND TO ENSURE UNIFORM SUPPORT TO THE PIPE AS LAID. ENSURE PIPELINE IS NOT DISLODGED DURING PROCESS. ONCE 100mm COVER IS ACHIEVED OVER THE PIPE, PLATE COMPACTOR MAY BE APPLIED IN MAX. 150mm LAYERS.
BEDDING	COARSE SAND WITH NO ORGANIC MATTER AND THE FOLLOWING GRADING PROPERTIES: 100% < 13.2mm MIN. 85% < 2.36mm MAX. 15% < 0.075mm	TRAFFICABLE AREAS: MMDD > 95% NON TRAFFICABLE AREAS: MMDD > 90%

STORMWATER PIPE - BEDDING AND BACKFILL DETAIL

Water Impact Assessment

Proposed Hume Materials Recovery Facility, Hume, ACT

Final Report

P2510725JR01V01

April 2025

Prepared for Element Environment C/- Veolia

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1 Introduction

1.1 Background

Martens and Associates (**MA**) have been engaged by Element Environment on behalf of Veolia (the **Client**) to prepare a Water Impact Assessment (**WIA**) to support an Environmental Impact Statement (**EIS**) for a proposed Materials Recycling Facility (**MRF**) located at Block 12, Section 25, Hume, ACT (the **Site**).

This WIA is an update to the previous WIA by GHD (May 2024) (the **GHD Report**).

1.2 Proposed Development

It is understood the proposed development includes:

- Demolition of the previous fire-damaged MRF on the Site (presently being used for materials storage).
- Construction of a new MRF with a processing capacity of 115,000 tonnes/year of mixed recyclables.
- Construction of associated infrastructure including site accesses, parking and hard stand areas.
- Provision of services including electricity, telecommunications, water, sewerage, etc.
- Construction of new onsite stormwater management facilities including discharge quantity and quality controls.
- Provision of a new onsite wastewater treatment system.

Refer to Appendix A for the proposed site layout.

1.3 Project Scope

The scope of the WIA includes:

- Describe Site stormwater management measures, including detailed water quantity and quality modelling, to demonstrate compliance with Water Sensitive Urban Design (**WSUD**) requirements.
- Provide a water balance assessment detailing water requirements and sources, and site stormwater discharge/rainwater tank overflow frequency and volume.
- Provide a summary of proposed onsite wastewater management including details of treatment systems, storages, recycling and discharge to reticulated sewer.
- Describe proposed sediment and erosion control management measures.

1.4 Guidelines

The guidelines referenced in this report are:

- *ACT Practice Guidelines for Water Sensitive Urban Design – Module 1: Introduction to WSUD in the ACT*, published by Environmental, Planning and Sustainable Development Directorate (ACT Government), dated 2017.

- *ACT Practice Guidelines for Water Sensitive Urban Design – Module 2: Designing Successful WSUD in the ACT*, published by Environmental, Planning and Sustainable Development Directorate (ACT Government), dated 2018.
- *Australian/New Zealand Standard 1547:2012*, published by SAI Global Limited, dated 2012.
- *Environment Protection Guidelines for Construction and Land Development in the ACT*, published by the ACT Government, dated 2022.
- *Icon Water Acceptance Guideline 1*, published by Icon Water, dated 2016
- *Icon Water Acceptance Guideline 19*, published by Icon Water, dated 2016
- *Icon Water Acceptance Guideline 20*, published by Icon Water, dated 2016
- *Managing Urban Stormwater: Soils and Construction – Volume 1*, published by Landcom, dated 2004.
- *Municipal Infrastructure Standard 08 Stormwater*, Edition 1 Revision 2, published by Transport Canberra and City Services, dated December 2024 (**MIS08**).
- *NSW MUSIC Modelling Guidelines*, published by BMT WBM, dated August 2015.
- *Planning (Industrial Zones) Technical Specifications 2024*, under the *Planning Act 2023*, published by Act Government, dated September 2024.

2 Environmental Setting

2.1 Site Summary

The Site is summarised in Table 1. An overview of the Site is provided in Map 1 at Appendix B.

Table 1: Site summary.

Item	Description / Comment
Address	Block 12, Section 25 Recycling Road, Hume, ACT.
Legal identifier	Block 12, Section 25, DP 15841.
Local government area	Australian Capital Territory
Site area	Approx. 5.06 ha (3.024 considered in the works)
Land zoning	IZ1: General Industry
Current land use	Existing waste transfer and storage station within main shed of previous MRF, site accesses, hardstand, services (telecommunications, electricity, water, sewer, etc.), materials stockpiles, security fences, an onsite dam and undeveloped land area.
Surrounding land use	Site is located within the Hume Resource Recovery Estate. Adjacent land use is largely industrial (Hume Industrial Estate), waste management (landfill), energy production and transport (Mugga Lane and the Monaro Highway).
Elevation and Aspect	Site elevation ranges from approximately 610 mAHD in the northern corner of the Site adjacent to Dog Trap Creek, to approximately 619 mAHD along the southern Site boundary. Site aspect is towards the north and west.
Site Drainage and Waterways	The existing Site drainage is unknown, however it is assumed from the topography that it generally drains south to north. It is expected the majority of the drainage system is comprised of overland paths with the existing roof area collected via downpipes and discharged to overland flow paths in the surrounding hardstand. The undeveloped portion of the site drains north to the existing dam located adjacent to the northwestern site boundary or offsite to Dog Trap Creek. Dog Trap Creek is located on an adjacent lot approximately 40 m northwest of the Site boundary. It drains in a north-easterly direction, approximately parallel to the Site boundary. Dog Trap Creek is a tributary of Jerrabomberra Creek.
Site soils	Soils in the vicinity of the Site are generally loam or sandy loam (source: eSPADE). The GHD Report indicates that some clayey and silty sands are also present.
Climate	Climate at the Site is generally temperate with an average annual rainfall of 616 mm (measured from 1939 to 2010). Highest monthly rainfall occurs in October and November and lowest monthly rainfall occurs in June and July. The mean maximum daily temperature range is 13.2°C to 28.0°C and the mean minimum daily temperature range is -0.1°C to 11.4°C.

3 Stormwater Quality Management

3.1 Stormwater Quality Objectives

Stormwater quality management objectives have been obtained from ACT Planning (Industrial Zones) Technical Specifications 2024 (the **Technical Specifications**).

Clause 14.7 of the Technical Specifications requires the following stormwater reduction targets:¹

- 90% reduction in total gross pollutants (**GP**).
- 60% reduction in total suspended solids (**TSS**).
- 45% reduction in total phosphorous (**TP**).
- 40% reduction in total nitrogen (**TN**).

Clause 14.5(a) of the Technical Specifications requires that stormwater retention measures are provided and achieve the following:

- Stormwater storage capacity of 1.4 kL per 100 m² of the total impervious area of the site is provided specifically to retain and reuse stormwater generated on site as a whole.
- Retained stormwater is used on site.

The proposed stormwater management strategy has been designed to satisfy the above objectives.

3.2 Modelling Methodology

3.2.1 Approach

Model for Urban Stormwater Improvement Conceptualisation (**MUSIC**) version 6.3 developed by CRC for Catchment Hydrology was used to evaluate the treatment train effectiveness to remove post development pollutant loads from the Site.

Modelling was undertaken in accordance with the Technical Specifications and MIS08 for the proposed development. The model was developed based on the conceptual site layout and catchment area details.

An iterative approach was used for post development modelling to determine appropriate types, sizes, and locations of stormwater treatment devices to achieve water quality objectives. Refer to Map 2 in Appendix B for conceptual stormwater layout and Figure 1 at Appendix C for the post development MUSIC model layout.

¹ Table 8-32 at Section 11.1 of MIS08 contains the same requirements.

3.2.2 Rainfall Data

MUSIC was run on a 6 minute timestep using 6 minute rainfall data dated from 01/01/1968 to 31/12/1977 recorded at Canberra Airport in accordance with the requirements of the Technical Specifications and MIS08.

3.2.3 Input Parameters

Input parameters for source and treatment nodes have been derived from Table 8-33 and Table 8-44 in MIS08, refer to Appendix D for all input parameters.

3.2.4 Catchment Area

Catchment areas were separated into areas corresponding to roof, hardstand and landscaped areas. Catchment area details are provided at Table 2 and shown in Map 3 in Appendix B.

Table 2: MUSIC Catchments.

Name	Description	Area (ha)	% Impervious Area
1A01	Roof to Rainwater Tank	1.15	100%
1A02	Roof to Gross Pollutant Trap	0.02	100%
1A03	Carpark to Gross Pollutant Trap	0.11	100%
1A04	Landscape to Gross Pollutant Trap	0.06	0%
1A05	Hardstand to Gross Pollutant Trap	1.61	100%
1A06	Landscape Bypass	0.06	0%
TOTAL AREA		3.02	96%

3.3 Proposed Treatment Train

The stormwater treatment strategy utilises at source and end of line treatment devices to achieve treatment objectives. Individual stormwater quality improvement devices (**SQID**) are outlined in the following sections.

All MUSIC modelling treatment node inputs parameters are provided in Appendix D.

3.3.1 Rainwater Tanks

Rainwater tanks are proposed to store and allow reuse of captured roof water from the main building. Rainwater tanks provide primary treatment and help to filter coarse matter and litter from collected roof areas.

The total Site impervious area of 2.898 ha requires a minimum of 405.7 kL rainwater tank storage per the Technical Specifications. To satisfy the objective a minimum of 406 kL rainwater tank storage has been included in the proposed stormwater management strategy. Rainwater tank storage can be increased at detailed design stage if required.

The proposed rainwater tank volume has been modelled with a reuse demand of 8ML/yr as provided by the Client. Internal reuse will be used for glass washing facilities. Additional rainwater tank reuse details are provided in Section 5.

3.3.2 Gross Pollutant Trap (Atlan Ecoceptor)

A Gross Pollutant Trap (**GPT**) has been proposed to treat and manage site runoff from hardstand areas. GPT's provide primary treatment and help to filter coarse matter and sediments from surface runoff with specific devices also able to treat suspended solids and nutrients.

The Atlan Ecoceptor (4000 Series) has been proposed for the development, refer to Appendix E for the product guide. The GPT is to be located at the end of line to collect and treat site discharge from the development footprint. The modelled treatment efficiency of the Atlan Ecoceptor is based on the manufacturer's specifications.

3.4 MUSIC Model Results

Treatment train effectiveness results based on MUSIC modelling for the proposed development are provided in Table 3. Results indicate the proposed stormwater management treatment strategy achieves the stormwater quality reduction targets outlined in Section 3.1.

Table 3: MUSIC treatment train effectiveness results.

Parameter (kg/year)	Source	Residual Load	%Reduction	Performance Criteria Target (%)
TSS	240	72	70	60
TP	4.26	1.32	69	45
TN	50.9	23.1	54.7	40
GP	635	50.9	92	90

3.5 Discussion

MUSIC modelling results indicates the proposed stormwater treatment requirements of the Technical Specifications and MIS08 will be satisfied by the proposed stormwater quality treatment train. The proposed treatment train is comprised of the following:

1. Minimum 406 kL rainwater tanks with 8 ML/yr internal reuse demand to be used for glass washing purposes.
2. A GPT (Atlan Ecoceptor) located to treatment proposed roof and hardstand areas.

Further refinement of the models at the detailed design stage may alter the size and locations of the proposed stormwater treatment devices. However, the minimum performance outcomes outlined in Section 3.1 of this report are to be achieved.

4 Stormwater Quantity Management

4.1 Water Quantity Objectives

Stormwater quantity management objectives have been obtained from the Technical Specifications.

Clause 14.5(b) of the Technical Specifications requires that stormwater detention measures are provided and achieve all of the following:

- Capture and direct runoff from the entire site.
- Stormwater storage capacity of 1kL per 100m² of impervious area is provided to specifically detain stormwater generate on site.
- Detained stormwater is designed to be released over a period of 6 hours after the storm event.

The proposed onsite detention (**OSD**) system has been conceptually designed to satisfy the above objectives.

4.2 DRAINS Modelling

4.2.1 Approach

DRAINS hydrological and hydraulic modelling package was used with the ILSAX hydrological engine to determine requirements to satisfy the criteria nominated in Section 4.1.

The hydrological model was modelled using the prescribed DRAINS model parameters found in Table 8-8 of MIS08. Hydraulic modelling has been completed to determine the maximum flow rate for the 1 EY to 1% AEP storm events with durations between 5 minutes to 9 hours for both existing and developed conditions.

The DRAINS model layout is provided at Appendix F.

4.2.2 Rainfall/IFD Data

IFD data that was used for the model was sourced from the Bureau of Meteorology (BoM) for all storm events referenced above. Design rainfall depths have been provided at Table 4 in accordance with Part 3.1.3 of MIS08.

Table 4: Design Rainfall Depths (BoM)

Duration	Rainfall Depths for various Annual Exceedance Probability (mm)							
	1 EY	0.5 EY	20% AEP	0.2 EY	10% AEP	5% AEP	2% AEP	1% AEP
5 min	5.36	6.77	8.59	8.76	10.4	12.4	15.1	17.4
10 min	8.19	10.4	13.2	13.5	16.1	19.2	23.7	27.5
15 min	10.1	12.7	16.3	16.6	19.9	23.7	29.2	33.9
20 min	11.5	14.5	18.6	18.9	22.6	26.9	33.2	38.3

	Rainfall Depths for various Annual Exceedance Probability (mm)							
25 min	12.6	16	20.4	20.8	24.8	29.5	36.1	41.7
30 min	13.6	17.2	21.8	22.3	26.6	31.5	38.6	44.3
45 min	15.8	19.9	25.2	25.7	30.6	36.1	43.9	50.2
1 hour	17.5	22	27.7	28.3	33.5	39.4	47.7	54.4
1.5 hours	20.1	25.2	31.4	32.1	37.8	44.3	53.3	60.7
2 hours	22.1	27.7	34.3	35	41	48	57.8	65.7
3 hours	25.4	31.6	38.7	39.5	46.2	54	64.9	73.9
4.5 hours	29.3	36.2	43.9	44.7	52.2	60.9	73.5	83.9
6 hours	32.3	39.9	48	48.9	57	66.6	80.6	92.3
9 hours	37.2	45.6	54.6	55.7	64.8	75.9	92.2	106

4.2.3 Catchment Area

Existing catchment delineation was completed using the proposed development footprint received from Element Environment (Appendix A) and lidar data with the impervious fraction determined from aerial photography. The existing catchment was modelled as one node in DRAINS. Proposed catchment delineation was based on the development footprint with impervious fraction based on the proposed land uses. Time of concentration for catchments was estimated based on the longest flow path.

Catchments are presented in Table 5 and Table 6, refer to Map 4 in Appendix B for the post development catchments. The pre development catchment area is equivalent to the post development catchment extent.

Table 5: Pre Development DRAINS Catchments .

Name	Description	Area (ha)	% Impervious Area
1E01	Existing Site	3.02	57%

Table 6: Post Development DRAINS Catchments.

Name	Description	Area (ha)	% Impervious Area
1A01	Roof	1.17	100%
1A02	Other Area	1.85	93%
	TOTAL AREA	3.02	96%

4.3 Concept Drainage and OSD Strategy

An OSD basin has been proposed downstream of the proposed development footprint and stormwater quality devices (i.e. GPT) to detain surface runoff generated by the development, refer to the concept drainage plan provided in Map 2 in Appendix B.

The preliminary modelling indicates the proposed OSD basin properties are:

- Minimum volume of approximately 600m³ (approximately equal to 2.09kL per 100m²),
- Orifice Diameter of 110 mm,
- Storage depth of 1.3 m with minimum 300 mm freeboard to the circulation road,
- Overflow weir length of 4.0 m
- Overflow pit intake perimeter of 2.7 m.

To reduce erosion risk for the controlled development discharge an energy dissipation structure has been nominated at the OSD outlet with detailed sizing to be completed at detailed design stage, refer to Map 2 for the location.

4.4 DRAINS Model Results

The DRAINS modelling results indicate the proposed OSD strategy satisfies the stormwater quantity reduction targets outlined in Section 4.1. Here:

1. The pre development 1 EY site discharge rate is 214 L/s with the post development discharge rate reduced to 51 L/s.
2. Storm event discharge duration in Table 7 demonstrates that the detained stormwater is released over a minimum period of 6 hours after the critical duration storm for each storm event.

Table 7: DRAINS Storage Discharge Results

Storm Event	Storm Event Duration (min)	Discharge Duration (min)	Discharge Duration after storm event (hrs)	Complies (Y/N)
1EY	180 min	608 min	7.13	Y
0.5EY	120 min	562 min	7.37	Y
20% AEP	90 min	538 min	7.47	Y
0.2EY	90 min	538 min	7.47	Y
10% AEP	30 min	478 min	7.47	Y
5% AEP	30 min	478 min	7.47	Y
2% AEP	20 min	470 min	7.50	Y
1% AEP	15 min	465 min	7.50	Y

4.5 Discussion

Stormwater detention requirements of the Technical Specifications are satisfied by the proposed stormwater drainage and OSD strategy. The proposed strategy includes an OSD storage volume of 600 m³ with a controlled slow release discharge outlet to ensure development runoff is discharged over a period greater than 6 hours.

Further refinement of the models at the detailed design stage may alter the size and locations of the proposed OSD system. However, the minimum performance outcomes outlined in Section 4.1 of this report are to be achieved.

5 Water Balance Analysis

5.1 Overview

Site water balance analysis has been prepared to document the following:

1. Average annual water demand for glass washing water use requirements.
2. The volume of rainwater harvested from roofs and alternative water sources.
3. Site discharge volumes and frequency.
4. Rainwater tank overflow volume and frequency.

5.2 Methodology

To address items in Section 5.1 the assessment has been separated into the following components:

1. **Site water demand:** Consideration of water demands required for the glass washing facility during operation.
2. **Site water supply:** Assessment of site water supply options (roof water, recycled water and mains water).
3. **Site water balance:** Assessment of supply availability to meet long term water demands and a summary of stormwater runoff volume and frequency.

5.3 Site Water Demand

Annual water demand was determined based on advice from the Client provided in an email dated 20/02/2025. The Client advised expected annual demand is based on 50 m³/hr for 10 hours of operation per day for 5 days a week over 50 weeks. Annual demand has been converted to average daily demand over 250 days for modelling purposes.

Table 8: Summary of water demand at the site.

Demand	Annual Demand (kL/year)	Average Daily Demand (kL/day)
Glass Washing	125,000	500

5.4 Site Water Supply Sources

The Client advised water for the glass washing process can be supplied by provision of a mix of the following water supply sources:

- Rainwater
- Recycled water
- Mains water (potable water).

5.4.1 Roof Water

MUSIC has been used to assess the average annual reuse supplied by roof water, the volume and frequency of rainwater tank overflow and site discharge. Modelling has been undertaken in accordance the NSW MUSIC Modelling Guidelines for the proposed development.

The water balance assessment was completed using the MUSIC model documented in Section 3.3 (i.e. rainfall and evapotranspiration data, source node inputs, catchment areas and treatment node parameters). The MUSIC model has been modified to remove baseflow to assess the stormwater runoff. Refer to Figure 2 in Appendix C for MUSIC model layout.

Modelling indicates the volume of rainwater able to be harvested from the development with the nominated 406 kL rainwater tank storage is 4.64 ML/y, refer to Table 9.

Table 9: Volume of rainwater harvested.

Reuse Requested (ML/yr)	Reuse Supplied (ML/yr)	Demand Supplied (%)
8.0 ¹	4.64	57.9

1. Reuse demand requested as advised by the Client via email (refer to Section 5.3).

5.4.2 Recycled Water

The Client has advised via email (refer to Section 5.3) that recycled water can be sourced from the onsite leachate treatment facilities. The recycled water potential is 15 m³/hr, refer to Table 10 for the available annual volume. MA has assumed that this is constantly available.

Table 10: Volume of recycled water available.

Average Daily Supply (kL/day)	Annual Supply (ML/year)
150	37.50

5.4.3 Mains Water

Water unable to be supplied by roof water or recycled water shall be supplied by mains water at cost to the recycling facility to satisfy the water deficit as nominated by the Client.

5.5 Water Balance

The water balance assessment for glass washing at the site is summarised below in Table 11. The assessment determines the portion of the site's water demand to be provided through roof and recycled water with mains water satisfying the demand deficit.

Table 11: Site Water Balance

Use	Annual Demand (ML/year)	Supplied by Rainwater tank (ML/year)	Supplied by Recycled Water (ML/year)	Supplied by Water Mains (ML/year)
Glass Washing	125	4.64	37.50	82.86
Demand Supplied (%)	-	3.7%	30.0%	66.3%

5.6 Surface and Rainwater Tanks Flow Frequency and Volume

The MUSIC model was used to determine the frequency and volume of runoff and overflows of the site and rainwater tanks. Table 12 below indicates the results of the assessment. The results indicate that the proposed rainwater tanks will overflow infrequently (<60 days per year) due to the high internal reuse demand.

Table 12: Surface flow runoff days and volume.

Location	Mean Annual Runoff Days	Runoff days as a Proportion of Runoff Days	Volume of runoff (ML/year)
Rainwater tanks	58	16%	7.52
Total site runoff	116	32%	14.50

6 Stream Erosion Index Assessment

6.1 Overview

A Stream Erosion Index (**SEI**) assessment has been completed to determine the likely impact on downstream soils and the bed and banks of Dog Trap Creek. The SEI is the ratio of the developed catchment stormwater volume exceeding the 'stream forming flow' to the pre development catchment stormwater volume exceeding the 'stream forming flow'.

The SEI analysis filters out the more frequent flows and compares the total amount of higher flows between the pre development and post development scenarios. The SEI is presented as a ratio, lower ratios represent less potential to induce environmental change (for reference Blacktown City Council and Camden Council allow SEIs to be no greater than 3.5 and 5.0 respectively). A ratio of 1 or lower indicates that the likelihood of the development causing change is very low.

In the absence of defined targets in ACT legislation/guidelines a target value of less than 3 has been adopted.

6.2 Modelling Methodology

6.2.1 Approach

The SEI assessment was based on the procedures set out in the NSW MUSIC Modelling Guidelines 2015 using the following methodology:

1. The DRAINS model documented in Section 4.2 was used to determine the stream forming flow rate for the site (10% of the 0.5 EY pre development flow based on the presence of sandy loam soils and gravel content).
2. The MUSIC model documented in Section 3.3 was amended to include the pre development catchment scenario.
3. The amended MUSIC model was used to compare pre and post development runoff flows greater than the stream forming flow rate.

6.2.2 DRAINS Modelling

The modelled pre development 0.5 EY flow rate was 0.287 m³/s. Therefore, the stream forming flow rate (10% of 0.5 EY flow rate) for the development area is 0.029 m³/s.

6.2.3 MUSIC Modelling

The predevelopment catchment was separated into areas corresponding to pervious and impervious based on aerial imagery and surface type, refer to Map 5 and Table 13. Model layout can be found at Figure 3 in Appendix C.

Table 13: MUSIC Catchments for SEI assessment.

Name	Description	Area (ha)	% Impervious Area
1A01	Roof and Sealed Road	1.18	100%
1A02	Unsealed Road/Compacted Landscape	1.10	50%
1A03	Landscape	0.74	0%
TOTAL AREA		3.02	57%

The stream forming rate in Section 6.2.2 was applied to a generic treatment node for pre and post development catchments to remove flows less than the critical rate for comparison.

6.3 Results

MUSIC model results demonstrating the comparison between pre and post development scenarios with the stream forming flows removed are presented in Table 14.

Table 14: SEI assessment results.

Description	Value
Pre development flow volume (ML/yr)	2.5
Post development flow volume (ML/yr)	4.08
SEI	1.63

The SEI of 1.63 is lower than the adopted target of 3, indicating that the development is unlikely to have a negative impact on the stream morphology downstream from the site. The results are likely due to the retention and reuse from the rainwater tank within the proposed treatment train.

It is noted the SEI assessment does not include the effects of the OSD with regard the controlled discharge, refer to Section 4.5 for more detail. This would further reduce post development flow rates which minimises the possibility of impacts from flow discharge as a result of the development.

7 Wastewater Management

7.1 Wastewater Generation

7.1.1 Sources

Wastewater will be generated from a number of sources including:

1. Wastewater generated by the washing of recycled materials in the wash plant.
2. Wastewater generated by staff amenities (e.g. toilets, hand basins, kitchen, etc.).

7.1.2 Design Flow Rates

The proposed MRF wash plant is anticipated to require approximately 50 kL/hr (approximately 13.9 L/s) for the wash process. Site operation is intended to be 10 hours/day. This results in a total design daily wastewater generation rate of 500 kL/day. To reduce reliance on mains water supply, 150 kL/day of treated effluent is proposed to be recycled and used in the MRF wash plant. The total estimated daily wastewater discharge to reticulated sewer is therefore 350 kL/day.

Wastewater generation rates of 50 L/day/staff member for rural factories and shopping centres given in Australian / New Zealand Standard 1547 (2012) is adopted for the Site.

7.2 Wastewater Characteristics

Ranges of anticipated raw MRF wastewater strength have been provided by Aerofloat and are summarised in Table 15. Wastewater strength from staff amenities is estimated based on Table 9 of NSW DLG (1998) guidelines.

Table 15: Anticipated raw wastewater quality.

Parameter	MRF Wash Plant Range ¹	Staff Amenities Range ²
pH	6 – 7	
BOD ₅ (mg/L)	90 – 109	200 – 300
BOD ₅ - filtered (mg/L)	83 – 92	
COD - unfiltered (mg/L)	420 – 607	
COD - filtered (mg/L)	192 – 225	
Total suspended solids (mg/L)	1,830 – 2,540	200 – 300
Ammonia (mg/L)	0.84 – 0.91	
Nitrate and nitrite (mg/L)	<0.01	
Total kjeldahl nitrogen (mg/L)	15.2 – 17.8	
Total nitrogen (mg/L)	16.1 – 18.7	20 – 100
Total phosphorus (mg/L)	1.8 – 2.2	10 – 25
Oil and grease (mg/L)	7 – 9	

Parameter	MRF Wash Plant Range ¹	Staff Amenities Range ²
Electrical conductivity (µS/cm)	471 – 493	
Total dissolved solids – organic (mg/L)	360 – 406	
Total dissolved solids – inorganic (mg/L)	247 – 258	
Total dissolved solids (mg/L)	113 – 148	
Colour (PCU)	60 – 70	
Anionic Surfactants as MBAS (mg/L)	1.0 – 1.2	
Faecal coliforms	-	10 ³ - 10 ¹⁰

Notes:

1. Based on information provided by Veolia.
2. Based on Table 9 of NSW DLG *et al.* (1998) guidelines).

7.3 Proposed Wastewater Treatment System

7.3.1 Treatment Process Flow Chart

Appendix G provides a schematic of the adopted wastewater treatment process. Broadly, it comprises:

1. Primary screening of wastewater from washing plant via a rotary drum screen to remove solids >1 mm. Collected solids are directed to a sludge tank for further processing.
2. Effluent from the primary screens is directed to two 100 kL mixed and aerated balance tanks.
3. Effluent is directed from the balance tanks via a pH correction and coagulant tank to a dissolved air floatation (**DAF**) treatment system.
4. DAF treatment which uses dissolved air to remove solid materials. Flocculated solids rise to the surface of the DAF and are periodically scraped off into a sludge chute..
5. Effluent from the DAF process is directed to an effluent tank and then to the MRF supply tank or tis discharged to sewer.
6. Sludge from the sludge weir and from the base of the DAF is directed to a sludge tank.
7. Collected sludge is flocculated then processed in an AeroWave separator unit.
8. The AeroWave separator unit processes flocculated sludge to form a solids cake for disposal with filtrate (remaining water) recirculated to the inlet of the wastewater treatment system. Aerofloat estimates solid waste generation of 8 – 9 tonnes/day based on 500 kL/day treatment.

7.4 Treatment Standard

Wastewater treatment effluent standards are designed to allow both recycling of treated effluent for reuse in the wash plant and also to achieve Icon Water's trade waste requirements. Adopted effluent quality is anticipated to meet Icon Water's trade waste licence conditions and is summarised in Table 16.

Table 16: Proposed wastewater effluent standard.

Parameter	Acceptance Standard
Flow	To be determined in consultation with Icon Water depending on downstream network capacity.
BOD ₅ (mg/L)	≤ 300 (up to 600 mg/L may be accepted)
COD (mg/L)	Must not exceed 3 times the BOD concentration
Total Suspended Solids (mg/L)	≤ 300 (up to 600 mg/L may be accepted)
Ammonia (mg/L)	≤ 50
Total Kjeldahl Nitrogen (mg/L)	≤ 100
Total Dissolved Solids (mg/L)	≤ 1,000
Temperature	< 38°C
pH	6.5 – 10
Oil and Grease (mg/L)	≤ 100 if discharge ≤ 10% treatment works design capacity ≤ 50 if discharge > 10% treatment works design capacity
Detergents	To be biodegradable or ≤ 50 (MBAS method)
Colour (PCU)	No visible colour

7.5 Discharge to Sewer

Site wastewater management includes connection of the wastewater treatment system and all wastewater generating fixtures in staff amenities to reticulated sewer.

Icon Water has previously indicated that the downstream Jerrabomberra sewage pump station is presently at capacity and requires an upgrade to facilitate additional flows. Icon Water have indicated that 3 – 4 years of lead time will be required to upgrade the pump station and that the proposed commencement of the MRF (in late 2027) is acceptable. The receiving sewerage network is expected to have capacity to accommodate Site wastewater discharges at proposed commencement.

Future discharge to sewer will be subject to Icon Water's trade waste licence conditions.

8 Sediment and Erosion Control Strategy

MA have prepared a sediment and erosion control strategy outlining the intentions and fundamental principles that are to be used during construction activities for the proposed development. The strategy has been prepared to protect downstream environments including Dog Trap Creek from disturbance impacts during the construction duration.

A detailed Soil and Water Management Plan should be prepared at detailed design stage consistent with the following guidelines:

- ACT Government Environment Protection Guidelines for Construction and Land Development in the ACT (2022).
- Landcom Managing Urban Stormwater: Soils and Construction – Volume 1 (2004), commonly known as ‘The Blue Book’

The following sediment and erosion management strategies should be incorporated into the final management plan:

1. Reduce disturbance area during construction as much as reasonably possible.
2. Install a stabilised site access to reduce likelihood of vehicles tracking soil material onto public roads.
3. Erect a sediment control fence downstream of all construction works to protect downstream environments.
4. Construct upstream runoff diversion controls to divert runoff around the site disturbance area.
5. Incorporate sediment filters such as straw bales or woven geotextile located as protection measures as required.
6. Nominate a stockpile location for construction materials with appropriate sediment management measures (i.e. sediment filters and upstream flow diversion).
7. Construct a sediment basin to collect runoff for retention/particle settling to protect downstream waterways from excess sediment.

The sediment basin should be constructed in the location of the proposed OSD basin where it can be converted to the OSD basin once sediment disturbing construction activities are completed. Detailed sizing for the sediment basin should be completed prior to construction works. Based on the existing soil materials the basin is likely to be Type D/F ‘wet’ basin. The basin should be designed considering the settling zone and the sediment storage zone adhering to the requirements and methodology documented in the Blue Book.

It is recommended the sediment basin water quality discharge is regularly monitored. A water quality monitoring plan should be prepared at detailed design stage.

9 Conclusion

This WAI has been prepared to address stormwater quality and quantity management, water balance for the glass washing use, stream erosion index and wastewater management. The report findings are summarised below:

1. Water quality and quantity modelling indicates that the proposed stormwater management measures achieve the stormwater management objectives. All measures have been designed to comply with the Technical Specifications and MIS08.
2. Water quality management consists of the installation of rainwater tanks with a net minimum volume of 406 kL and an Atlan Ecoceptor 4000 Series (or similar). The rainwater tanks are modelled to have a reuse demand of 8 ML/year which achieves a reuse supply of approximately 4.64 ML/yr.
3. Water quantity management consists of the construction of a 600 m³ OSD basin collecting stormwater runoff from developed areas of the Site. The basin is designed to achieve a slow discharge of flows over the course of minimum 6 hours after storm events. This is managed through a 110 mm orifice and overflow intake pit and weir. A minimum freeboard to the circulation road of 300 mm is maintained (design levels are to be finalised at detailed design stage).
4. The water balance assessment indicates that the net potable water requirement for the site is approximately 82.9 ML/yr, with 37.5 ML/yr supplied through recycled water from the leachate treatment and 4.64ML/yr supplied through rainwater capture and reuse. Overflows from the rainwater tanks are expected to be infrequent (less than 60 days per year) due to the high reuse demand for the glass washing facility.
5. The SEI assessment indicates that no significant impacts are likely downstream of the discharge location. It is expected that the detailed design of the OSD and energy dissipation structure would further reduce the likelihood of any impacts to the downstream receiving environment (both within Dog Trap Creek generally and in surrounding locations).
6. Site wastewater treatment is proposed to be via an onsite wastewater treatment plant. Site wastewater management includes connection of the wastewater treatment system and all wastewater generating fixtures in staff amenities to reticulated sewer. Future discharge to sewer will be subject to Icon Water's trade waste licence conditions.
7. Sediment and erosion management strategies are proposed to ensure that stormwater runoff during construction from the disturbed area does not adversely impact downstream environments including Dog Trap Creek.

10 References

- ACT Practice Guidelines for Water Sensitive Urban Design*, ACT Government, 2018.
- Australian/New Zealand Standard 1547 (2012)*
- Hume Materials Recovery Facility – Water Impact Assessment*, GHD (May 2024).
- Icon Water Acceptance Guidelines*, Icon Water (2024)
- Municipal Infrastructure Standard 08 Stormwater*, Edition 1 Revision 2, Transport Canberra and City Services (December 2024).
- NSW Department of Local Government *et al.* (1998)
- NSW MUSIC Modelling Guidelines*, BMT WBM (August 2015).
- Planning (Industrial Zones) Technical Specifications 2024*, Planning Act 2023, Act Government (September 2024).
- Environment Protection Guidelines for Construction and Land Development in the ACT*, ACT Government, 2022.
- Managing Urban Stormwater: Soils and Construction – Volume 1*, Landcom, (2004)

Appendix A – Proposed Site Layout

Appendix B – Maps



0 10 20 30 40 50 m

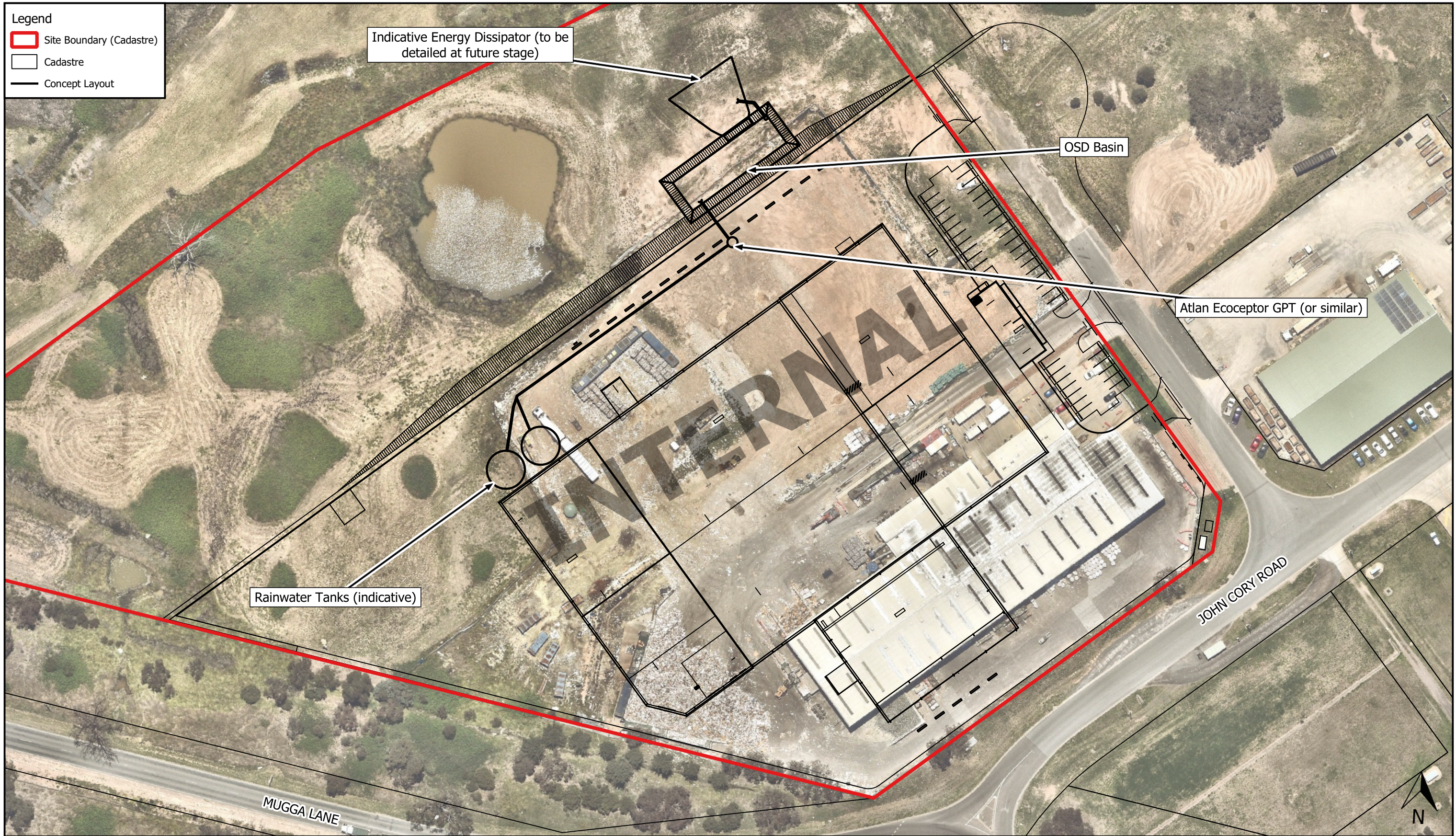
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Notes:
 - Aerial from Nearmap (2024).
 - Cadastre and site boundary from ACT Government (2025).
 - Contours from ELVIS Lidar (2020).

Map Title / Figure:
Site Overview

Map 01
 Block 12, Section 25, Hume, ACT
 Material Recycling Facility
 Water Impact Assessment
 Element Environment
 10/03/2025

Map
 Site
 Project
 Sub-Project
 Client
 Date



Legend

- Site Boundary (Cadastre)
- Cadastre
- Concept Layout



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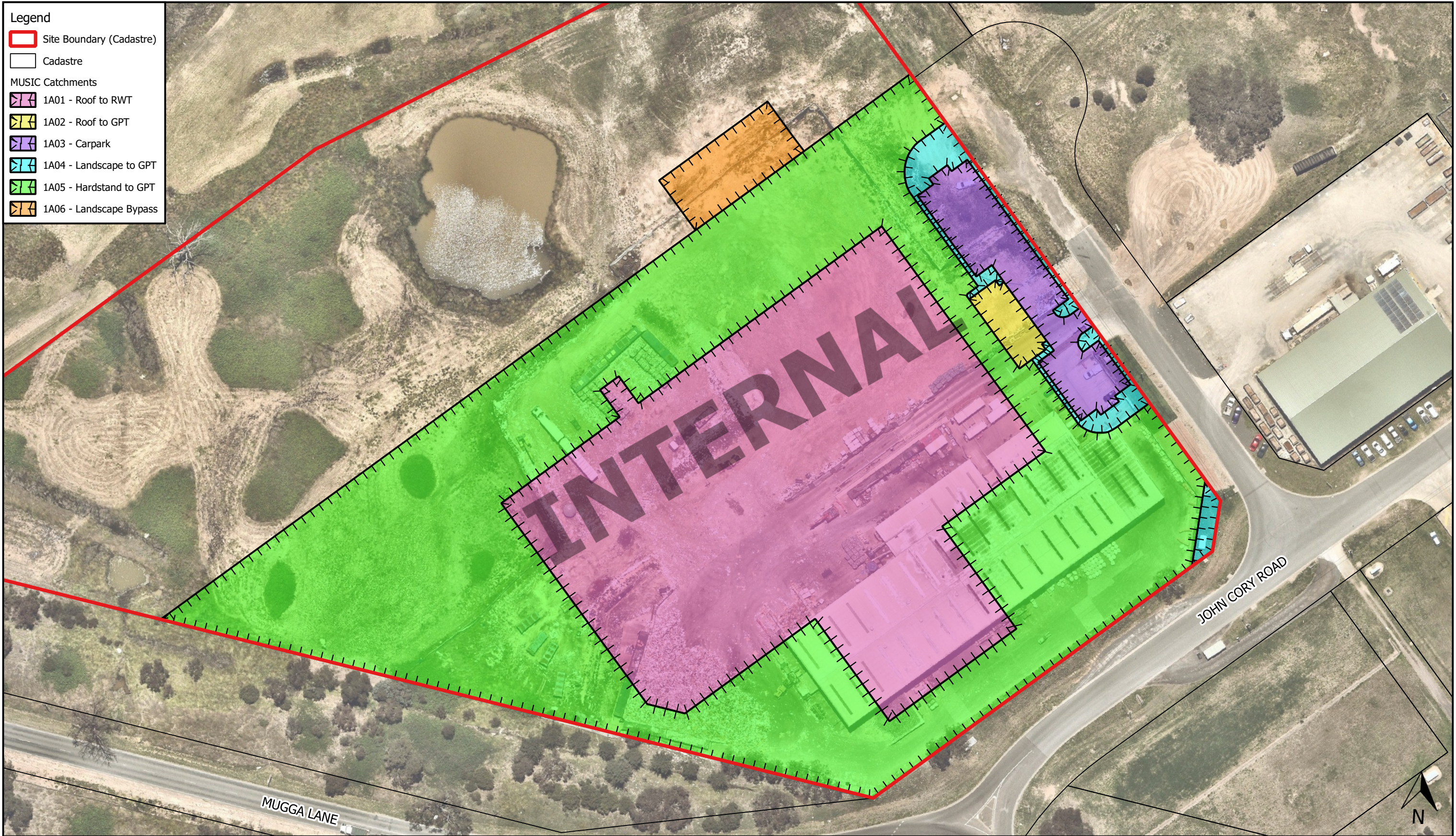
Notes:
 - Aerial from Nearmap (2024).
 - Cadastre and site boundary from ACT Government (2025).
 - Stormwater concept layout is indicative only (not to scale). Detailed design to be completed at future stage.

Map Title / Figure:
Conceptual Stormwater Layout

Map 02	Map
Block 12, Section 25, Hume, ACT	Site
Material Recycling Facility	Project
Water Impact Assessment	Sub-Project
Element Environment	Client
10/03/2025	Date

Legend

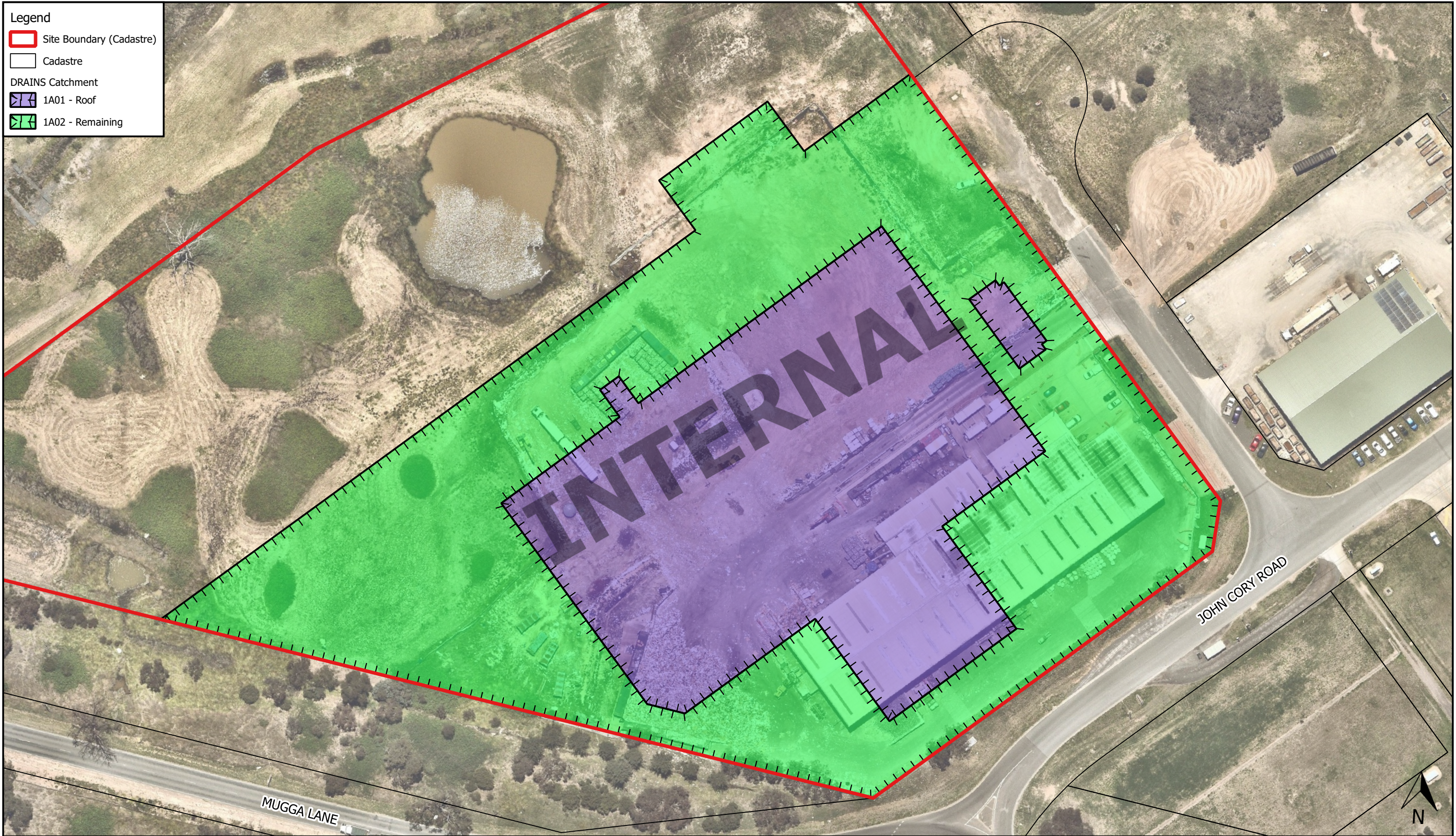
- Site Boundary (Cadastre)
- Cadastre
- MUSIC Catchments**
- 1A01 - Roof to RWT
- 1A02 - Roof to GPT
- 1A03 - Carpark
- 1A04 - Landscape to GPT
- 1A05 - Hardstand to GPT
- 1A06 - Landscape Bypass



0 10 20 30 40 50 m

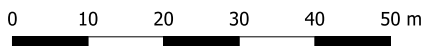
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Notes:
 - Aerial from Nearmap (2024).
 - Cadastre and site boundary from ACT Government (2025).
 - Works extent considered only as remaining lot area is unchanged.



Legend

- Site Boundary (Cadastre)
- Cadastre
- DRAINS Catchment**
- 1A01 - Roof
- 1A02 - Remaining

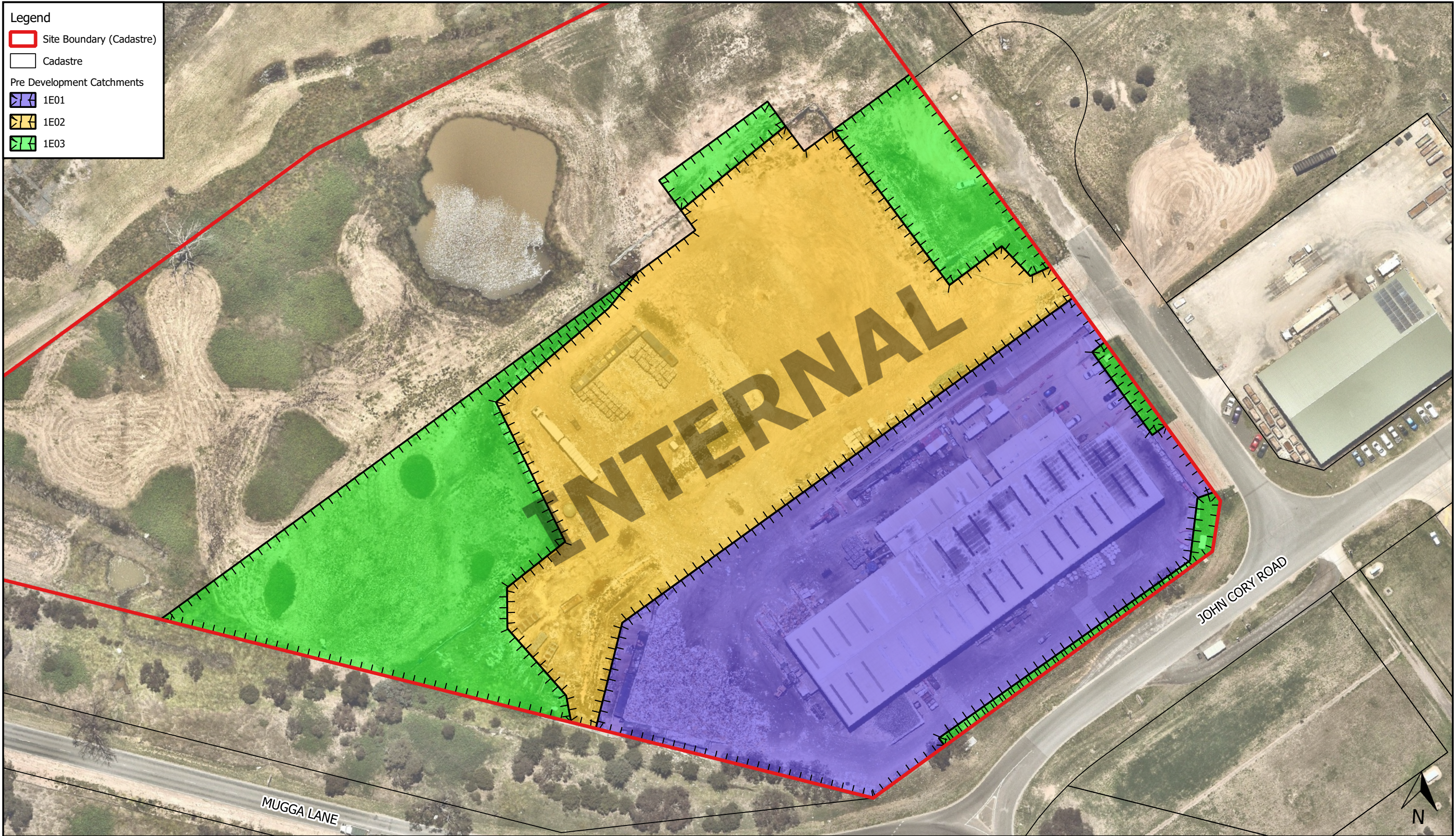


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 - Cadastre and site boundary from ACT Government (2025).
 - Works extent considered only as remaining lot area is unchanged.

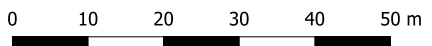
Map Title / Figure:
DRAINS Post Development Catchments

Map 04	Map
Block 12, Section 25, Hume, ACT	Site
Material Recycling Facility	Project
Water Impact Assessment	Sub-Project
Element Environment	Client
10/03/2025	Date



Legend

- Site Boundary (Cadastre)
- Cadastre
- Pre Development Catchments**
- 1E01
- 1E02
- 1E03



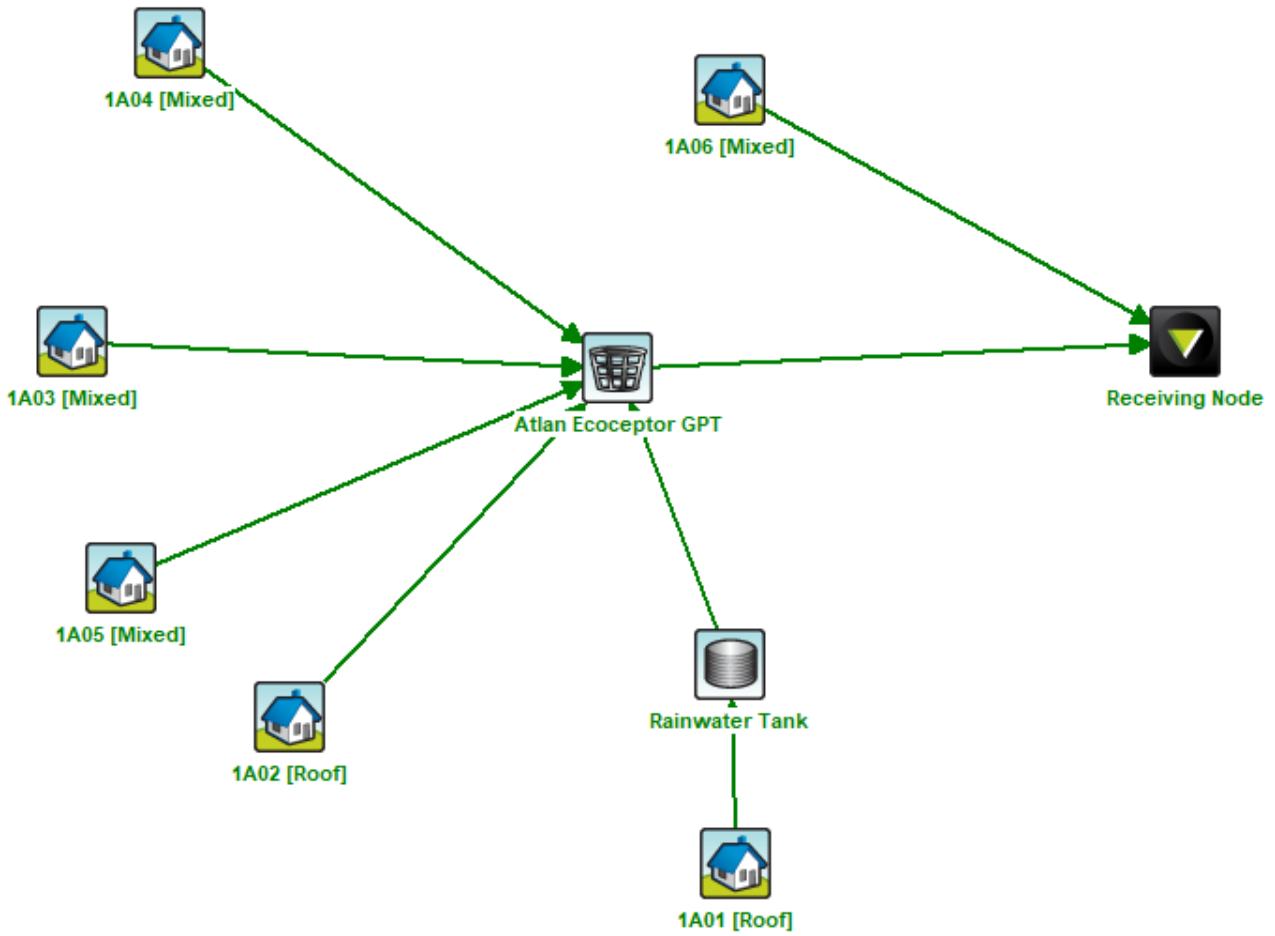
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Notes:
 - Aerial from Nearmap (2024).
 - Cadastre and site boundary from ACT Government (2025).

Map Title / Figure:
Pre Development Catchments

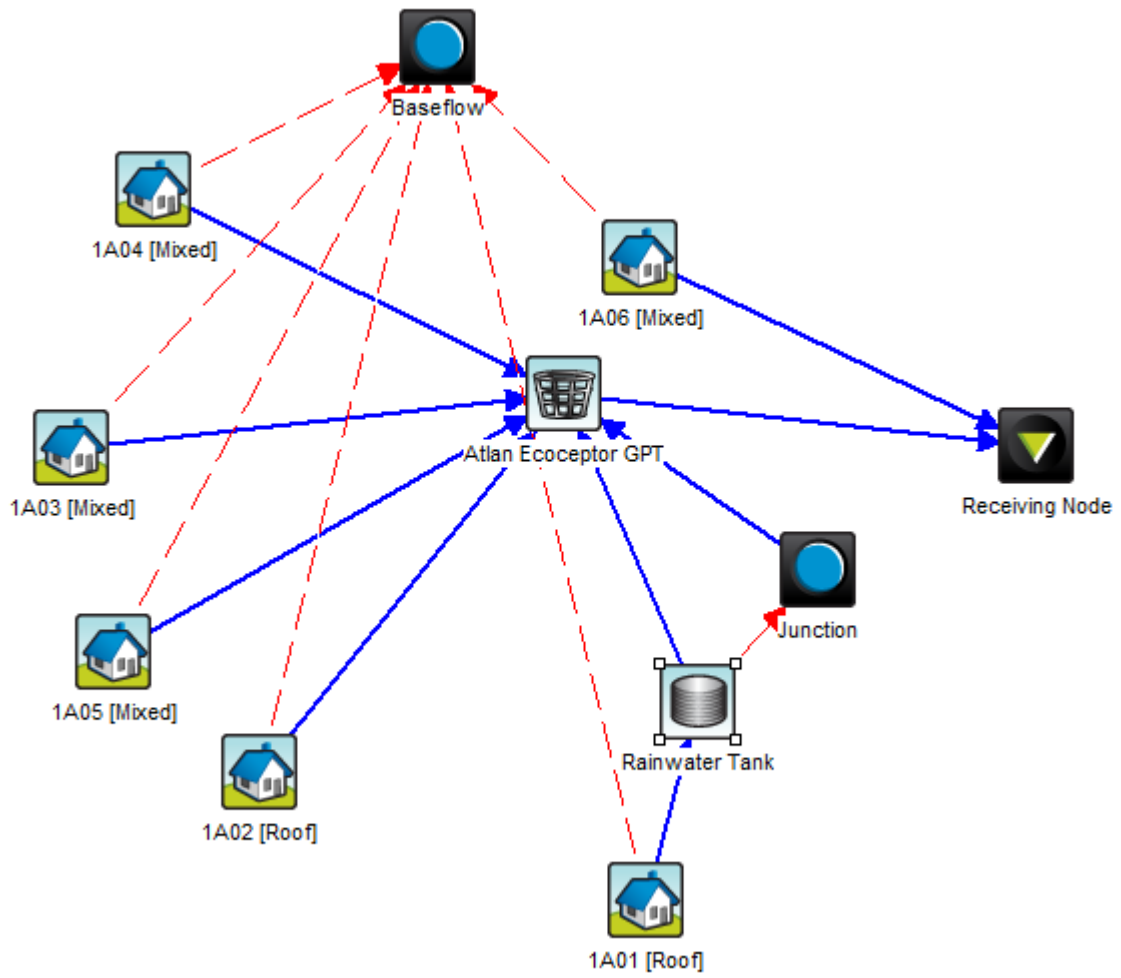
Map 05	Map
Block 12, Section 25, Hume, ACT	Site
Material Recycling Facility	Project
Water Impact Assessment	Sub-Project
Element Environment	Client
10/03/2025	Date

Appendix C – MUSIC Model Layouts



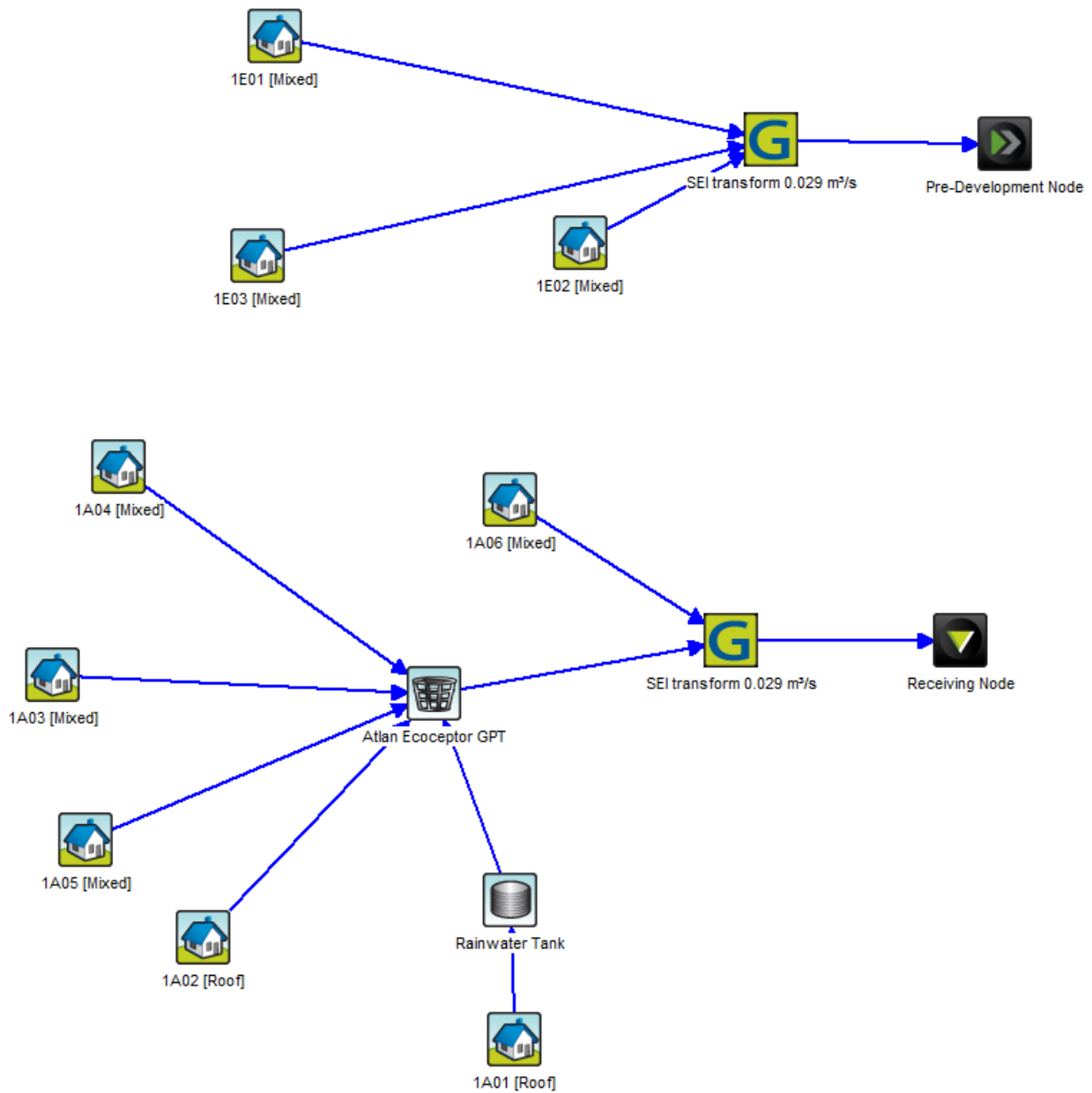
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Scale:	N/A
Document:	P2510725JR01V01

Figure 1: MUSIC Model Post Development Catchment



Drawn:	LG
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Document:	P2510725JR01V01

Figure 2: MUSIC Model Post Development Catchment (Baseflows removed)



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Scale:	N/A
Document:	P2510725JR01V01

Figure 3: MUSIC Model Pre and Post Development Catchment Layouts with flow transformation nodes for SEI calculation

Appendix D – MUSIC Input Parameters

Parameter	Description	Input	Reference
Setup	Climate File	6-minute timestep using the Canberra Airport rainfall data from 1968-1977.	MIS08
Source Nodes	Node Type	Site catchments modelled as mixed but input parameters based on MIS08.	MIS08
	Rainfall Threshold	0.00 mm/day	MIS08
	Pervious Area Properties	As per MIS08.	MIS08
	Base & Storm flow Parameter	As per MIS08.	MIS08
	Estimation Method	Stochastically generated	MIS08
Rainwater Tanks	Low Flow By-Pass	0 m ³ /s	NSW MUSIC Modelling Guidelines (2015)
	High Flow By-Pass	0.010 m ³ /s	Assumed 0.005 m ³ /s per tank (NSW MUSIC Modelling Guidelines 2015)
	Number of Tanks	2	By design
	Volume below overflow pipe (kL)	203	By design
	Depth above overflow (m)	0.1	By design
	Surface Area (m ²)	142.2	By design
	Initial Volume (kL)	203	By design
	Overflow Pipe Diameter (mm)	90	By design
Atlan Ecoceptor GPT (NSW) 4000 Series	Low Flow Bypass	0.00	By design
	High Flow Bypass	0.06	Provided by Atlan

Appendix E – Atlan Ecoceptor Product Guide

Ecoceptor

Inline Gross Pollutant Trap (GPT)





APPLICATIONS

- Shopping precincts
- Commercial zones
- Recreational grounds
- Light industrial areas
- Beaches and parks



BENEFITS



The Ecoceptor is delivered to site fully assembled saving on installation time and crane costs. The Ecoceptor fibreglass GPT can be installed in all types of trafficable zones, including vehicular truck (Class D). This trafficability is subject to the installation of an engineered cast in situ concrete slab.

The cylindrical shape of the Ecoceptor with its sloped cone-configured base ensures sediment accretes at the centre of the Ecoceptor's base, which facilitates easy and simple cleaning.

The poly/fibreglass construction is non-porous and ensures that oil and sediment can be removed without sticking to the sides of the internal walls.

Flow rates on standard units available up to 2800 LPS to fit pipe sizes of 150mm to 1800mm - with other sizes available on request.

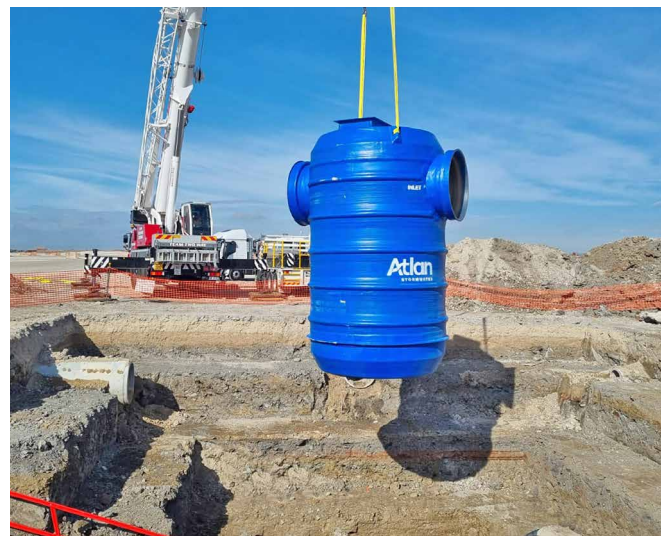
The Ecoceptor is a hydrodynamic inline Gross Pollutant Trap (GPT) with a unique treatment action that produces low velocity conditions (and extended dwell times to separate pollutants), resulting in discharge water quality outcomes complying to statutory guidelines across Australia.

This device separates and captures sediments, silt, total suspended solids, and oil and grease. Oil & grease rise to the "oil-capture" zone of the treatment chamber and are contained in all flow events.

Areas with a high fraction of impervious surfaces that require stormwater treatment are ideal for the Ecoceptor. These include car parks, ports, streetscapes, roads, subdivisions, and industrial estates.

The one-piece, self-contained fibreglass construction, is lightweight, yet robust in strength, making it simple and cost-effective to install.

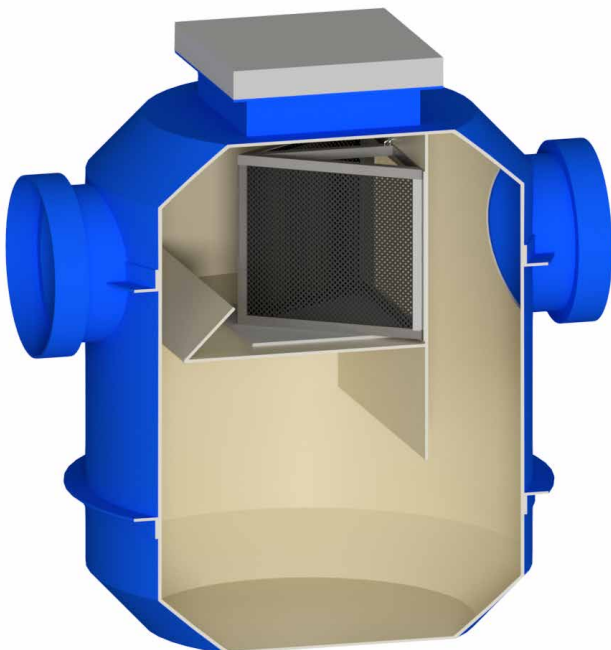
MUSIC node is available on request.



CLASS 3 ECOCEPTOR

The Class 3 Ecoceptor acts as a gross pollutant trap (GPT) and improves stormwater quality.

These devices separate and capture gross pollutants, sediments and silt. Light liquids (petroleum hydrocarbons) rise to the top of the lower chamber while sludge settles on the bottom.



FEATURES

- Unique stainless steel V screen collects gross pollutants
- Easy access to all parts for desludging and oil removal
- Can handle high flows
- By-pass operation when very heavy rain persists, preventing “back up”
- Units are FRP fabricated to suit any application
- Fibreglass construction & design life
- Minimum on-site labour costs
- Flow rates up to 2800 LPS

Options:

- Trafficable lid types
- Different pipe configurations and sizes
- Manhole risers
- Larger tanks

Tested Treatment Efficiencies*

POLLUTANT	EFFICIENCY
Gross Pollutants (GP)	95%
Total Suspended Solids (TSS)	71%
Total Phosphorus (TP)	69%
Total Nitrogen (TN)	47%
Petroleum Hydrocarbon	93%

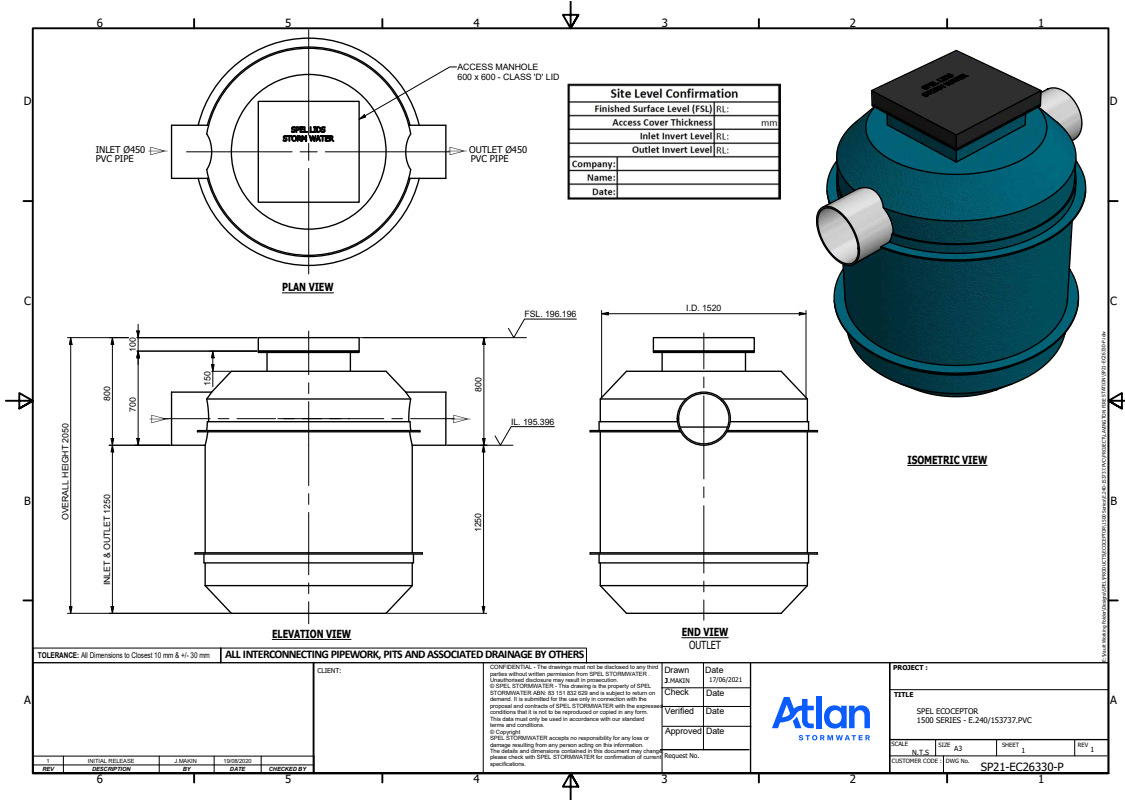
*Contact Atlan to confirm approved performance for the project LGA Organic/particulate component of the nutrient only.

APPLICATIONS

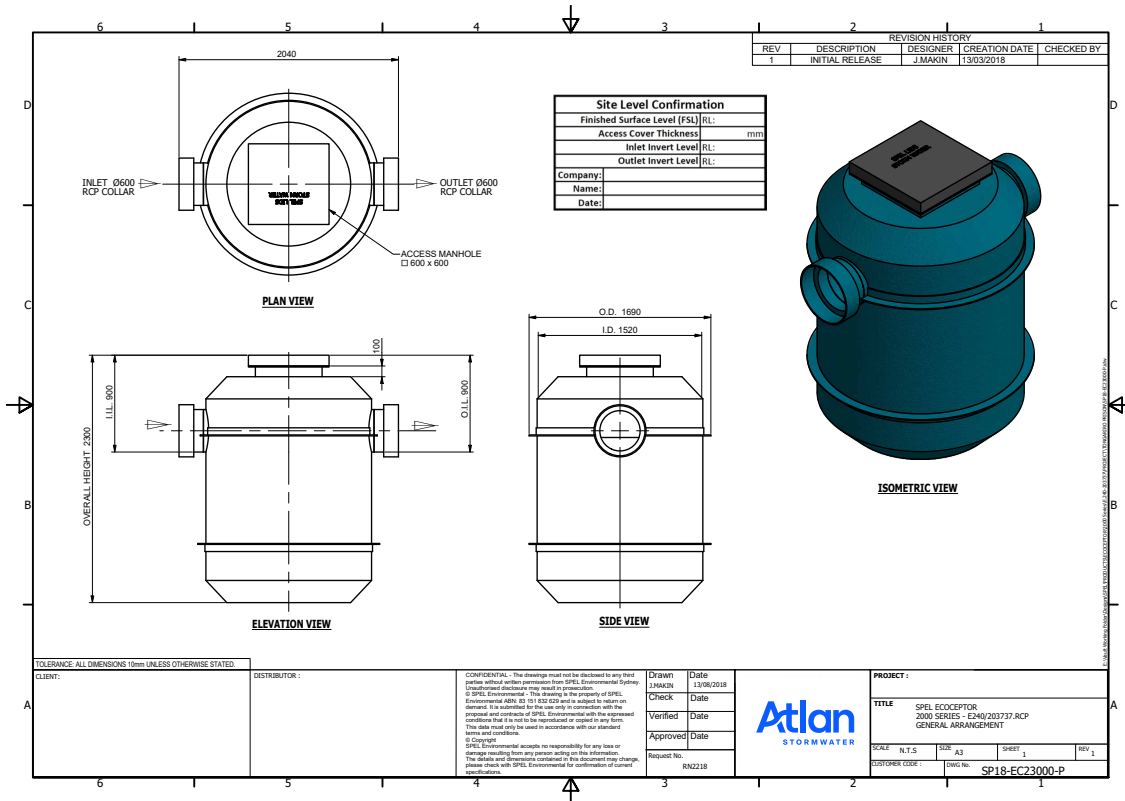
- Shopping precincts
- Commercial zones
- Recreation grounds
- Waterfront, beaches & parks
- Car parks
- Industrial estates
- Townhouses

DRAWINGS

1500 Series

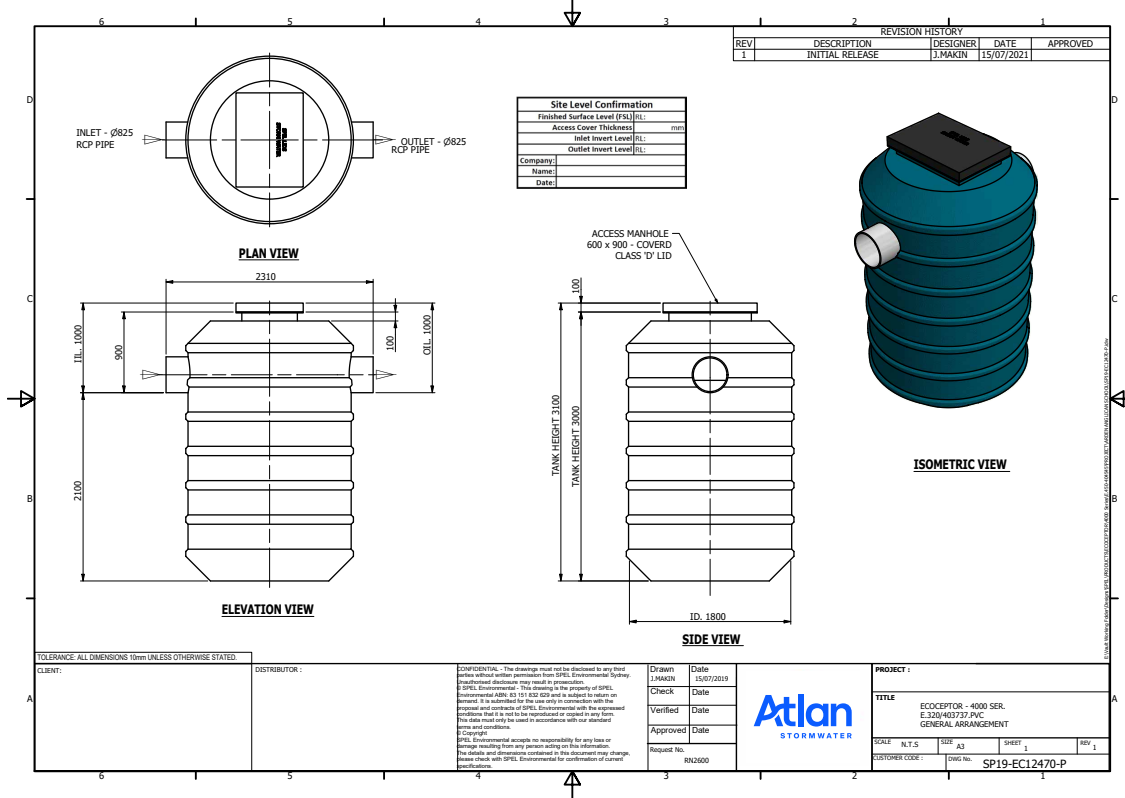


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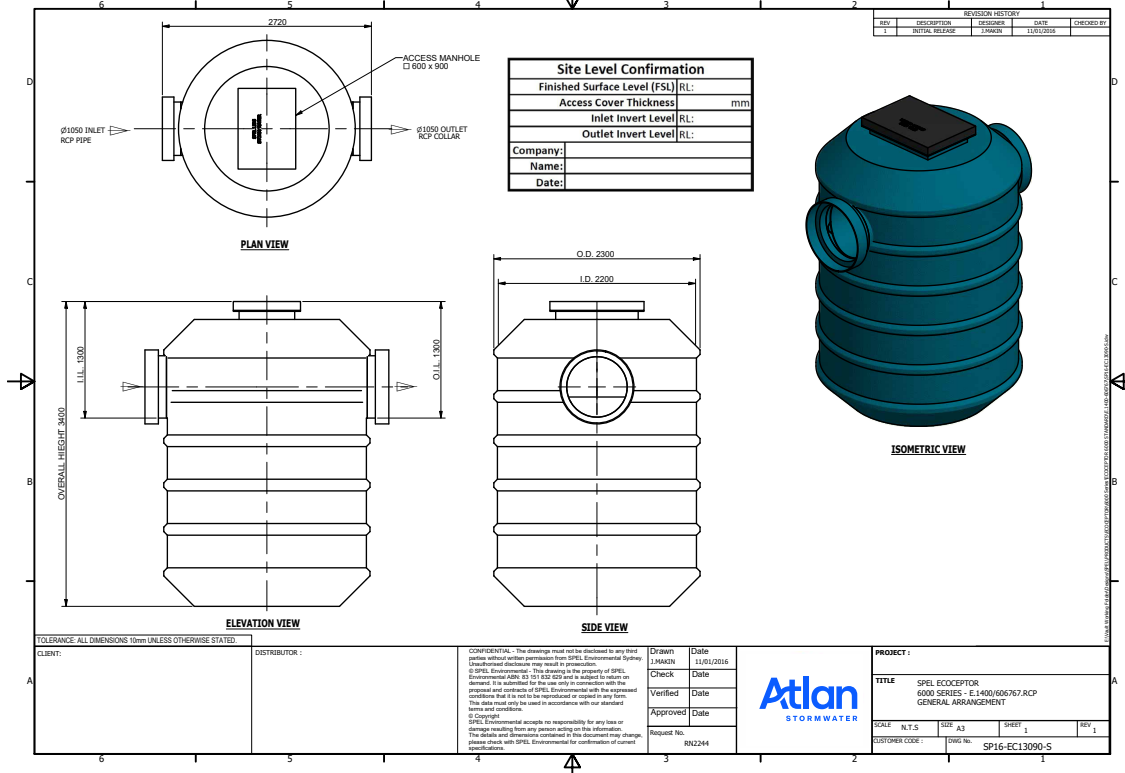


DRAWINGS

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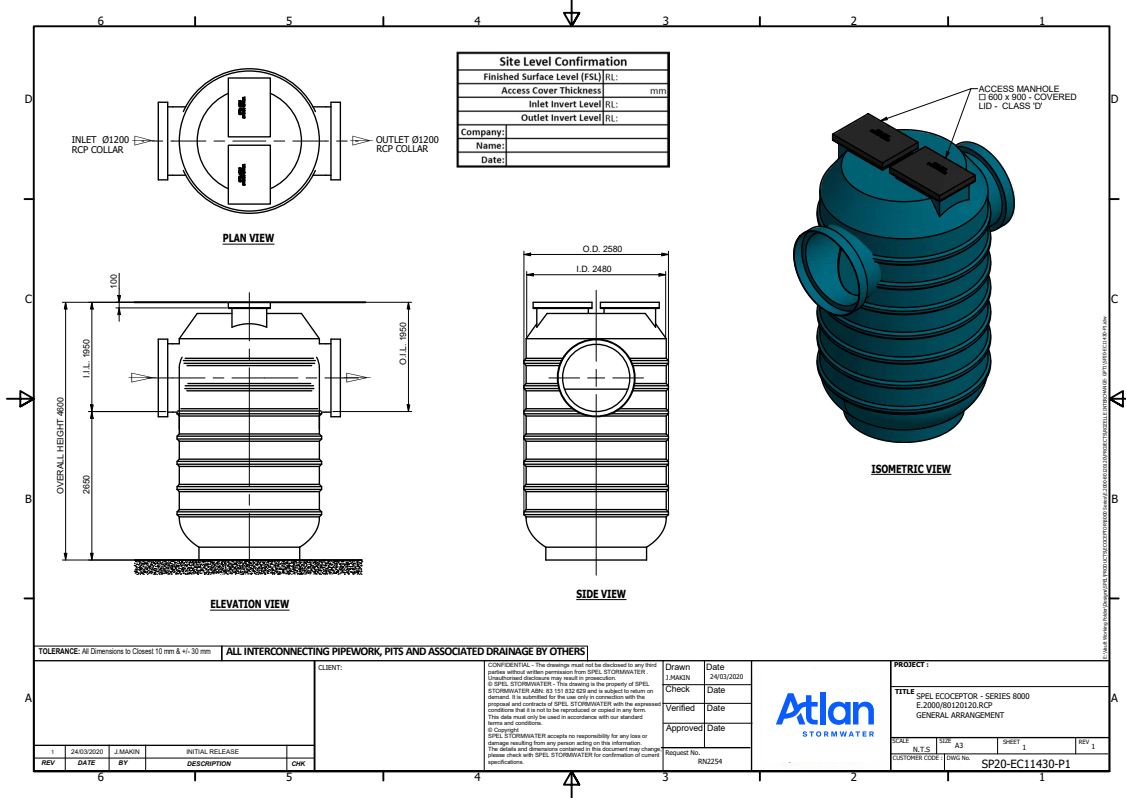


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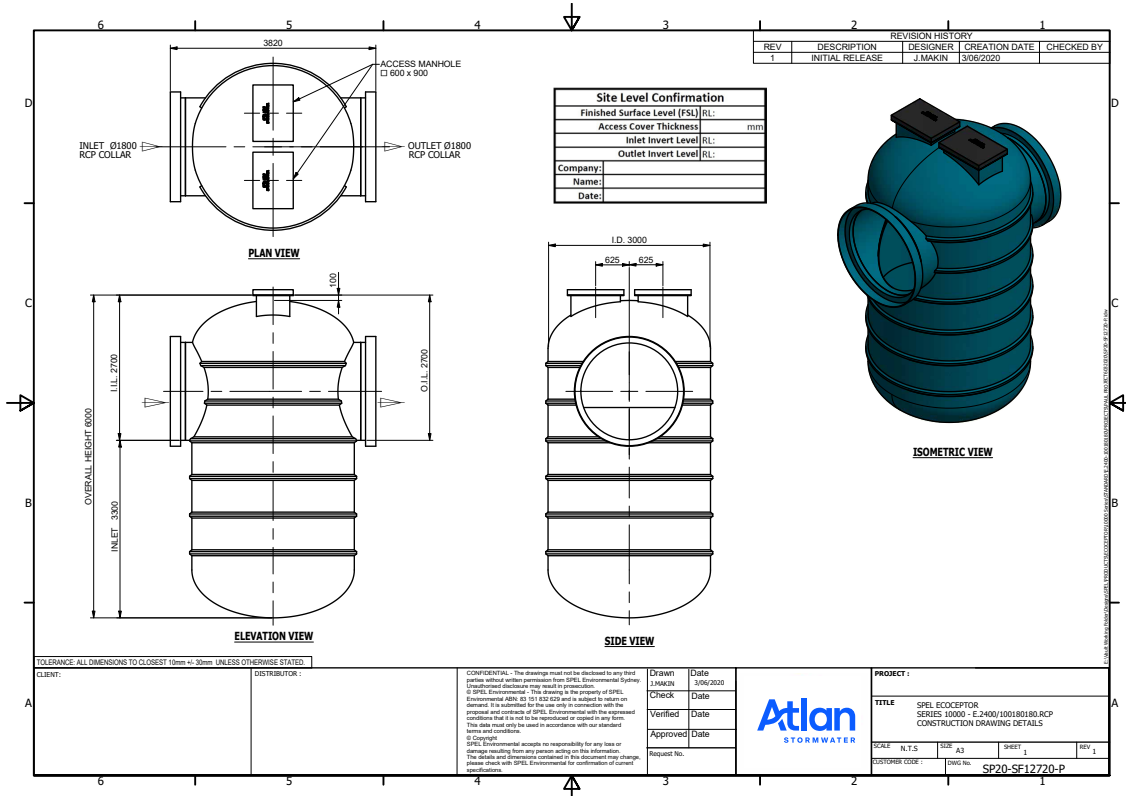


DRAWINGS

8000 Series



10000 Series



Ecoceptor

Inline Gross Pollutant Trap (GPT)



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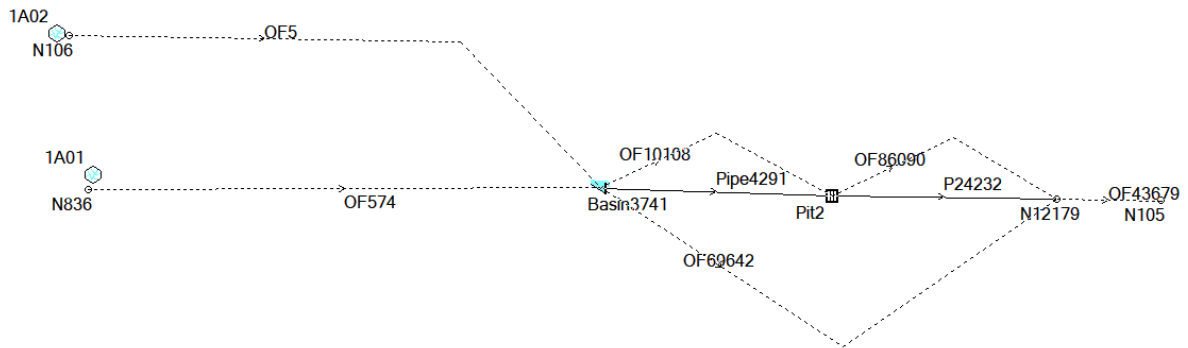
Joy in water

'We believe clean waterways are a right not a privilege and we work to ensure a joy in water experience for you and future generations.'

Andy Hornbuckle

Appendix F – DRAINS Model Layout

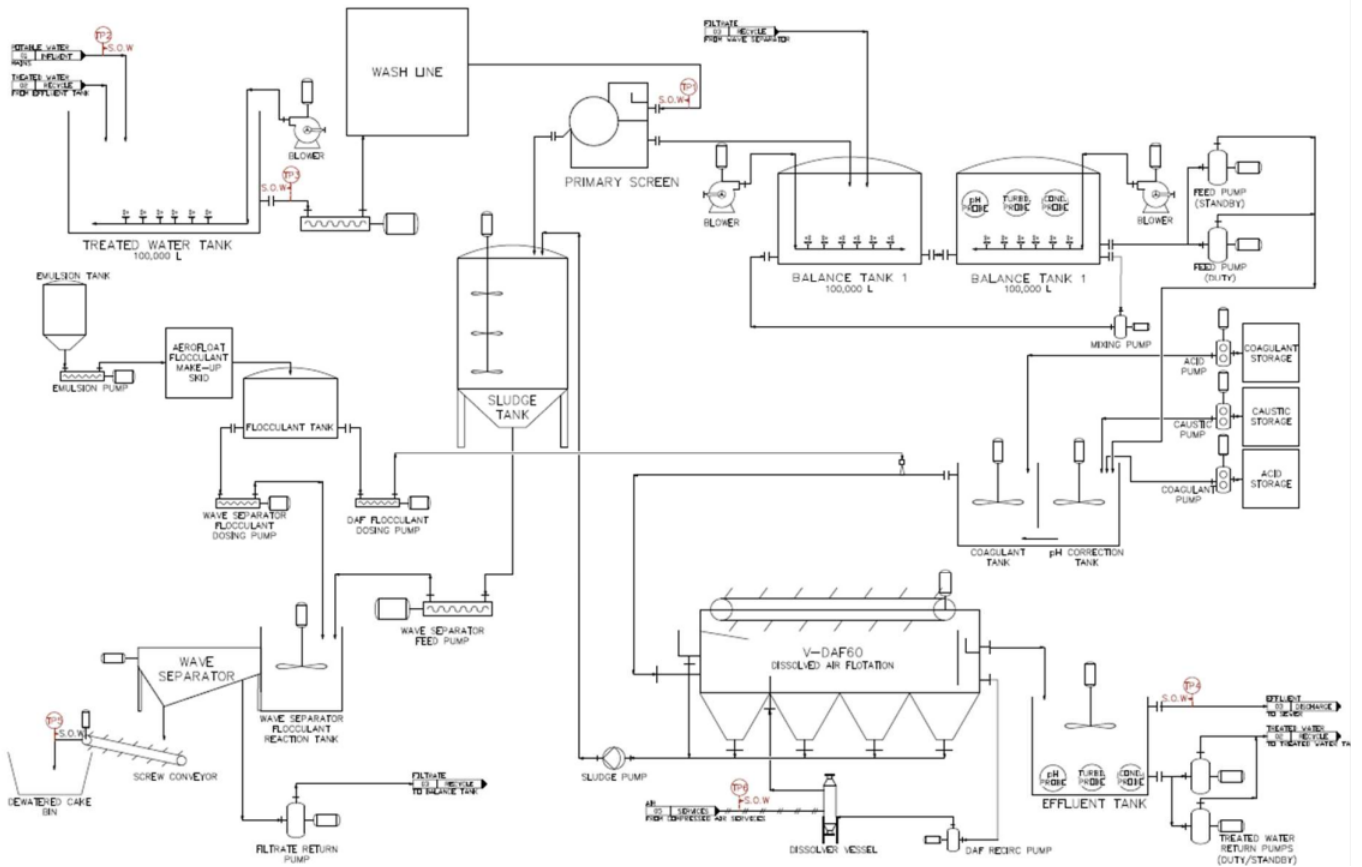
1E01
N57897



Drawn:	LG
Scale:	N/A
Document:	P2510725JR01V01

Figure 4: DRAINS Model Pre and Post Development Layout

Appendix G – Preliminary Wastewater Treatment Plant Design



Drawn:	Aerofloat
Scale:	N/A
Document:	P2510725JR01V01

Figure 5: Schematic of the proposed wastewater treatment process (Aerofloat, 2024).



Hume Materials Recovery Facility Hume

Water Impact Assessment

Transport Canberra and City Services

11 May 2023

→ The Power of Commitment



Project name		Materials Recovery Facility Hume ACT PMCA					
Document title		Hume Materials Recovery Facility Hume Water Impact Assessment					
Project number		12540460					
File name		12650460_REP-A_Hume MRF Water Impact Assessment.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	T Darley	R Towner	*on file*	A Montgomery	Record on file	15/08/23

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Appendices

Appendix A	Flood mapping
Appendix B	MUSIC Link Summary Report

Terminology

Terminology	Definition
Authority	The ACT Planning and Land Authority
Impact	The effect of a project, which can be adverse or beneficial, when measured against an existing condition.
Proposal	The construction and operation of the proposed materials recovery facility in Hume, Australian Capital Territory.
Proposal site	The area within which all the Project construction and operational elements will be contained within.
Study area	Consists of land in the vicinity of, and including, the proposal site. The study area is a wider area surrounding the proposal site as defined in this assessment, including land that has the potential to be indirectly impacted by the proposal.

Abbreviations and meaning

Abbreviations	Meaning
1 EY	One Exceedance per Year
ACT	Australian Capital Territory
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARR	Australian Rainfall and Runoff
CDS	Container deposit scheme
EIS	Environmental Impact Statement
EPSDD	Environment, Planning and Sustainable Development Directorate
FOGO	Food Organics and Garden Organics
GHD	GHD Pty Ltd
ha	Hectares
HDPE	High-density Polyethylene
HRRE	Hume Resource Recovery Estate
kg	Kilogram
kL	Kilolitre
km	Kilometre
LGA	Local Government Area
m	Metre
ML	Mega Litres
MRF	Materials Recovery Facility
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
NSW	New South Wales
TCCS	Transport Canberra and City Services
tpa	tonnes per annum
WIA	Water Impact Assessment
WSUD	Water-sensitive Urban Design
yr	Year

1. Introduction

1.1 Overview

The ACT Government is proposing to replace and upgrade the existing Material Recovery Facility (MRF) on Block 12, Section 25 Hume, ACT (the proposal site). The proposal site is located to the north of the Monaro Highway in an industrial and rural area located approximately 12.5 km south of Canberra City (refer to Figure 1.1). The existing MRF was extensively damaged due to fire on 26 December 2022 and the facility is non-operational. The main shed remains standing and is currently being used as a waste transfer station to accept recyclables, sort, and store materials before being shipped to other processing facilities.

The proposal would replace the existing MRF and provide technological improvements to facilitate greater resource recovery by both increasing the quality of recycled materials and by reducing the amount of nonrecyclable residual waste generated that is currently sent to landfill. The new Hume MRF would be one of the first advanced facilities in Australia to enable separation mixed plastics. Upgraded technology would also improve the quality and therefore marketability of paper and mixed cardboard, mixed plastics and glass that would be received from the ACT and five regional NSW councils.

The proposal would be designed to process up to 115,000 tonnes per year of mixed recyclables. The proposed capacity would provide for population growth and changing consumer behaviours which are expected to contribute to increases in recoverable materials over time.

Key features of the proposal include (See Figure 1.2):

- Replacement of the existing MRF.
- Additional warehouse style facilities.
- Civil works and piling to support the dynamic loads imposed by rotating and high frequency vibrating equipment.
- Expansion of hardstand space towards the west of the proposal site.
- A trade waste system to capture contaminated stormwater runoff.

1.1.1 Approval and assessment requirements

This report has been prepared by GHD Pty Ltd (GHD) as part of the environmental impact assessment (EIS) for the proposal. The EIS supports the application for approval of the proposal and to address the requirements provided by the ACT Department of Environment, Planning and Sustainable Development Directorate dated 21 July 2022.

The proposal is subject to approval by the planning and land authority within the Environment, Planning and Sustainability Development Directorate.

1.2 The proposal location

The proposal would be located within the current bounds of the Hume Resource Recovery Estate (HRRE) on Block 12, Section 25 Hume, Recycling Road (see Figure 1.1). The proposal site is surrounded by industrial facilities including:

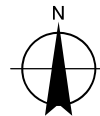
- ACT Skip Hire across Recycling Road to the east.
- Soft Landing Mattress Recycling located south-east, across John Cory Road.
- Hume Industrial Estate located to the south and east across Monaro Highway.
- Mugga Lane Landfill located approximately 200 metres (m) to the north-west.
- Proposed FOGO facility located to the east, across John Cory Road.

The proposed relevant built area is estimated to be 3.5 hectares (ha) which includes the loading bay, processing area, and car park. The roadways on-site would be 0.5 ha, while the building itself would be 1.05 ha. The new MRF would be accessed via Recycling Road, which is situated at the east of the proposal site.



- Legend**
- Proposal site
 - Cadastre
 - Watercourses

Paper Size ISO A4
 0 25 50
 Metres



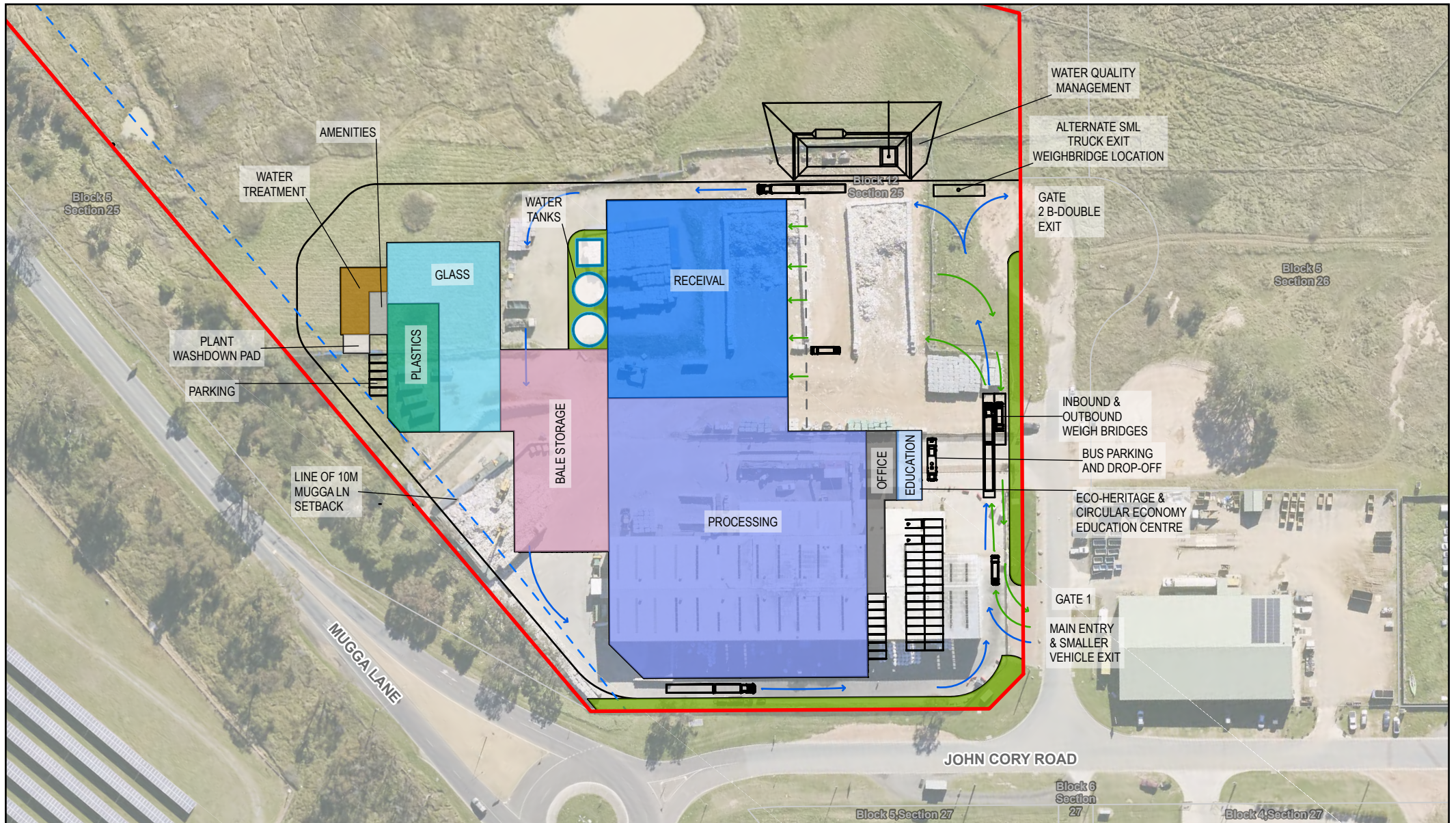
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 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

**Transport Canberra and City Services
 Hume Materials Recovery Facility
 Water Impact Assessment**

Project No. 12540460
 Revision No. 0
 Date 16/08/2023

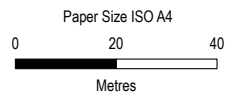
Proposal location

FIGURE 1.1



Legend

- ▬ Proposal site
- Cadastre
- Water Tanks
- Amenities
- Bale Storage
- Education
- Glass
- Office
- Plant Washdown
- Plastics
- Processing
- Reival
- Water Treatment
- Grass



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



**Transport Canberra and City Services
Hume Materials Recovery Facility
Water Impact Assessment**

Project No. 12540460
Revision No. 0
Date 16/08/2023

Proposal layout

FIGURE 1.2

1.3 Assessment requirements

The ACT Government Environment, Planning and Sustainable Development Directorate's (EPSDD) scoping document requirements for impacts related to water quality are summarised and listed in Table 1.1 below:

Table 1.1 Assessment requirements relevant to the water impact assessment (WIA)

Requirement	Where it is addressed in this report
Describe the surface water and groundwater features of the area.	Section 2.2 Section 2.3
Provide a description of likely annual wastewater volumes generated on-site under maximum operational capacity.	Section 3.5
Provide a description about suitable sizing/treatment of the proposed bioretention pond system, to give confidence about the ability of the proposed bioretention pond system to manage volume and quality of wastewater under maximum operational capacity.	Section 3.3
Provide details of the existing dam and proposed bioretention pond, including height of the dam/pond wall from toe to crest in metres and volume of the dam/pond in Mugga Lane.	Section 3.3
Consider the potential for impacts associated with wastewater generation and any other on-site activity, on water quality, aquatic ecosystem, and erosion within Dog Trap Creek (which flows to Jerrabomberra Creek and Lake Burley Griffin).	Section 4
Include mitigation measures to prevent potential water quality, aquatic ecosystem and erosion impacts to Dog Trap Creek and further downstream.	Section 5.2
Demonstrate compliance with the 'Waterways: Water Sensitive Urban Design General Code' made under the Territory Plan.	Section 3.2 Section 3.3 Section 3.4
Consider any feasible options to divert wastewater away from Dog Trap Creek.	Section 3.5 Section 3.4
Describe the potential impacts of wastewater and contaminant spills on local groundwater and surface water.	Section 4
Describe how runoff from the proposal site will be treated before entering the receiving environment.	Section 3.3
Provide information on stormwater retention and reuse capabilities at the proposal site.	Section 3.3 Section 3.4
Provide information on measures to manage wastewater/contaminants emanating from the facility to avoid impacts on groundwater and surface water.	Section 3.5 Section 5.1

1.4 Purpose and scope

The purpose of this report is to:

- Address the assessment requirements prepared by the planning and land authority (the Authority) within the EPSDD listed in Table 1.1.
- Describe the existing environment of the proposal site relevant to surface water and erosion and sediment control.
- Assess the impacts of constructing and operating the proposal on surface water and erosion and sediment controls.
- Recommend mitigation measures based on the impacts identified.

1.5 Structure of this report

The structure of the report is outlined below:

- **Chapter 1** – This chapter introduces the report, providing information like the background information, key stakeholders, assessment requirements, purpose and scope, and structure of report.
- **Chapter 2** – This chapter describes the existing environment of the proposal site, including climate, hydrology and land use, flooding, and soils.
- **Chapter 3** – This chapter describes the proposed soil and water management, noting a focus on the in-built measures in the proposal.
- **Chapter 4** – This chapter provides an impact assessment.
- **Chapter 5** – This chapter specifies the mitigation measures based on the impact assessment identified in Chapter 4.
- **Chapter 6** – This concludes the report with the relevant findings and assessment.

2. Existing environment

This section summarises the key features of the existing environment with respect to soil and water management.

2.1 Climate

The proposal site is in a temperate zone characterised by mild/warm summers and cold winters, under the Koppen Climate Classification (Bureau of Meteorology, accessed 24 April 2023).

The climatic data for the proposal site is sourced from SILO Long Paddock patched point grid data which provides spatial and temporal continuous climatic data. The data is summarised and graphically presented in Figure 2.1. It generally indicated that:

- By observing the accumulative annual total rainfall and potential evapotranspiration curve, potential evapotranspiration exceeds precipitation. The potential evapotranspiration rates are highest during the late-spring and summer months (November to February).
- Precipitation is generally steady across the year, with the mean of the monthly total rainfalls falling below 100 mm. The wettest month is found to be November, and the driest April.
- Months with the highest temperatures occur during late spring, summer, and autumn, with the majority occurring between November and February. Months with the coldest temperatures occur during winter, between June and August.

2.2 Hydrology and land use

The proposal site location and layout are shown in Figure 1.1 and Figure 1.2. The proposal site's highest point is at the south-eastern boundary (at approximately 618 m AHD) and falls towards the northern boundary (at approximately 611 m AHD). A pond that is located at the north-west of the site boundary was identified as a low point within the proposal site and Dog Trap Creek (Woden Creek) was identified to be a natural watercourse that passes through the western boundaries of the proposal site.

The watercourse identified in proximity is a 2nd order stream according to the Strahler stream ordering system, increasing to a 3rd order stream immediately downstream of the proposal site. The stream flows in a north-easterly direction, through culverts and under the Monaro Highway before it reaches Jerrabomberra Creek.

The proposal site is part of the Murrumbidgee River Catchment. This catchment covers an area of 84,000 km² which is 8% the size of the Murray-Darling Basin. This catchment contributes 16% of the basin's water. Its tributaries include Cotter, Yass, and Tumut, and the towns of this catchment include Cooma, Canberra, Yass, Tumut, Gundagai, Cootamundra, Wagga Wagga, Narrandera, Leeton, Griffith, Hay, and Queanbeyan. The Murrumbidgee River flows towards the east, into the Murray River downstream of Balranald.

As previously mentioned, Dog Trap Creek is located at the western boundaries of the proposal site, and as such is identified as a floodplain location. This highlights that the proposal site may be subject to temporary inundation during periods of higher flows.

The following type of land uses in proximity of the proposal site were identified:

- Several mixed industrial businesses can be found across the Monaro Highway, located south-east of the proposal site.
- A large landfill and mining facility is located north-west of the proposal site with several dams overflowing into a tributary of Dog Trap Creek.
- Southwest of the proposal site and upstream of Dog Trap Creek is a solar park.
- Nearby lands located north-east of the proposal site are used majorly as grazing lands and modified pastures. These landscapes feature minor vegetation, most prominent along the riparian zones of the creek.

2.3 Flooding

The proposal site is located adjacent to a waterway with a series of gullies and ephemeral channels feeding southward towards along Mugga Lane into Dog Trap Creek near the north-western border of the proposal site. This is joined by a tributary of Dog Trap Creek which flows northward from the solar park towards Mugga Lane. From Mugga Lane, waters combine and flow in a north-easterly direction along Dog Trap Creek. Some minor flow paths and trunk drainage lines also flow in from the south, mainly through the Hume industrial area and crossing the Monaro Highway via transverse culverts. Culverts along Isabella Drive and Mugga Lane also cross a number of flow paths and watercourses. Several dams located in the landfill and mining facility north-west of the MRF proposal site overflow into a tributary of Dog Trap Creek. Dog Trap Creek eventually feeds into Jerrabomberra Creek, east of the intersection of Lanyon Drive with the Monaro Highway.

The proposal site is not significantly impacted by flood flows, with flood waters generally confined to the north-western side of the site. Run-on from other sites is not notable, as upstream flood waters diverted around the existing operations.

2.4 Soils and geology

Soils were reviewed based on regional soil classification systems. This identified that soils in the proposal site region generally demonstrated characteristics associated with the Williamsdale Soil Type, described as follows (Jenkins, B.R. 2000):

- Original savanna woodland is primarily cleared, with waterlogged grasslands being highly altered following introduction of exotic grass species. Land use shaping the local landscape follows sheep and cattle production.
- Gully erosion is common and widespread.
- Local geology comprises of Silurian volcanics with minor intrusions of siltstone, shale, sandstone, and limestone. Bedrock tends to be highly weathered.
- Dominant soils include:
 - Brownish black loam topsoil.
 - Yellowish brown sandy clay loam subsoil with high erodibility.
 - Bright brown clay subsoil with high erodibility and low permeability.
 - Bleached dull brown sandy loam subsoil, moderate permeability and high erodibility.
 - Bright yellowish brown pedal sandy clay subsoil, low permeability, and high erodibility.
 - Dark reddish brown clay loam subsoil with moderate permeability.
 - Dark reddish brown clay loam subsoil slowly permeable and highly erodible.
- Soils at the proposal site are moderately to highly erodible with local soil types ranging from moderate to very-high erodibility from both non-concentrated and concentrated flows.
- Soils may be susceptible to waterlogging which can influence urban development.

Data sourced: SILO Long Paddock Continuous Patched Point Data
 Lat: -35.4, Long: 149.15. Accessed: 2023-02-07
 Data extent: 1 Jan 1970 - 30 Dec 2022

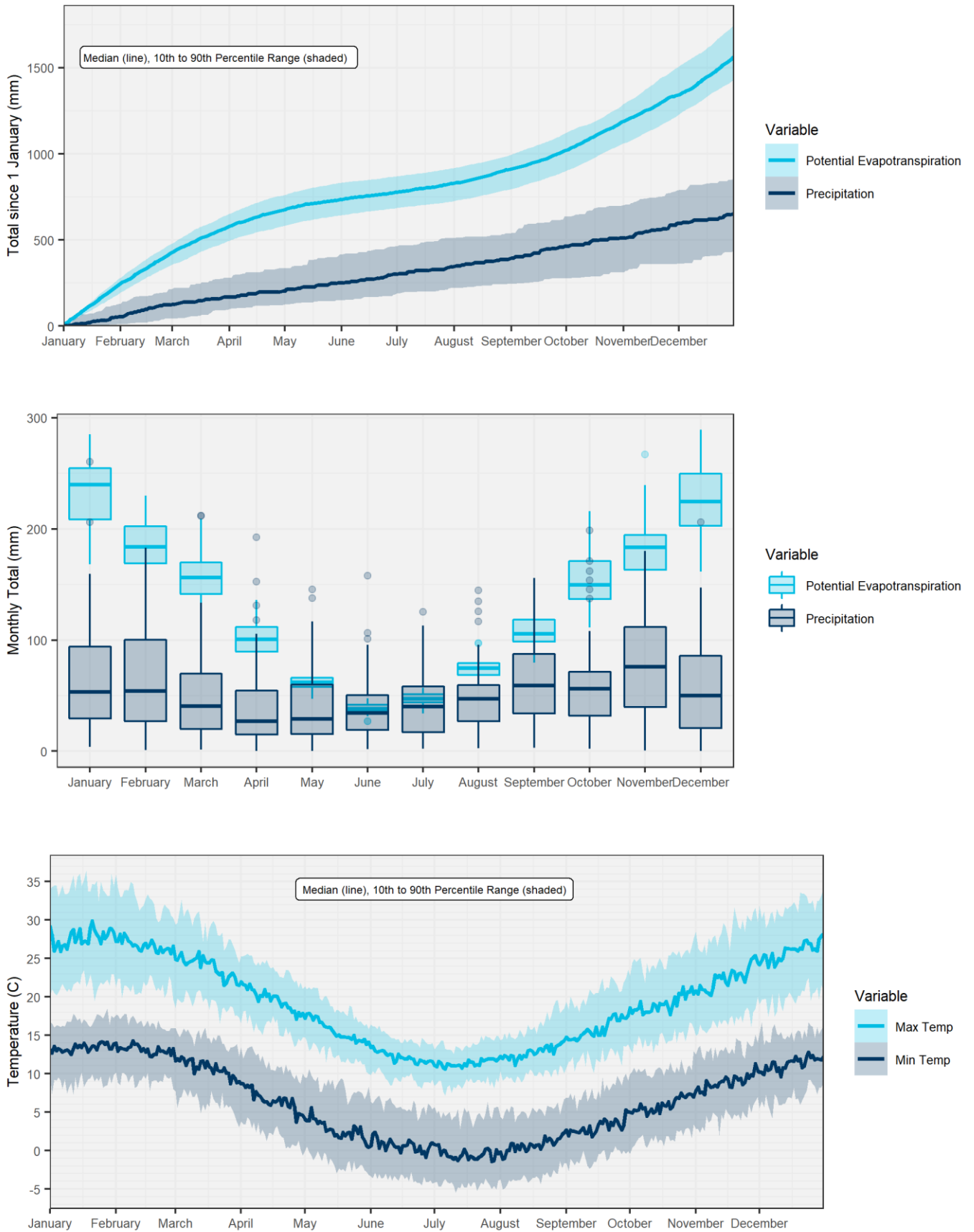
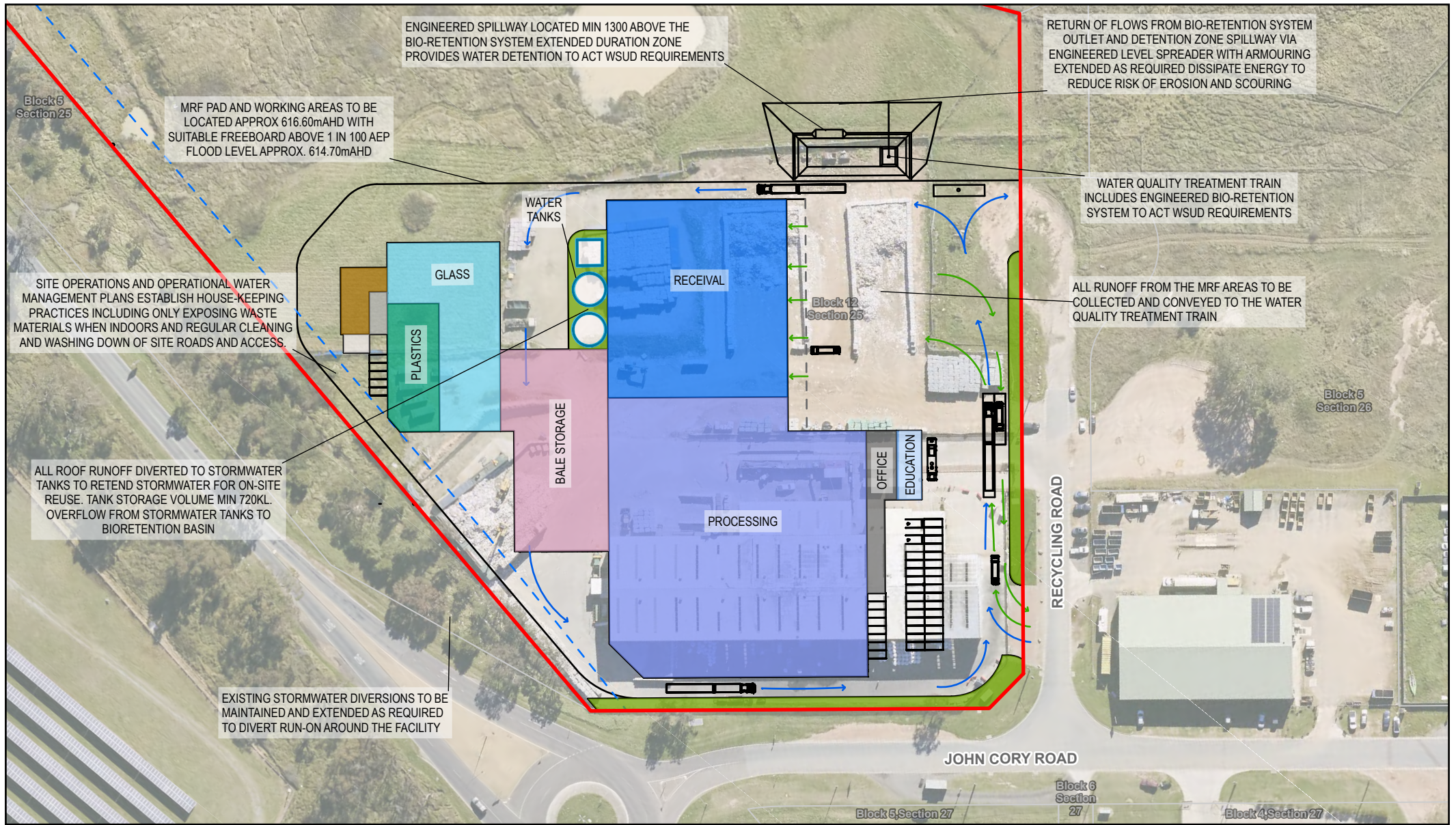


Figure 2.1 Climate data

3. Proposed soil and water management

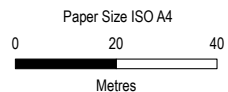
A key component of the proposed soil and water management strategy for the proposal is the principle of providing important water management measures in-built into the proposal. This section details the methods adopted to derive these in-built measures, as well as documenting the corresponding measures developed. Section 4 then assesses the impacts of the proposed works including the measures, with residual mitigation requirements documented in Section 5.

The measures have been developed in accordance with the assessment requirements as well as relevant regulations such as the Environment Protection Regulation 2005. Figure 3.1 presents key design elements relevant to all the following scenarios.



Legend

- ▬ Proposal site
- Cadastre
- Water Tanks
- Amenities
- Bale Storage
- Education
- Glass
- Office
- Plant Washdown
- Plastics
- Processing
- Receival
- Water Treatment
- Grass



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

**Transport Canberra and City Services
Hume Materials Recovery Facility
Water Impact Assessment**

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Soil and water management

FIGURE 3.1

3.1 Flooding

Hydraulic flood modelling of the proposal site was undertaken by GHD to inform the proposed pad level, as well as to identify and avoid flood impacts to nearby receptors. A TUFLOW hydraulic model received from Cardno (now Stantec), dated 06/12/2022, was used to simulate flooding for existing and design case conditions. Prior to this, Cardno had received the original TUFLOW model from Jacobs. The purpose of the original model was to assess the highway adjacent to the proposed site, therefore, some adjustments were made for the proposed site. Cardno's model was adapted by GHD to simulate the existing case as follows:

- Adjustments to the model configuration, included:
 - Two additional culverts were identified and added to the model.
 - The lengths and invert levels were adjusted for two culverts.
 - The Manning's roughness coefficient for relevant culverts were increased from 0.013 to 0.015.
 - The source-area inflow polygons in the model were adjusted to permit assessment for this proposal.
- The RORB hydrological model provided by Cardno identified that the critical storm at the proposal site resulted from temporal pattern 22, with a 1-hour duration. This storm was adopted in GHD's flood modelling for both the existing and design case scenarios, for the 1 in 100 Annual Exceedance Probability (AEP) storm event.

Results obtained from the model for the existing scenario were utilised identify a pad location that would avoid impacts to the proposal from nearby waterways. Setting a nominal pad level for the MRF proposal site was first used to inform design development. Based on the initial results, the final pad elevation was selected to avoid flooding impact to the proposal, as well as to minimise potential impacts to flood velocities, hazard, and level (afflux) for nearby receptors.

It was determined from the flood model that the design pad level can be suitably located to not be impacted by the 1 in 100 AEP flood level, with diversion infrastructure conveying floodwater around the pad. A minimum pad level of 614.7 mAHD plus the required freeboard would be adopted for the proposal. The concept pad level developed for the proposal was set at 616.6 mAHD, a freeboard of over 1.9 m, indicating the proposal's flood immunity. Due to the proposal site topography, the design for pad levels would be expected to be higher than standard freeboard, therefore the provision of a realistic freeboard would be easily achieved and would be further confirmed in the detailed design stage. Results indicate that there would be no notable impacts on downstream waterways based on minimal change in flood height, with maximum increases of 50 mm adjacent to the northern edge of the proposal site. The pad levels will not cause flooding to extend to any adjacent landholdings.

Detailed flood mapping for the existing and design case are included in Appendix A.

3.2 Water quality

A water quality treatment train, mainly consisting of rainwater tanks, detention (refer Section 3.3), and a bio-retention system, is inbuilt into the proposed design as indicated on Figure 3.1.

A key consideration in developing the treatment train was identifying where the MRF processes would be taking place as this determines the level of surface water management required. Identifying that the MRF processes would be taken place indoors, it is noted that water quality risk is similar to that of a typical urban development. Therefore, the risks of typical urban development would be associated with the proposal such as an increase in runoff volume, sediment, and nutrients.

Noting this, and the fact that the proposal site is located within the ACT, best-practice methods were identified in assessing stormwater quality impacts due to typical industrial urbanisation activities. An appropriate treatment strategy was therefore developed.

The relevant water quality targets for the ACT require assessment based on development of a Model for Urban Stormwater Improvement Conceptualisation (MUSIC) stormwater quality model. Therefore, to inform the development of the stormwater treatment train a MUSIC model was developed in accordance with ACT government regulations and guidelines which includes the Environment Protection Regulation 2005, and the 'Waterways: Water Sensitive Urban Design General Code'.

The MUSIC stormwater quality model was developed in accordance with the 'Waterways: Water Sensitive Urban Design General Code'. Additionally, the ACT government has provided MUSIC-link functionality that was accessed through the software that pre-loads default parameters. The MUSIC-link incorporated the Local Government Area (LGA) -specific guidelines and targets. The output of the MUSIC-link provided validation results, showing the compliance status (pass or fail) of each parameter which indicates whether results are within allowable ranges.

As part of the MUSIC-link provided, default meteorological template of the climate data were in-built into MUSIC, sourced from the ACT Government database. This template includes relevant information including rainfall, potential evapotranspiration data and a range of climatic conditions for the climatic zone. The climatic data dates range from 1968 to 1977.

As previously identified in Section 2.2, the land use in proximity to the proposal site is a mix of industrial businesses and pastoral lands. Therefore, the node of the existing site was specified to be 'Urban – Mixed'. Topsoil was identified to be consisting of gravels and stones. These soil characteristics were used to characterise existing site runoff.

The proposal site was modelled as impervious urban mixed nodes consisting of sealed roads and a roof catchment.

A stormwater quality treatment train was developed and specified as follows:

- Roof runoff would be conveyed, captured, and stored in two rainwater tanks with capacity of 360 kL each. The captured water would be reused for toilet flushing in the building and other processes in the MRF. This is equivalent to 2.7 kL of storage per 100 m² of impervious area.
- Runoff from impervious ground surface water would be conveyed to a bio-retention system that would be located at the north of the proposal site.
- Bioretention would be located north of the proposal site, with an extended detention depth of 0.3 m, surface area of 26 m², and filter area of 15 m².
- Discharge of waters from the treatment train would be via a level spreader or equivalent energy dissipation structure at the outlet to return flows to nearby waterways whilst lowering risk of erosion.

Reuse demands are outlined in Section 3.4.

Numerous default parameters were provided in the MUSIC-link provided by ACT, an exception was the orthophosphate content which was referred to WaterNSW guidelines for appropriate values. Since there were no data in MUSIC-link for roofs, mixed-urban area data was adopted. The sizing of the bio-retention basin was iterated until the requirements for all pollutant types were met, indicated by the compliance status. Upon running the simulation, performance targets were met for Total Suspended Solids, Total Phosphorus, and Total Nitrogen. Parameters modified such as the high flow bypass, orthophosphate content of filter media, and reuse demand are following the ACT Government regulations. The model was iterated and as a result, targets were satisfied with a bio-retention system of a 15 m² filter area.

Table 3.1 below presents the MUSIC model output of the proposal site with the treatment train implemented. The MUSIC Link summary report published from MUSIC is included in Appendix B.

Table 3.1 MUSIC modelling pollutant load results

Scenario	Annual pollutant load (kg/yr)		
	Total suspended solids	Total phosphorus	Total nitrogen
Baseline	1619	2.544	31.394
Development	378	1.328	19.392
% Reduction targets (Min)	85%	65%	45%
% Reduction results	86.12%	65.79%	58.72%
Pass or fail?	Pass	Pass	Pass

The MUSIC model generated indicated that all requirements post-development would be achieved in accordance with the ACT Water-sensitive Urban Design (WSUD) Design Code. That is the total suspended solids, total

phosphorus, and total nitrogen reduction was at least 85%, 65%, and 45% respectively through the treatment train as shown in Appendix B.

The annual discharge would be 11.93 ML/year.

3.3 Water retention and detention

Infrastructure to manage the quantity of stormwater leaving the proposal site would be provided to ensure that retention and detention of water minimise impacts to downstream conditions. As part of this process, the water detention system was considered in tandem to the water quality treatment infrastructure (refer Section 3.2).

During detailed design of the facility, the drainage network would be assessed to consider detailed sizes and infrastructure requirements to meet the stormwater quantity requirements. However, at this current stage a stormwater quantity system was conceptually developed in accordance with ACT government regulations and guidelines. This includes the Environment Protection Regulation 2005, and the 'Waterways: Water Sensitive Urban Design General Code'.

This conceptual stormwater quantity consisted of the following components to address the assessment's requirements:

- Water retention would be provided at a minimum rate of 1.4 kL of storage per 100 m² of impervious area.
- Stormwater detention would be implemented at a minimum rate of 1 kL of storage per 100 m² of impervious areas. Detained stormwater is released over a period of 6 hours. Peak rate of runoff for the 1 Exceedance per Year (1 EY) event is lesser than an unmitigated (rural) site of the equivalent area.

A conceptual DRAINS model was established to establish the baseline stormwater quantity assessment and to permit comparison to a proposed scenario. The model included the following methodology:

- A baseline, pervious catchment was established with an equivalent area to the development to estimate runoff from the proposal area under current conditions. A single-node, initial-loss-continuing-loss model was established using loss parameters sourced from the ARR Data Hub (Ball, et al., Australian Rainfall and Runoff: A Guide to Flood Estimation, 2019). A background impervious fraction of 10% was adopted to consider for rock and other impervious features with loss values of 1 mm and 0 mm/hr.
- A model was established for the proposed development comprising of the following:
 - The catchment draining to the detention system comprises of 2.779 ha with a pervious fraction of 4% with a time of concentration of 5 minutes.
 - Roof water was connected to the drainage network and tanks and other retention infrastructure were assumed to be full prior to the storm event.
 - All areas of the proposal site reported to the stormwater detention system, which comprised of a dedicated stormwater detention zone located above the bio-retention outlet. An engineered pipe-outlet is used to discharge from the stormwater detention zone.
 - During events larger than the 1 EY event, flows would report over a spillway and this spillway would be appropriately sized during detailed design.

Using the DRAINS model, the conceptual detention system was developed based on the following:

- A detention pond is proposed to manage stormwater quantity impacts in accordance with the Act WSUD regulations.
- A spillway of the detention pond is to be located 1.3 m above the engineered pipe-outlet. The engineered pipe-outlet collected flow from a grated inlet pit and comprised of a High-density Polyethylene (HDPE) 160 mm pipe with peak flow during the 1 EY event of 52 L/s compared to the rural baseline of 66 L/s. This provides 380 kL of temporary storage which is solely drained through the engineered pipe-outlet (which is equivalent to 1.18 kL of detention per 100 m² of impervious areas). The outlet drains longer duration events typically over a 6-9 hour period.
- During rarer events, up to the 1 in 100 AEP storm, flow over a trapezoidal spillway, located 1.3 m above the pit inlet, with a crest length of 8 m allows for large events to be safely passed through the system.

- To allow for the 1 in 100 AEP event to be safely passed with a freeboard of 300 mm, the detention system located above the bio-retention pond is to have a total depth of 1.8 m, equivalent to 500 kL of storage (or 380 kL excluding freeboard).

3.4 Water sourcing

Water demand information was provided by the proponent such that the appropriate sourcing of water could be included in the development of the proposal.

It is estimated that approximately 7,300 kL/year of water input for the MRF processes and proposal site operation would be required to be sourced from the facility.

Through the assessment undertaken using MUSIC (refer Section 3.2), results showed that the reuse provided by the rainwater tanks significantly reduced the reliance on potable water. The MUSIC model simulated that 77.6% of water demands could be sourced from on-site water collection. However, during dry periods, potable supply would need to be relied on to meet water demands.

Future increases of expansion may result in water demands up to 13,000 kL/year. At these higher rates, the two proposed rain-water tanks would only provide 53% of reuse, however future expansion of processing could consider additional storage capacities to provide higher rates of water re-use if required.

3.5 Wastewater management

Wastewater would be generated at the facility during the processing of waste materials. In particular, the washing of glass and plastics would result in accumulation of suspended solids and dissolved solids, which would require treatment to allow for reuse on-site. Wastewater generated during processing would be collected and conveyed to a treatment plant to process wastewater for reuse, or disposal via sewer.

A wastewater treatment plant is proposed to enable the processing of wastewater to allow for reuse, reducing reliance on external sources and to minimise wastewater/sewer discharge. The wastewater treatment plant would need to periodically discharge some waters to sewer. The required sewer discharge rate is anticipated to be in the order of 1 tonne of water for every 3 to 4 tonnes of glass or plastic washed.

Based on processing tonnages key materials, such as 2,000 tonnes of plastics and 20,000 tonnes of glass, this would require annual sewer discharge quantity of approximately 5,500 kL to 7,300 kL. This may increase with future processing rates up to 10,000 to 13,000 kL/year.

Design of the wastewater system, including the connection to the ACT sewerage network (owned by Icon Water) would be finalised during detailed design of the facility. No impacts from connecting to the existing wastewater network are anticipated.

4. Impact assessment

The potential soil and water impacts were assessed and the key in-built measures for the proposal are:

- Hydraulic modelling was undertaken for the 1 in 100 AEP flood event to set the required pad level, and to identify whether off-site impacts were expected. The built-in management measure for suitably setting the MRF pad level identified that no flood impacts are expected during the 1 in 100 AEP flood event. Additionally, no off-site impacts are anticipated during this event (refer to Section 3.1).
- Based on the MUSIC modelling results, and location of MRF processes indoors, the proposal was developed providing in-built management to achieve reduction targets on water quality during operation (refer Section 3.2). As in-built management measures are implemented to manage water quality, impacts to the receiving environment, surface water, groundwater and downstream ecosystems are not anticipated.
- Water quantity and discharge rates can be met through in-built management measures to manage stormwater flow rates and to reduce the risk of erosion and scour to nearby waterways, such as Dog Trap Creek, as outlined in Section 3.3.
- The appropriate sourcing of water demands has been confirmed as outlined in Section 3.4.
- Wastewater generated on-site would be managed in a dedicated collection and conveyance system. As waste materials would be located indoors or roofed, rainfall derived wastewater would not be generated. Wastewater generated would generally be from applied water to processes. The appropriate management of wastewater has been confirmed as outlined in Section 3.5, included an engineered system to contain wastewater on-site such that impacts to receiving environments are not predicted.

The assessment identified additional mitigation required for the following areas:

- The basis of the water quality approach is that runoff generated would be of a typical industrial catchment. An operational management plan is necessary with a particular focus that materials are always stored indoors and suitable housekeeping to manage waters and spills is implemented. While no significant impacts are anticipated from the wastewater and hazardous materials, the operational management plan would also include the management of the wastewater system, including how any response to spills or contamination would be managed.
- Significant erosion and sedimentation control measures are required to manage the disturbance associated with clearing and construction works adjacent to the waterways, which are unavoidable. Control measures implemented would manage disturbance and potential water quality impacts to downstream waterways and associated aquatic ecosystems with regards to suspended solids.

As per the in-built measures and the additional mitigation measures provided in Section 5, the proposal is not predicted to result in significant soils and water related impact.

5. Mitigation

As outlined in Section 4, the following mitigation measures have been identified.

5.1 Operational water management plan

The water quality approach would take on the approach where runoff generated is similar to that of a typical industrial catchment. Therefore, an operational water management is required. It is important that materials such as plastics are always stored indoors, and appropriate housekeeping measures are implemented.

Before the commencement of the MRF operations, a detailed operational management plan would be developed and updated on a yearly basis. Some key features of proposed activities that would be specified and maintained are as follows:

- Materials inside trucks are not to be removed until truck is fully inside the indoor receiving area.
- Fast action roller doors are to be installed so they can close promptly after trucks have entered the building.
- Products are to be fully repackaged before leaving indoors on instances where they are transferred off-site or between buildings.

With the previously mentioned mitigation measures in place, risks of litter falling outside of the MRF building and conveyed by stormwater are minimised. However, as an additional protection, daily visual inspection would be specified in the plan with any waste located outside to be collected. Inspections would be done by verified and authorised personnel with clearly mandated responsibilities. Instances where materials waste are found outside would be logged by the person inspecting.

The operational water management plan would also include details of the following:

- Maintenance of the wastewater system, including the containment and conveyance system to ensure wastewater is not discharged offsite.
- Emergency management procedures, such as management of uncontrolled spills, including where engineered controls of areas containing hazardous materials are required such as bunding or similar to intercept pollutants from the receiving environment.

It is proposed that the implementation and updating of the plan would be stipulated in the Environment Protection Authorisation. No license discharge points are proposed to be included in the license, as water quality discharged on-site are modelled to meet requirements in accordance to ACT WSUD Code.

5.2 Construction phase erosion and sediment control

Erosion and sediment control is an important consideration as there would be an extensive amount of disturbance during the construction phase of the proposal, with potential to impact Dog Trap Creek adjacent to the facility if not appropriately managed. Therefore, soil and sediment control measures are required.

Before the commencement of construction, a Soil and Water Management Plan would be developed to address erosion and sediment control. This plan would be developed in accordance with *Environment Protection Guidelines for Construction and Land Development in the ACT*, which references the NSW Guide: *Managing Urban Stormwater: Soils and Construction – Volume 1*, commonly known as 'The Blue Book'. The plan would be finalised after the detailed construction approach and method are confirmed. However, key principles of the Soil and Water Management Plan to be adopted are highlighted in Section 5.2.1. With the implementation of this plan, the performance of erosion and sediment control measures in the construction phase is expected to be acceptable and accordingly impacts to downstream sediment loads, water quality, or aquatic ecosystems are anticipated to be appropriately managed using typical erosion and sediment controls.

5.2.1 Soil and Water Management Plan

The Blue Book is a primary resource of stormwater management design and construction, particularly erosion and sediment control of urban developments (Landcom, 2004). Therefore, it would be used as the primary source in

the development of the Soil and Water Management Plan for the proposal site. The Blue Book outlines management, operations, and controls procedures as well as monitoring and maintenance processes to ensure compliance requirements are satisfied.

A key component of the Soil and Water Management Plan would be integration with the final water management configuration and appropriate staging of the work. Key activities in the staging, in chronological order, are listed below:

- Install the proposed northern basins initially as unlined sediment basins.
- Convey upstream run-off around the site disturbance area.
- Convey the site disturbance areas to the northern basins via dirty water drains.
- Undertake the main site construction activities.
- Once disturbance activities are complete, convert the basins into their final operational phase form.

Final sediment basin sizing requirements would be undertaken in the development of the plan, with the basins operating as Type D/F 'wet' basins based on the soil conditions of the proposal site. It is anticipated that the operational phase requirements for the basins will govern the sizing, in which case a greater volume will be provided than required strictly for construction phase sediment control.

The plan would include construction phase water quality monitoring of the sediment basins, as well as any discharge during construction hours. A daily rainfall record would also be kept. Where a discharge of greater than 50 mg/L of suspended solids occurs when the design rainfall event has not been exceeded this would be considered a non-compliance and remedial action taken.

The Blue Book specifies numerous general requirements that would apply to the plan. This would be in areas including:

- Minimising the extent and duration of disturbance
- Handling of soils
- Stockpiling
- Site access and egress
- Management of drainage
- Water quality monitoring
- Roles, responsibilities, and incident reporting
- Fuel storage
- Inspection requirements.

6. Conclusions

This soil and water impact assessment has been prepared to address the water quality and hydrology related requirements of the EPSDD. The report covers surface water management and construction phase erosion and sediment control.

The report identifies existing environmental factors relevant to surface water management and erosion and sediment control. It also outlines the assessment method adopted to analyse flooding, water quality, water retention and detention, water sourcing and wastewater management was covered. The assessment carried out informed the appropriate in-built measures and specified mitigation measures specific to relevant risks.

A critical component of the proposed soil and water management strategy for the proposal is the principle of providing important water management measures in-built into the proposal. These included:

- Appropriate pad levels plus the required freeboard so that flood levels of a 1 in 100 AEP would not be impacted.
- On the basis that MRF processes would take place indoors, based on MUSIC modelling results, the proposal was developed providing in-built management to achieve water quality standards in accordance with the ACT government regulation and relevant guidelines.
- Based on DRAINS modelling results, the proposal was developed providing appropriate in-built management of stormwater quantity to minimise the impacts of downstream flooding conditions in accordance with ACT government regulations and guidelines.
- Reusing site runoff for water demand as much as practicable, whilst securing an external potable supply to cover up to the full site demand during dry periods.
- Securing a sewer disposal capability with Council to accommodate the full wastewater demand from all activities taken place on the proposal site.

Relevant mitigation measures specific to the operational and construction phase are specified in Section 5 of this report. No significant soil and water impacts are anticipated with the implementation of these measures.

7. References

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http://www.bom.gov.au/jsp/ncc/climate_averages/climate-classifications/index.jsp?maptype=kpn#maps

Jenkins, B.R. 2000, Soil Landscapes of the Canberra 1:100 000 Sheet, Department of Land and Water Conservation, Sydney

Landcom. (2004). Managing Urban Stormwater: Soils and Construction. Parramatta, NSW, Australia.

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Queensland Government (n.d.) SILO – Australian climate data from 1889 to yesterday:

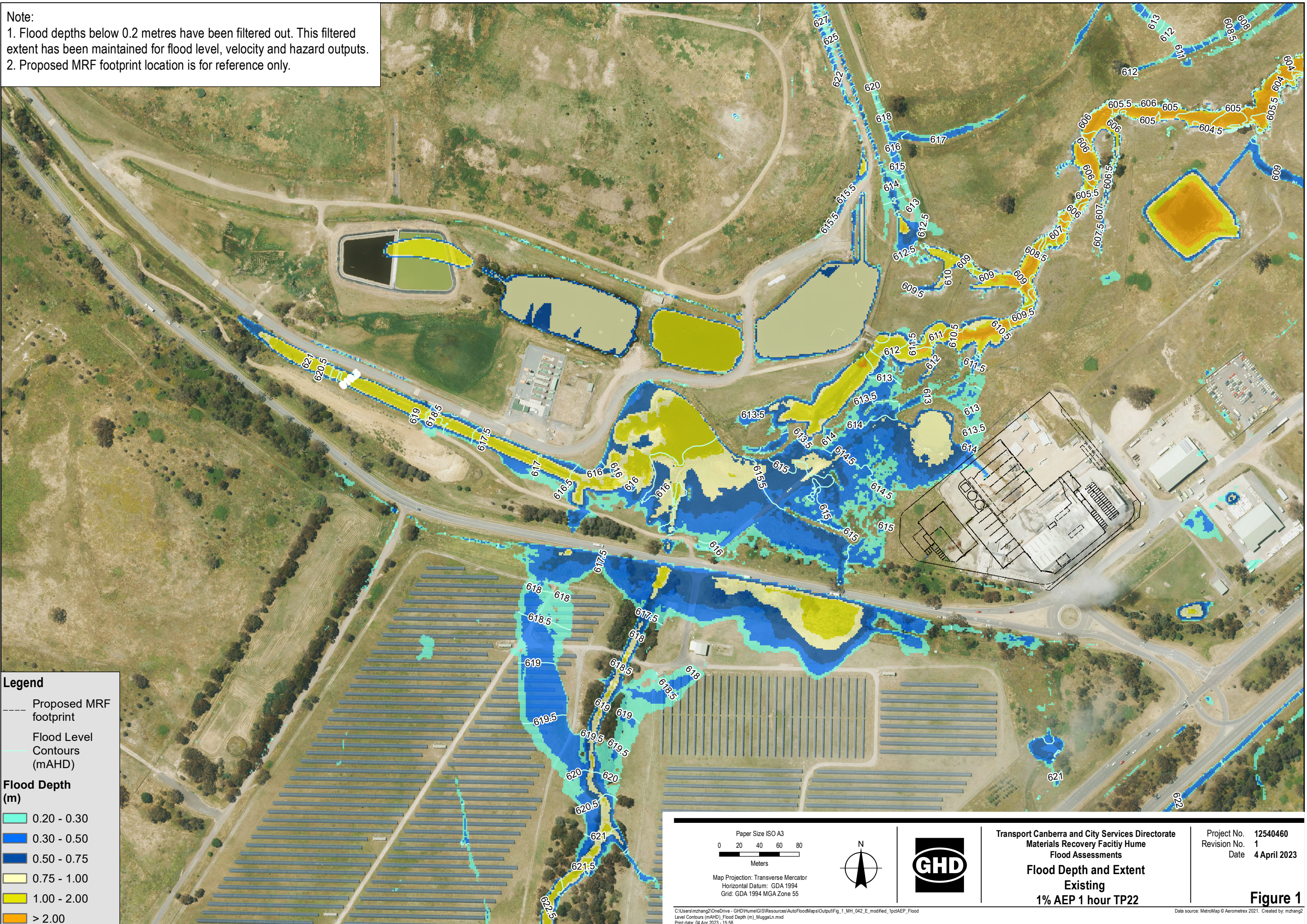
<https://www.longpaddock.qld.gov.au/silo/view-point-data/>

Appendices

Appendix A

Flood mapping

Note:
 1. Flood depths below 0.2 metres have been filtered out. This filtered extent has been maintained for flood level, velocity and hazard outputs.
 2. Proposed MRF footprint location is for reference only.



Legend

- Proposed MRF footprint
- Flood Level Contours (mAHD)

Flood Depth (m)

- 0.20 - 0.30
- 0.30 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

Paper Size ISO A3

0 20 40 60 80
Meters

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



Transport Canberra and City Services Directorate
 Materials Recovery Facility Hume
 Flood Assessments

Flood Depth and Extent Existing
 1% AEP 1 hour TP22

Project No. 12540460
 Revision No. 1
 Date 4 April 2023

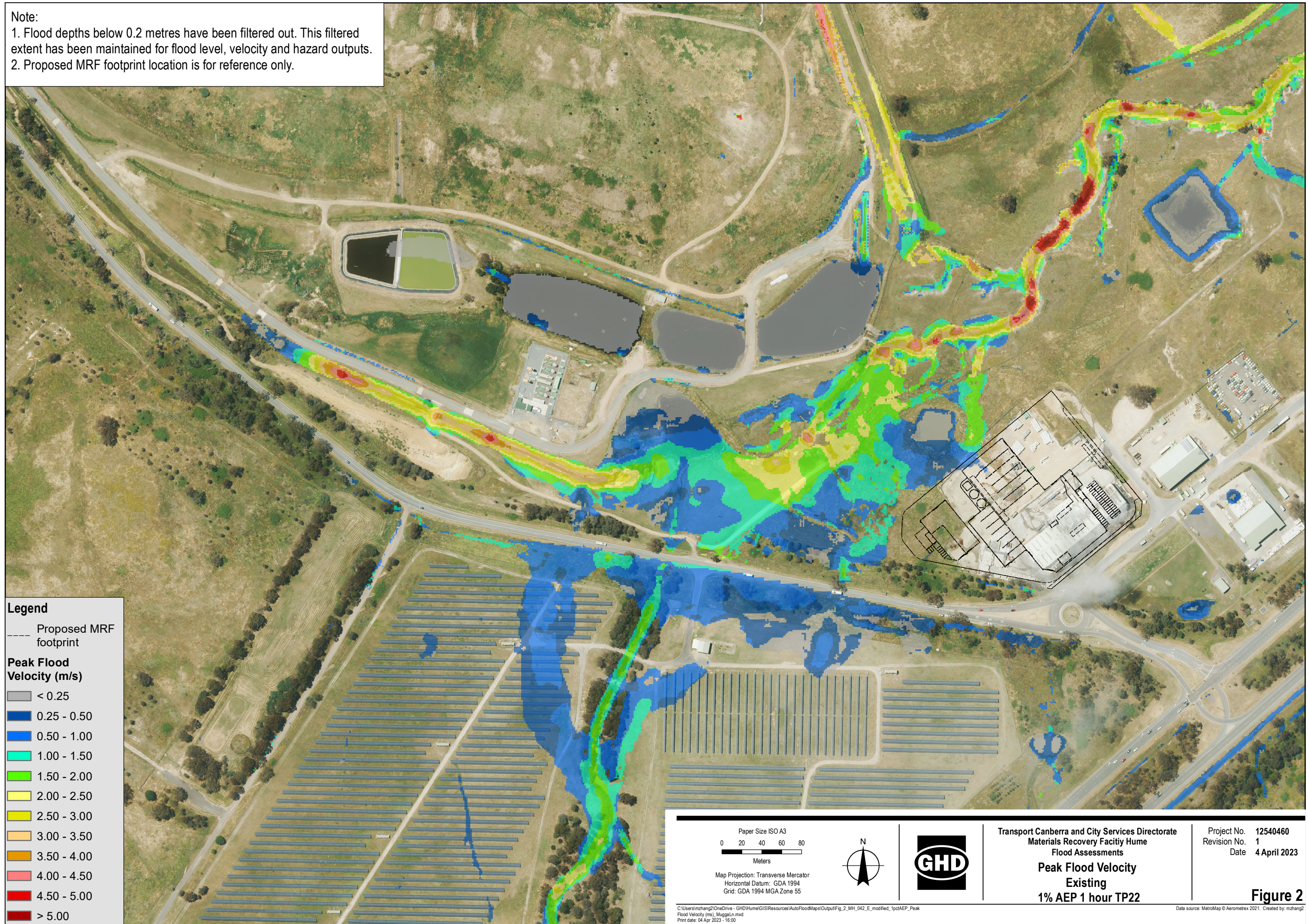
Figure 1

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 Print date: 04 Apr 2023 - 15:58

Data source: MetroMap © Aerometrex 2021. Created by: mzhang2

Note:

1. Flood depths below 0.2 metres have been filtered out. This filtered extent has been maintained for flood level, velocity and hazard outputs.
2. Proposed MRF footprint location is for reference only.

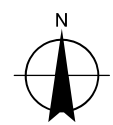
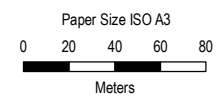


Legend

--- Proposed MRF footprint

Peak Flood Velocity (m/s)

- <math>< 0.25</math>
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 4.50
- 4.50 - 5.00
- > 5.00



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

Transport Canberra and City Services Directorate
Materials Recovery Facility Hume
Flood Assessments

Peak Flood Velocity
Existing
1% AEP 1 hour TP22

Project No. 12540460
Revision No. 1
Date 4 April 2023

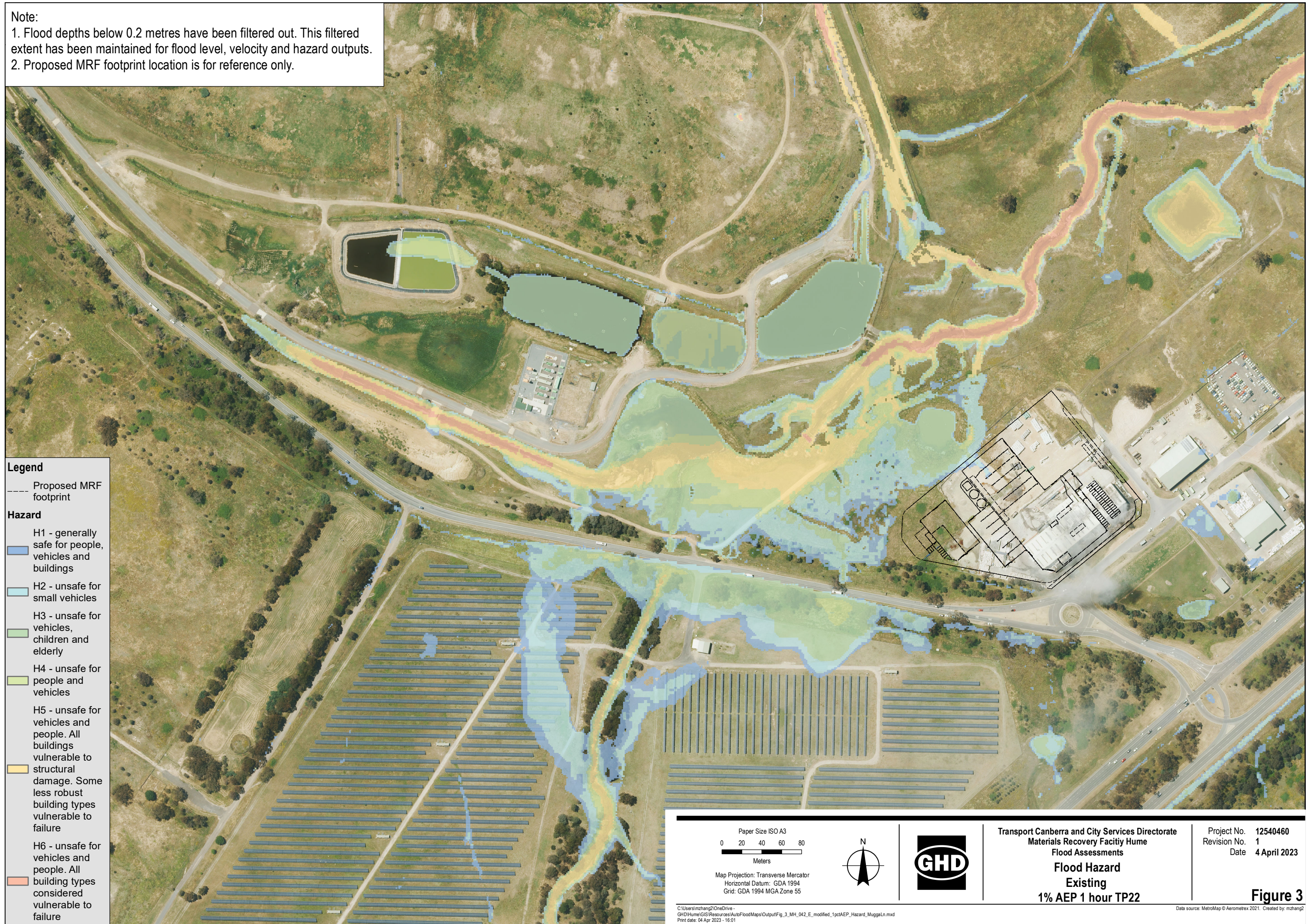
Figure 2

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Print date: 04 Apr 2023 - 16:00

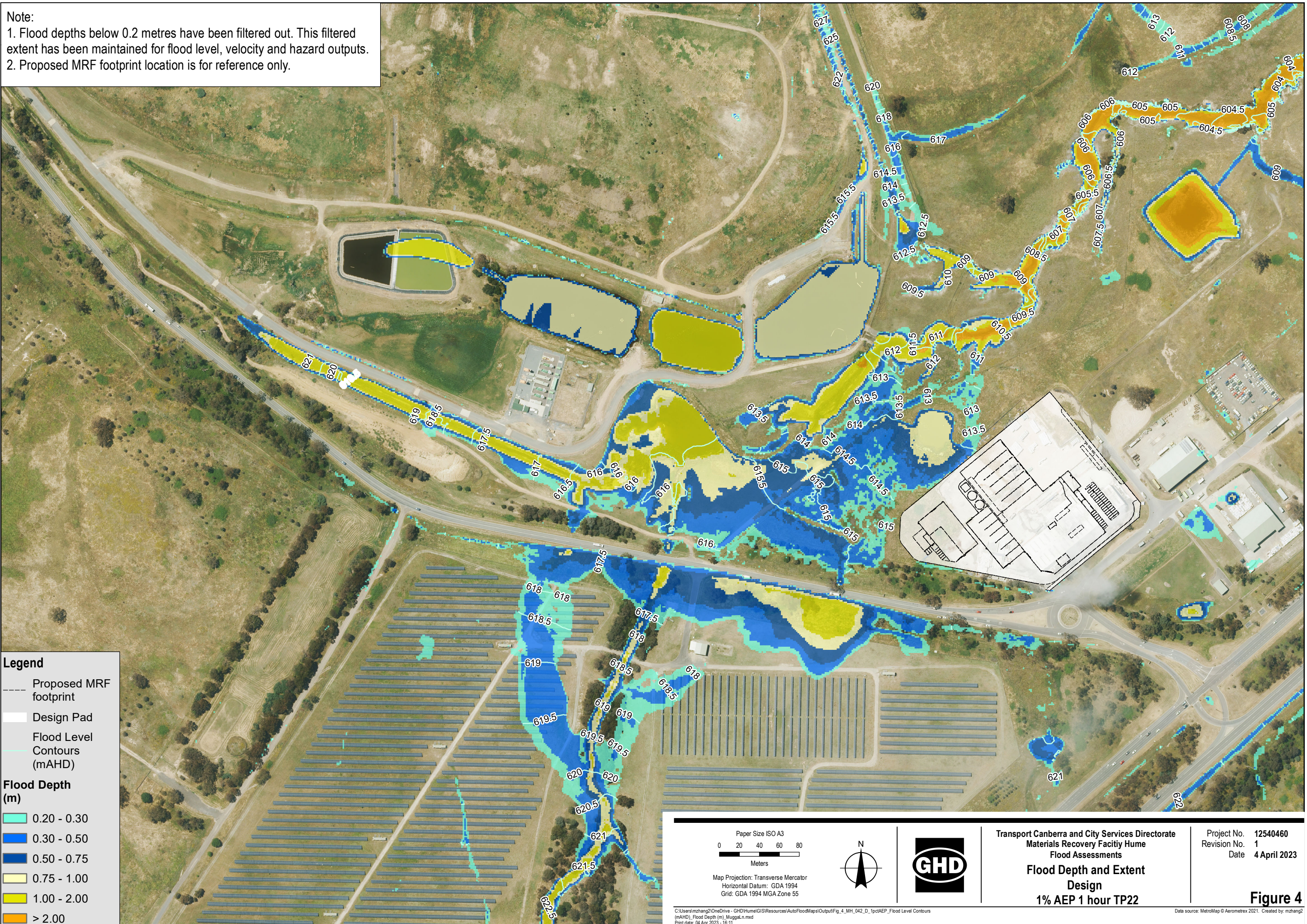
Data source: MetroMap © Aerometrex 2021. Created by: mzhang2

Note:

1. Flood depths below 0.2 metres have been filtered out. This filtered extent has been maintained for flood level, velocity and hazard outputs.
2. Proposed MRF footprint location is for reference only.



Note:
 1. Flood depths below 0.2 metres have been filtered out. This filtered extent has been maintained for flood level, velocity and hazard outputs.
 2. Proposed MRF footprint location is for reference only.



Legend

- Proposed MRF footprint
- ▭ Design Pad
- ▭ Flood Level Contours (mAHD)

Flood Depth (m)

- 0.20 - 0.30
- 0.30 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 2.00
- > 2.00

Paper Size ISO A3

0 20 40 60 80
Meters

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



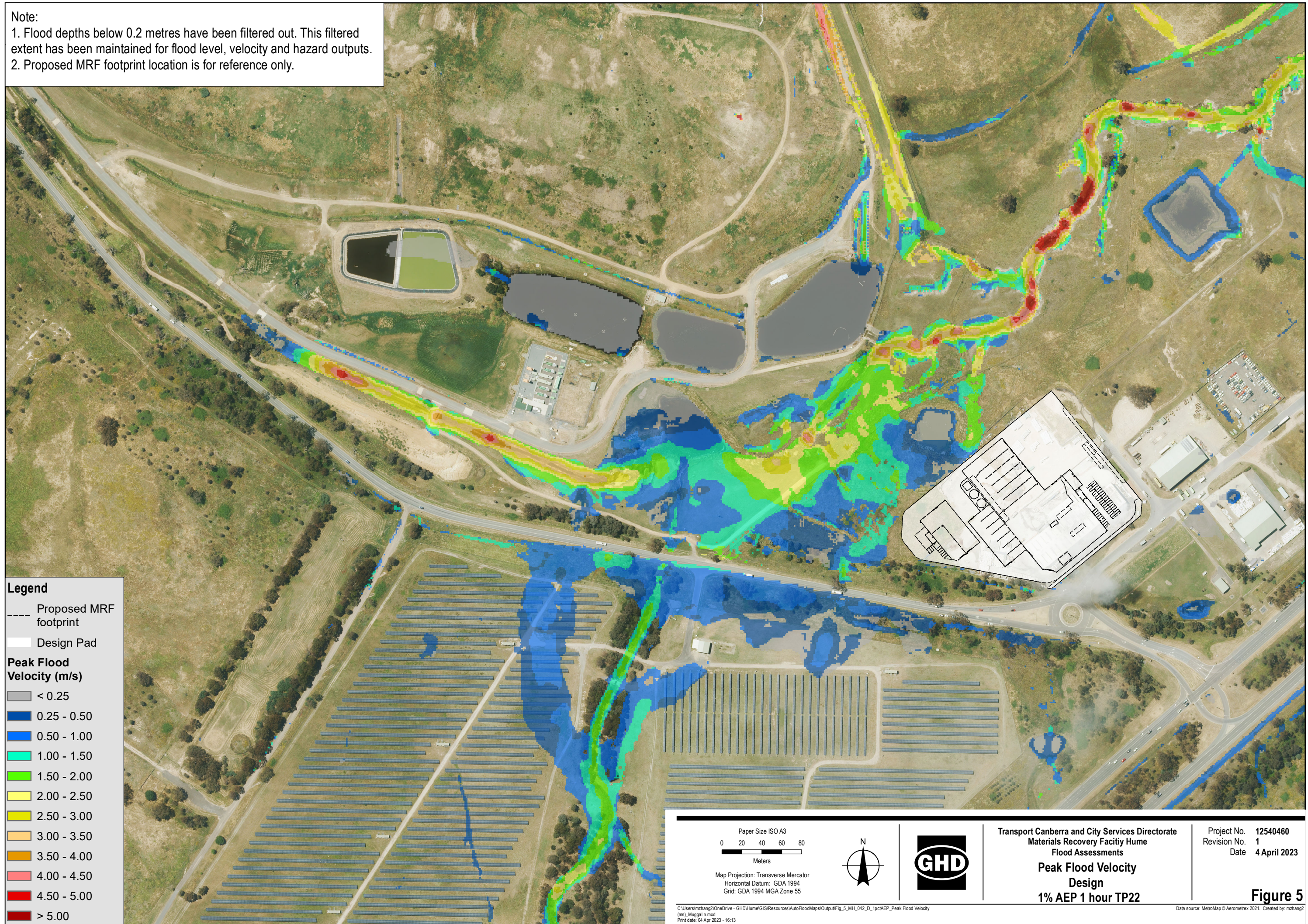
Transport Canberra and City Services Directorate
 Materials Recovery Facility Hume
 Flood Assessments
Flood Depth and Extent Design
 1% AEP 1 hour TP22

Project No. 12540460
 Revision No. 1
 Date 4 April 2023

Figure 4

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 Data source: MetroMap © Aerometrex 2021. Created by: mzhang2

Note:
 1. Flood depths below 0.2 metres have been filtered out. This filtered extent has been maintained for flood level, velocity and hazard outputs.
 2. Proposed MRF footprint location is for reference only.



Legend

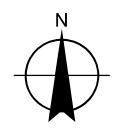
- Proposed MRF footprint
- Design Pad

Peak Flood Velocity (m/s)

- < 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 4.50
- 4.50 - 5.00
- > 5.00

Paper Size ISO A3
 0 20 40 60 80
 Meters

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

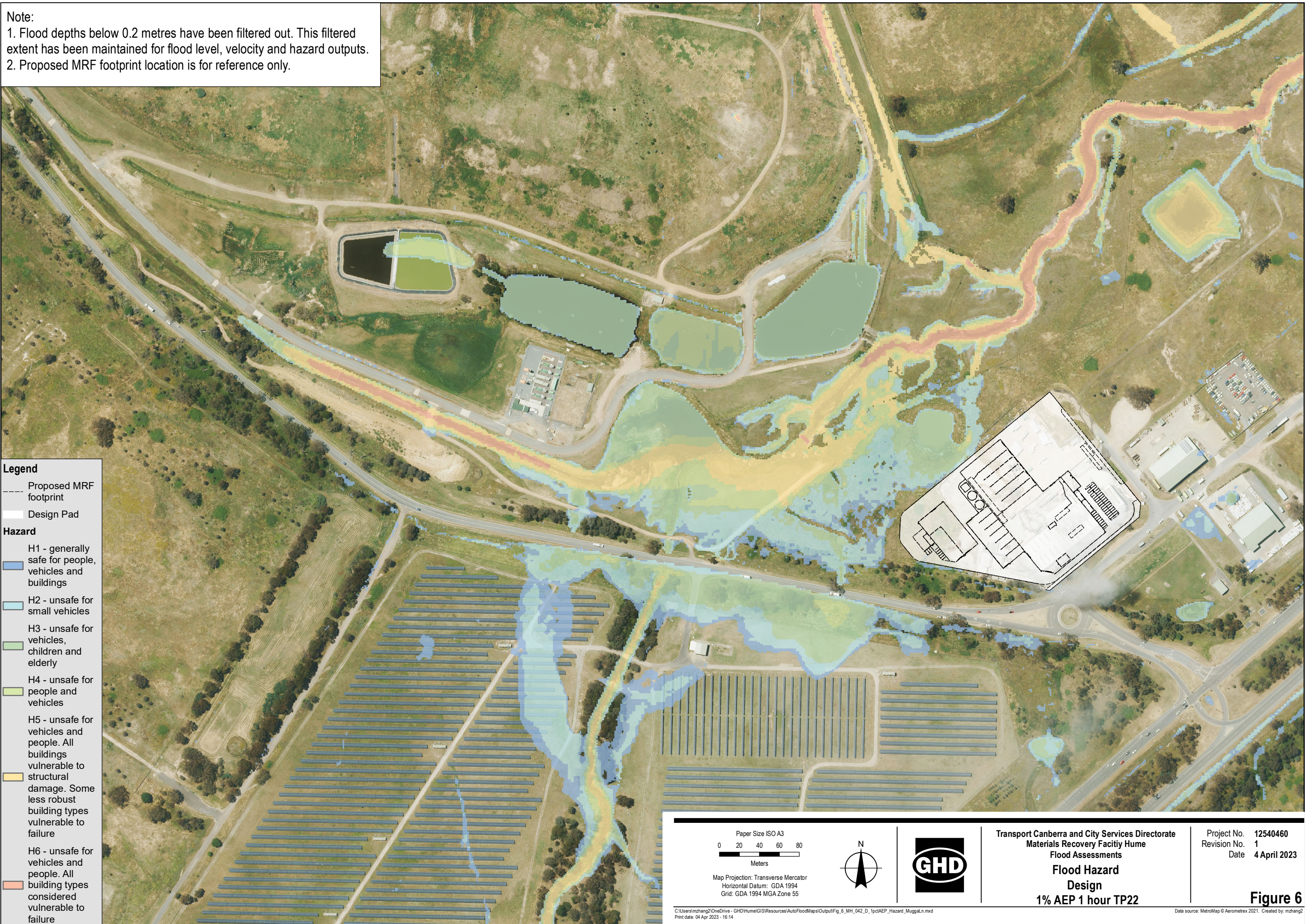


Transport Canberra and City Services Directorate
 Materials Recovery Facility Hume
 Flood Assessments
**Peak Flood Velocity
 Design**
 1% AEP 1 hour TP22

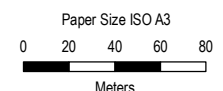
Project No. 12540460
 Revision No. 1
 Date 4 April 2023

Figure 5

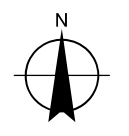
Note:
 1. Flood depths below 0.2 metres have been filtered out. This filtered extent has been maintained for flood level, velocity and hazard outputs.
 2. Proposed MRF footprint location is for reference only.



- Legend**
- Proposed MRF footprint
 - ▭ Design Pad
- Hazard**
- H1 - generally safe for people, vehicles and buildings
 - H2 - unsafe for small vehicles
 - H3 - unsafe for vehicles, children and elderly
 - H4 - unsafe for people and vehicles
 - H5 - unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
 - H6 - unsafe for vehicles and people. All building types considered vulnerable to failure



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



Transport Canberra and City Services Directorate
 Materials Recovery Facility Hume
 Flood Assessments
Flood Hazard Design
 1% AEP 1 hour TP22

Project No. 12540460
 Revision No. 1
 Date 4 April 2023

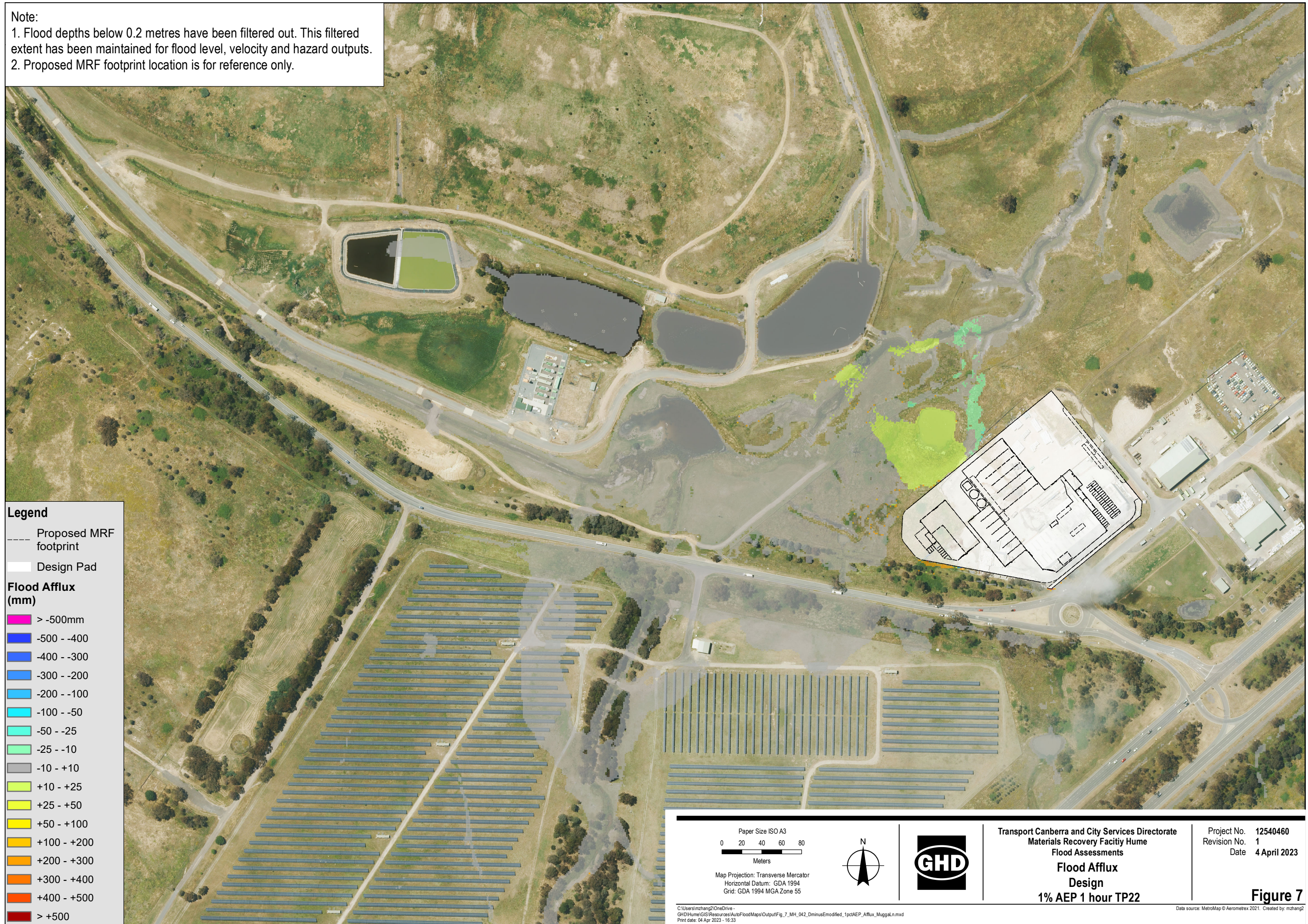
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 Print date: 04 Apr 2023 - 16:14

Data source: MetroMap © Aerometrex 2021. Created by: mzhang2

Note:

1. Flood depths below 0.2 metres have been filtered out. This filtered extent has been maintained for flood level, velocity and hazard outputs.
2. Proposed MRF footprint location is for reference only.

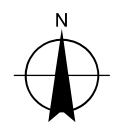
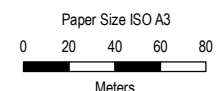


Legend

- Proposed MRF footprint
- Design Pad

Flood Afflux (mm)

- > -500mm
- 500 - -400
- 400 - -300
- 300 - -200
- 200 - -100
- 100 - -50
- 50 - -25
- 25 - -10
- 10 - +10
- +10 - +25
- +25 - +50
- +50 - +100
- +100 - +200
- +200 - +300
- +300 - +400
- +400 - +500
- > +500



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

Transport Canberra and City Services Directorate
Materials Recovery Facility Hume
Flood Assessments
Flood Afflux Design
1% AEP 1 hour TP22

Project No. 12540460
Revision No. 1
Date 4 April 2023

Figure 7

Appendix B

MUSIC Link Summary Report

MUSIC-link Report

Project Details		Company Details	
Project:	Hume MRF	Company:	ACT TCCS Directorate
Report Export Date:	21/04/2023	Contact:	
Catchment Name:	Receiving 4	Address:	
Catchment Area:	2.77902ha	Phone:	
Impervious Area*:	96.113200876568%	Email:	
Rainfall Station:			
Modelling Time-step:	Daily		
Modelling Period:	01/01/68 - 31/12/1977 00:00:00		
Mean Annual Rainfall:	655.404mm		
Evapotranspiration:	1116.37mm		
MUSICX Version:	1.1.0.11873 (5.0.3.11873)		
MUSIC-link data Version:	2.1		
Study Area:	ACT Government		
Scenario:	ACT Development		

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

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node:	Reduction	Node Type	Number	Node Type	Number
Flow	32.196%	Bioretention Nodes	1	Urban_Mxed Nodes	2
TSS	86.119%	Rainwater Tank Nodes	1		
TP	65.789%				
TN	58.719%				
GP	100%				

Comments

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bioretention	Bioretention 3	Exfiltration Rate	0	None	0 mm/h
Bioretention	Bioretention 3	High Flow Bypass	0	None	100 m ³ /s
Bioretention	Bioretention 3	Orthophosphate Content of Filter Media	0	55	40
Bioretention	Bioretention 3	PET Scaling Factor	2.1	2.1	2.1
Bioretention	Bioretention 3	TN Content of Filter Media	1	800	800
Rainwater	Rainwater Tank 5	% Reuse Demand Met	None	None	77.624 %
Receiving	Receiving 4	Flow Reduction	None	None	32.196 %
Receiving	Receiving 4	GP Reduction	90	None	100 %
Receiving	Receiving 4	TN Reduction	45	None	58.719 %
Receiving	Receiving 4	TP Reduction	65	None	65.789 %
Receiving	Receiving 4	TSS Reduction	85	None	86.119 %
Urban_Mixed	Ground	Impervious Area	None	None	1.332 ha
Urban_Mixed	Ground	Pervious Area	None	None	0.108 ha
Urban_Mixed	Ground	Total Area	None	None	1.44 ha
Urban_Mixed	Roof	Impervious Area	None	None	1.339 ha
Urban_Mixed	Roof	Pervious Area	None	None	0 ha
Urban_Mixed	Roof	Total Area	None	None	1.339 ha

Only certain parameters are reported when they pass validation

