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PRELIMINARY INVESTIGATION – CIVIL/STORMWATER

Client:	**EMMETT**
Project:	**PROPOSED DEVELOPMENT**
Location:	**HEASLIP ROAD cnr. MILL ROAD, WATERLOO CORNER, SA 5110**
Date:	**23-JANUARY-2025**
Our Job No.:	**24-419**

This is to certify that a desktop investigation and a preliminary stormwater management design have been completed for the proposed development at Waterloo Corner, SA. The preliminary stormwater management investigation included the following:

- review of the existing stormwater management study for the site stormwater management solution in the interim while upgrades to council infrastructures are not yet available
- determine the catchment area to be considered for the sizing of internal stormwater infrastructure
- provide a DRAINS model to confirm that the proposed onsite stormwater retention arrangement is adequate considering the runoff volume of a 72-hour 1% AEP rainfall event

The total catchment area considered in the DRAINS model is approximately 20.91 hectares. It is considered that 80% of the area will be sealed while the remaining 20% will be allocated for internal landscape and stormwater management.

In accordance with the previous stormwater study and the result of investigation conducted, the builder has been advised that:

- The site could be developed as proposed, provided that adequate internal stormwater infrastructures/retention storage is incorporated into the development.
- The stormwater management requirement will result to some modifications to the proposed site plan. The site plan should allow for the western swales in accordance with the overall stormwater management strategy of the surrounding areas.
- The proposed western swales/channels will collect and store the runoff from the catchment area directed to these open channels. The swales are dedicated

conveyor/storage of runoff from Emmett site only. External runoff should be diverted away from site boundaries.

- The combined volume from the proposed retention basin and swales is adequate to manage the site's post development flows with no overflow to adjacent lots for minor storm events and up to 72-hour 1% AEP rain event.
- The proposed retention basin is more than 3.0m deep including 300mm freeboard. A deeper basin is proposed to reduce the basin's top area. The depth of the basin should be reviewed against existing ground water level when the geotechnical report is available.
- The maximum slope of batter area should not exceed 1V:3H.
- Maintenance access should be provided to ensure swales and basin could be regularly maintained.
- Attached with this letter is the result of preliminary DRAINS model and conceptual stormwater management plan for reference.

Yours faithfully,

.....

John Bryant

General Manager/Specialist Consultant

DRAINS CALCULATION

Data

PIT / NODE DETAILS

Name	Type	Family	Version 15 Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph	Pit is	Internal Width (mm)	Inflow is Misaligned	Minor Safe Pond Depth (m)	Major Safe Pond Depth (m)
ADJACENT LOT	Node					10		0		283237.54	6153712.37		1699231		No					

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length(m)	id
RETENTION BASIN	8	5535.33		None						283222.91	6153712.82	No			1699229
	9	7007.15													
	10	10406.5													
	11	16099.3													
	11.2	17203.4													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%) %	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
TOTAL CA	RETENTION BASIN	20.911	80	20	0	5	5	0	100	100	0	0.5	0.5	0	0.012	0.035	0	0				1

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	Rl (m)	Chg (m)	RL (m)	etc (m)

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of Service (m)	etc etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed

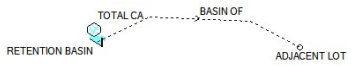
OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Storms (m)	SafeDepth Minor Storms (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id	U/S IL	D/S IL	Length (m)
BASIN OF	RETENTION BASIN	ADJACENT LOT	0.1	11	10	1.7	OF2	0.45	0.4	0.6	20	0	1699232	11	10	5

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover (m)	Cover (m)

This model has no pipes with non-return valves



DRAINS CALCULATION

10% AEP Result

DRAINS results prepared from Version 2024.11.9103.14755

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
TOTAL CA	2.852	2.761	0.092	12.48	19.21	0	10% AEP, 15 min burst, Storm 6

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

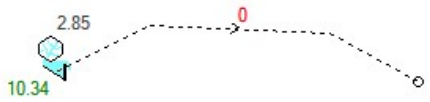
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
BASIN OF	0	0	1.45	0	0	0		0

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
RETENTION BASIN	10.34	18700.1	0	0	0

Run Log for DRAINS v2024.11.9103.14755 - 20-419 DRAINS
Run Log for DRAINS v2024.11.9103.14755 - 20-419 DRAINS.drn run at 07:07:54 on 23/1/2025.

Flows were safe in all overflow routes.



DRAINS CALCULATION

1% AEP Result

DRAINS results prepared from Version 2024.11.9103.14755

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
TOTAL CA	6.039	5.511	0.528	10.42	15.31	0	1% AEP, 10 min burst, Storm 9

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

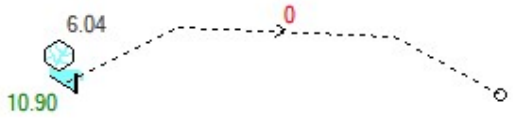
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
BASIN OF	0	0	1.449	0	0	0		0

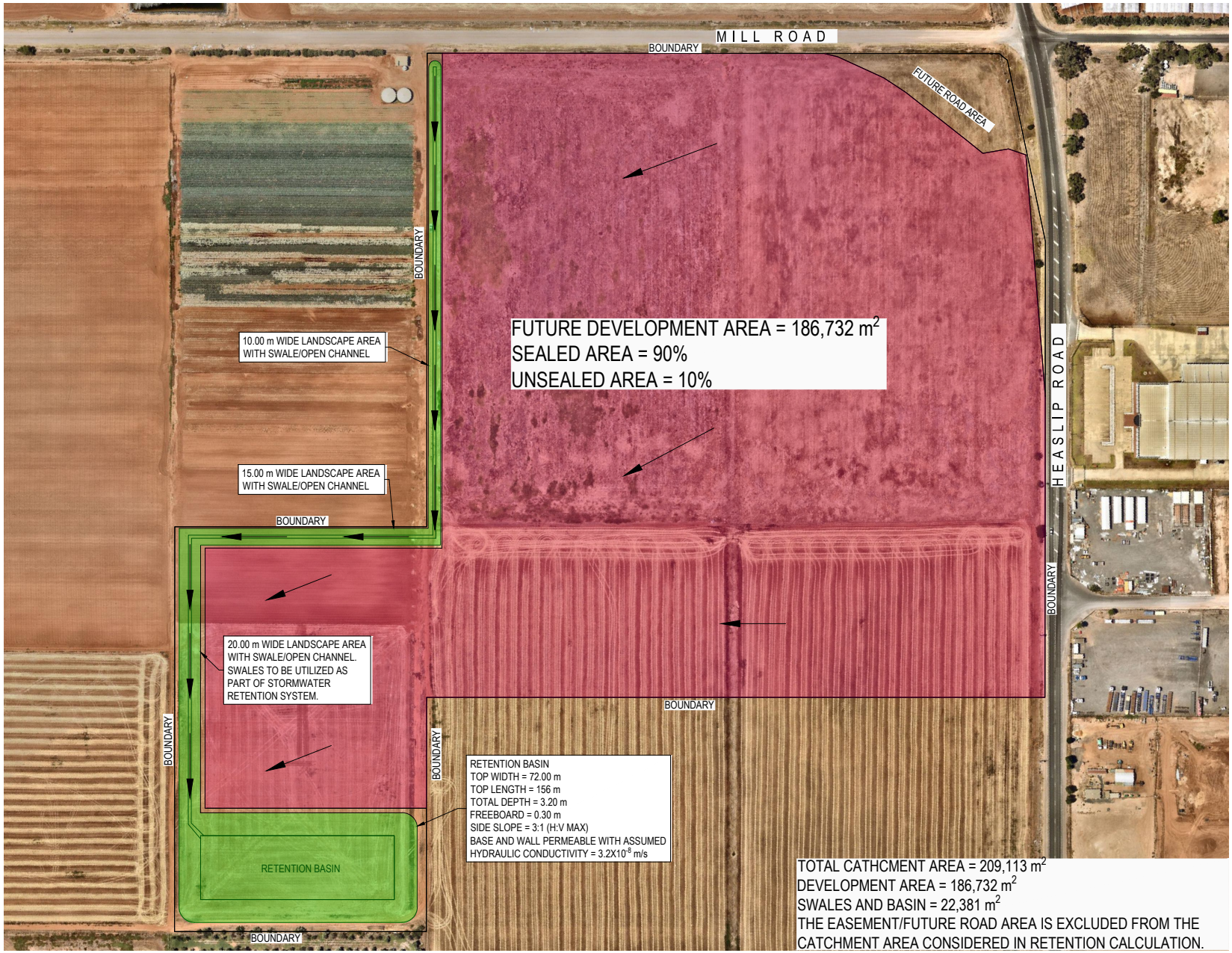
DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
RETENTION BASIN	10.9	26428.8	0	0	0

Run Log for DRAINS v2024.11.9103.14755 - 20-419 DRAINS
Run Log for DRAINS v2024.11.9103.14755 - 20-419 DRAINS.drn run at 07:09:41 on 23/1/2025.

Flows were safe in all overflow routes.





STORMWATER MANAGEMENT PLAN

SCALE NTS

CONCEPTUAL ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

EMMETT

ISSUE OF ACAD FILES

TQCSI ISO 9001:2015 Quality Certified AU1406-QC

SCALE/S	AS SHOWN
DATE	01-25
DRAWN	JMV
CHECKED	JCB

TITLE	CIVIL STORMWATER MANAGEMENT PLAN
ADDRESS	HEASLIP ROAD CNR. MILL ROAD WATERLOO CORNER, SOUTH AUSTRALIA 5110

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DESCRIPTION	DATE	BY	REV.
CONCEPTUAL ISSUE	23-01-25	JV	A

CLIENT	EMMETT	JOB #	24-419
PROJECT	PROPOSED DEVELOPMENT	SHEET #	CSK1 REV. A