Stormwater Management Report

Project name:	Proposed LDRZ Estate, 2 Carter St East Katunga
Contract number	6077
Prepared by:	Damien Ginger – Civil Manager
Checked by:	John McCartney – Certified Engineer PE0006172

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Rev 04
26th March 2024

Introduction

Onleys Consulting has been engaged by Katunga Fresh to prepare a Stormwater Management Report for a proposed residential subdivision. The subject site is located at 2 Carter St East, Katunga.

Figure 1: Site of Works

Existing Conditions

The site area is 3.744 ha, with the site primarily used as agricultural land.

The site falls approximately 800mm from south to north, where it discharges into GMW Strathmerton Drain 9/7/6.

Drainage Assessment

Hydrology

Moira Shire Council is the responsible authority for the major and minor drainage networks. As outlined in the Infrastructure Design Manual, Moira Shire Council requires the developer to construct - at its own cost – minor and major drainage works between the subject site and the Council nominated point of discharge with the capacity to contain events up to and including 1% AEP.
Internal drainage and method of disposal of stormwater from all roofed and sealed areas must be approved by Council.

Legal Point of Discharge (LPOD)

Historically, the legal point of discharge for the proposed Low Density Residential development was to GMW Strathmerton Drain 9/7/6.

Given the existing lot levels, combined with the depths and capacities of the existing town drainage system, the logical outfall point for the site would continue to be to the existing GMW Drain.

The development of the land into smaller Low Density Residential lots would result in increased runoff. In order to contain the discharge rate to acceptable level, a Stormwater Detention Basin will be required

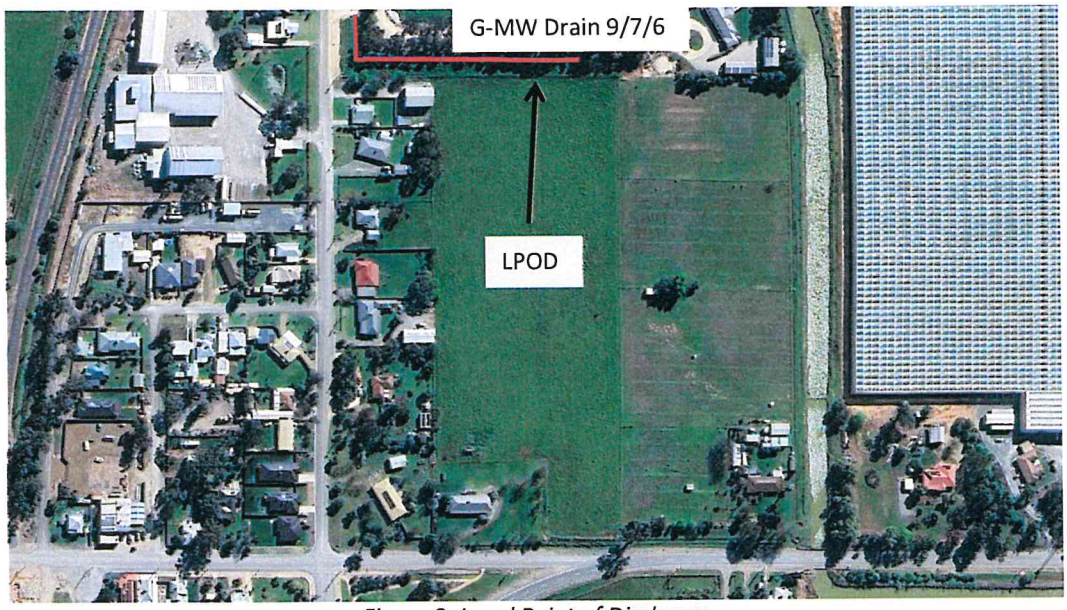


Figure 2: Legal Point of Discharge

Minor Drainage Network

As the development is Low Density Residential, the minor drainage system would consist mainly of open drains capable of carrying runoff from minor storms to the point of discharge without encroaching on road pavements or lots.

The design of the minor drainage system is to ensure the system is capable of conveying flows up to and including events equivalent of 20% AEP.

The minor drainage system shall connect to a proposed detention basin, located in Reserve 1 on Proposed Plan of Subdivision 6077, located in Appendix A.

The lots shall be graded to fall towards the internal road located centrally in the development site. This runoff shall be collected in swale drains within the road reserves. The internal road reserves on the west side shall drain towards Drainage Reserve 1 located between Lots 4 and 8, to be constructed as per the requirements set out in the Infrastructure Design Manual, Clause 17.5.

Major Drainage Network

The major drainage system shall contain planned drainage routes and overland flow paths. The system is designed to manage runoff on-site to avoid the increase of overland flow to adjacent drainage systems, as well as ensuring overland flows do not encroach on the lots themselves.

The road reserves shall be profiled to ensure runoff is contained within the road reserves, whilst also ensuring access to all lots is provided in accordance with the requirements of GBCMA (2014) *Floodplain Management Principles and Best Practice Assessment for Land Use and Development*.

Details of the proposed open drains and Drainage flow paths are shown in Appendix A, drawing 6077-D01.

Detention Storage

A proposed detention basin is to be constructed in Drainage Reserve 1 in the northeast corner of the property.

With a 5m width access strip around its circumference, the detention basin size required for the development fits adequately inside the reserve allocated for it. Drawing 6077-D01 in Appendix A shows the basic dimensions of the proposed basin top batter and floor.

At 1.5m depth (1 in 8 batters) the capacity of the basin is estimated at 1,776m^3.

Detention storage requirements have been determined using Ensemble simulations and ARR2016 rainfall data sourced from BOM for the area and temporal patterns sourced from the ARR Datahub. Preliminary computations have been undertaken, showing that the proposed drainage reserve areas are sufficiently sized to provide the required basin capacities. The results have been summarised in Table 1 below. Refer to Appendix E for further details.

Table 1: Detention volume summary

Catchment Area (ha)	Runoff coefficient	1% AEP Detention volume required (m^3)	Estimated Basin volume (m^3)	(Assumed) Total Discharge Flow (l/s)
3.74	0.40	1,725 – based on 24 hour no outflow	1,776	4.49

Stormwater Treatment

The development is to incorporate water sensitive urban design in accordance with Clause 20 of the Infrastructure Design Manual.

The treatment train for the development comprises two treatment measures:

- Swale drains in the road reserve, and
- Detention Basin.

Music results can be found on Table 2 below.

Table 2: MUSIC – Receiving Node treatment train effectiveness results

	Sources	Residual Load	% Reduction
Flow (ML/yr)	10.0	9.04	9.7
Total Suspended Solids (kg/yr)	1890	182	90.4
Total Phosphorus (kg/yr)	4.01	1.18	70.5
Total Nitrogen (kg/yr)	28.2	13.2	53.1
Gross Pollutants (kg/yr)	368	0.00	100.0

Conclusions

The above report illustrates that the proposed development complies with Moira Shire Council's drainage requirements as well as Goulburn-Murray Water's requirements.

The overland flows are controlled within the development area and adequately transferred via open drains where proposed, and hence do not encroach on the lots or proposed roads.

Based upon an assumed worst-case permissible site discharge (PSD) of no discharge for 24 hours as well as 1.2 l/s/ha for all storm events, the detention volume storage is adequately sized for post-development flows for all storm events up to and including 1% AEP.

300mm freeboard has been provided for all major drainage structures, overland flowpaths have been routed throughout the development and there is also provision for storage in the road reserves, should there be an event in excess of 1% AEP, thus minimising the risk of flooding in this development.

Appendix A

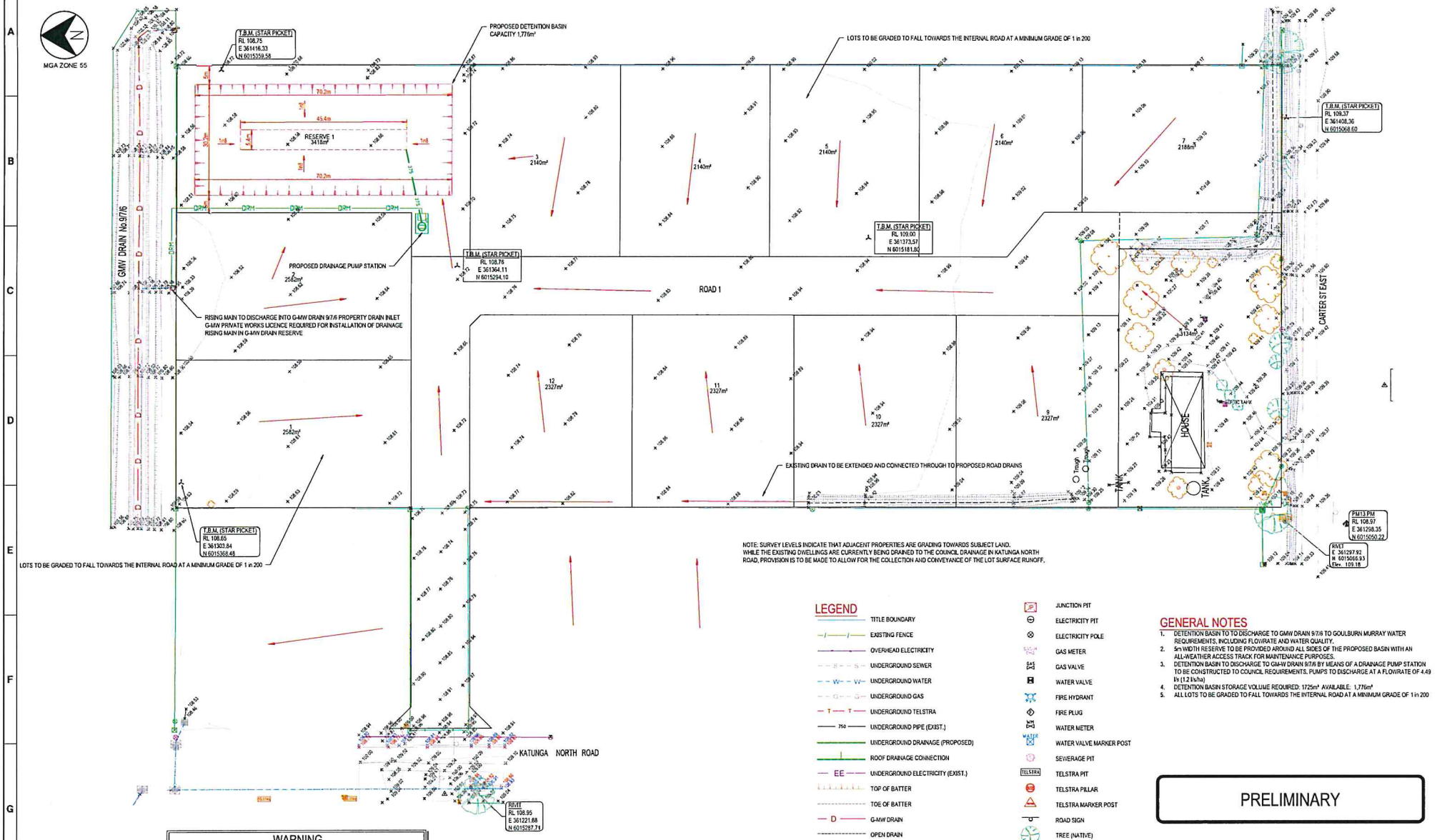
Drawing 6077-D01
6077 – Proposed Plan of Subdivision

Appendix B

Music File

Appendix C

Drainage Computations



DRAINAGE CONCEPT PLAN
SCALE 1:500

LEGEND

- TITLE BOUNDARY
- EXISTING FENCE
- OVERHEAD ELECTRICITY
- UNDERGROUND SEWER
- UNDERGROUND WATER
- UNDERGROUND GAS
- UNDERGROUND TELSTRA
- UNDERGROUND PIPE (EXIST.)
- UNDERGROUND DRAINAGE (PROPOSED)
- ROOF DRAINAGE CONNECTION
- UNDERGROUND ELECTRICITY (EXIST.)
- TOP OF BATTER
- TOE OF BATTER
- G-MW DRAIN
- OPEN DRAIN
- SURVEY CONTROL POINT
- SIDE ENTRY PIT
- GRATED PIT
- JUNCTION PIT
- ELECTRICITY PIT
- ELECTRICITY POLE
- GAS METER
- GAS VALVE
- WATER VALVE
- FIRE HYDRANT
- FIRE PLUG
- WATER METER
- WATER VALVE MARKER POST
- SEWERAGE PIT
- TELSTRA PIT
- TELSTRA PILLAR
- TELSTRA MARKER POST
- ROAD SIGN
- TREE (NATIVE)
- TREE (NON NATIVE)
- TREE (DEAD)
- DIRECTION OF FALL (PROPOSED)

GENERAL NOTES

1. DETENTION BASIN TO TO DISCHARGE TO GMW DRAIN 9/7/6 TO GOULBURN MURRAY WATER REQUIREMENTS, INCLUDING FLOWRATE AND WATER QUALITY.
2. 5m WIDTH RESERVE TO BE PROVIDED AROUND ALL SIDES OF THE PROPOSED BASIN WITH AN ALL-WEATHER ACCESS TRACK FOR MAINTENANCE PURPOSES.
3. DETENTION BASIN TO DISCHARGE TO GM-W DRAIN 9/7/6 BY MEANS OF A DRAINAGE PUMP STATION TO BE CONSTRUCTED TO COUNCIL REQUIREMENTS. PUMPS TO DISCHARGE AT A FLOWRATE OF 4.49 l/s (1.2 l/s/ha)
4. DETENTION BASIN STORAGE VOLUME REQUIRED: 1725m³ AVAILABLE: 1,776m³
5. ALL LOTS TO BE GRADED TO FALL TOWARDS THE INTERNAL ROAD AT A MINIMUM GRADE OF 1 in 200

PRELIMINARY

1:500 0 10 20 30 40 50m
10 8 6 4 2 AT A1

BEFORE YOU DIG www.byda.com.au

WARNING
BEWARE OF UNDERGROUND SERVICES

THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.

No	DATE	DRAFTING CHECK	DESIGN REVIEW	REV'D P.MGR	APP'D P.DIR	AMENDMENT
01	10.4.2024	DG				DRAINAGE CONCEPT PLAN

No	DRAWING NUMBER	REFERENCE DRAWING TITLE

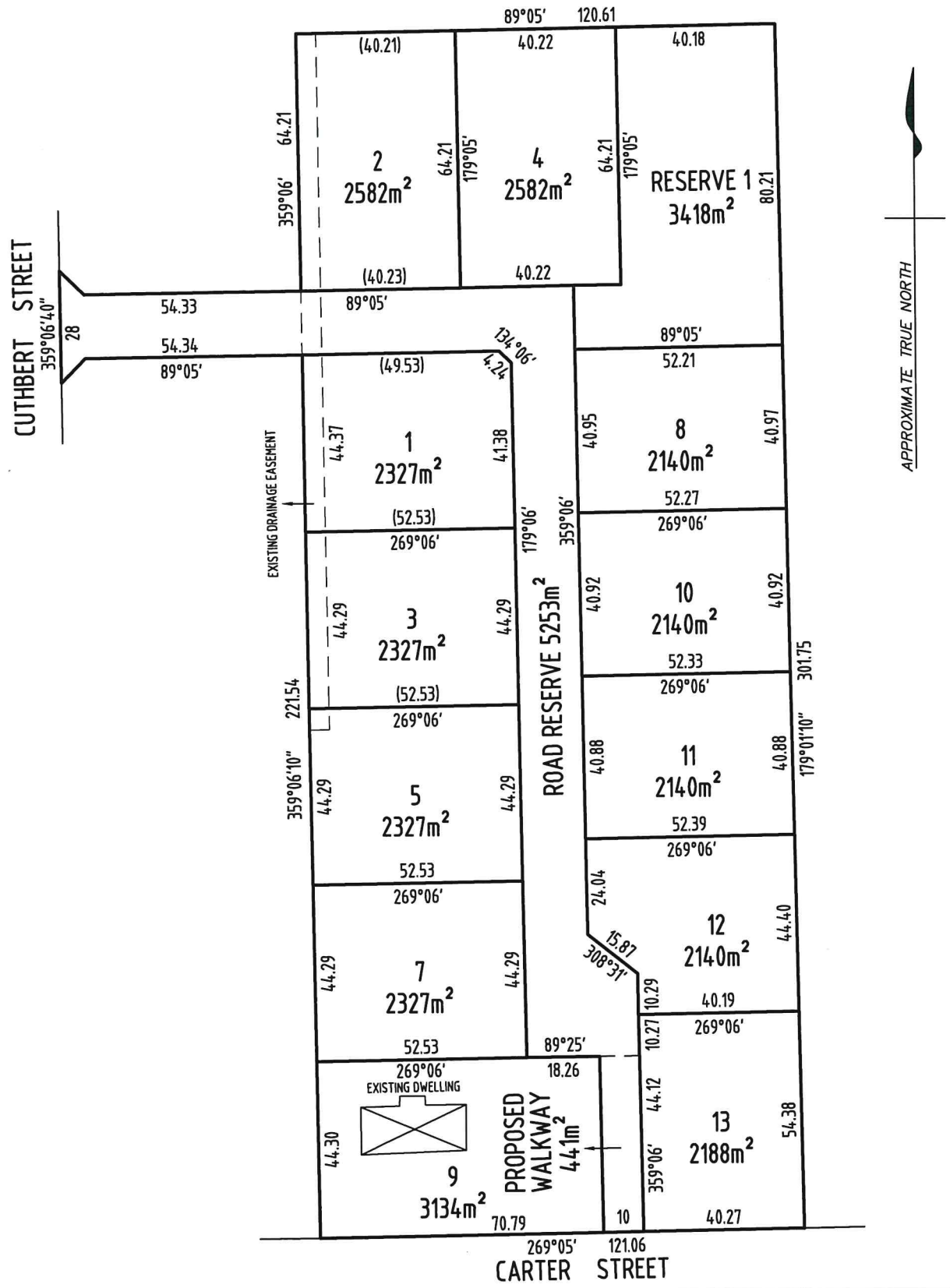
Onleys
SURVEY DESIGN IRRIGATION
98 NIXON STREET SHEPPARTON, VIC
P.O. Box 2120, SHEPPARTON, VIC 3632
P: (03) 5821 7171
F: (03) 5821 2725
E: mail@onleys.com.au
W: www.onleys.com.au

CLIENT			
KATUNGA FRESH			
PROJECT			
MULTI LOT LOW DENSITY SUBDIVISION			
DRAFTER	DRAFTING CHECK	CERTIFIED BY ENGINEER	APPROVED PROJECT DIRECTOR
D.GINGER	P.MEOLA		
DESIGNED	DESIGN REVIEW		
D.GINGER	10.4.2024		

TITLE
PROPOSED LOW DENSITY SUBDIVISION
2 CARTER ST EAST, KATUNGA
DRAINAGE CONCEPT PLAN

SCALE	PROJECT No.	DRAWING No.	SHEET No.	AMDT
AS SHOWN	6077	6077.D01	1 of 1	01

0 1 2 3 4 5 6 7 8 9 10 cm (FULL SIZE ON ORIGINAL)



Onleys
SURVEY DESIGN IRRIGATION
PO Box 2120
98 Nixon Street
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SCALE
1:1000
10 0 10 20 30 40
LENGTHS ARE IN METRES

PROPOSED PLAN OF SUBDIVISION

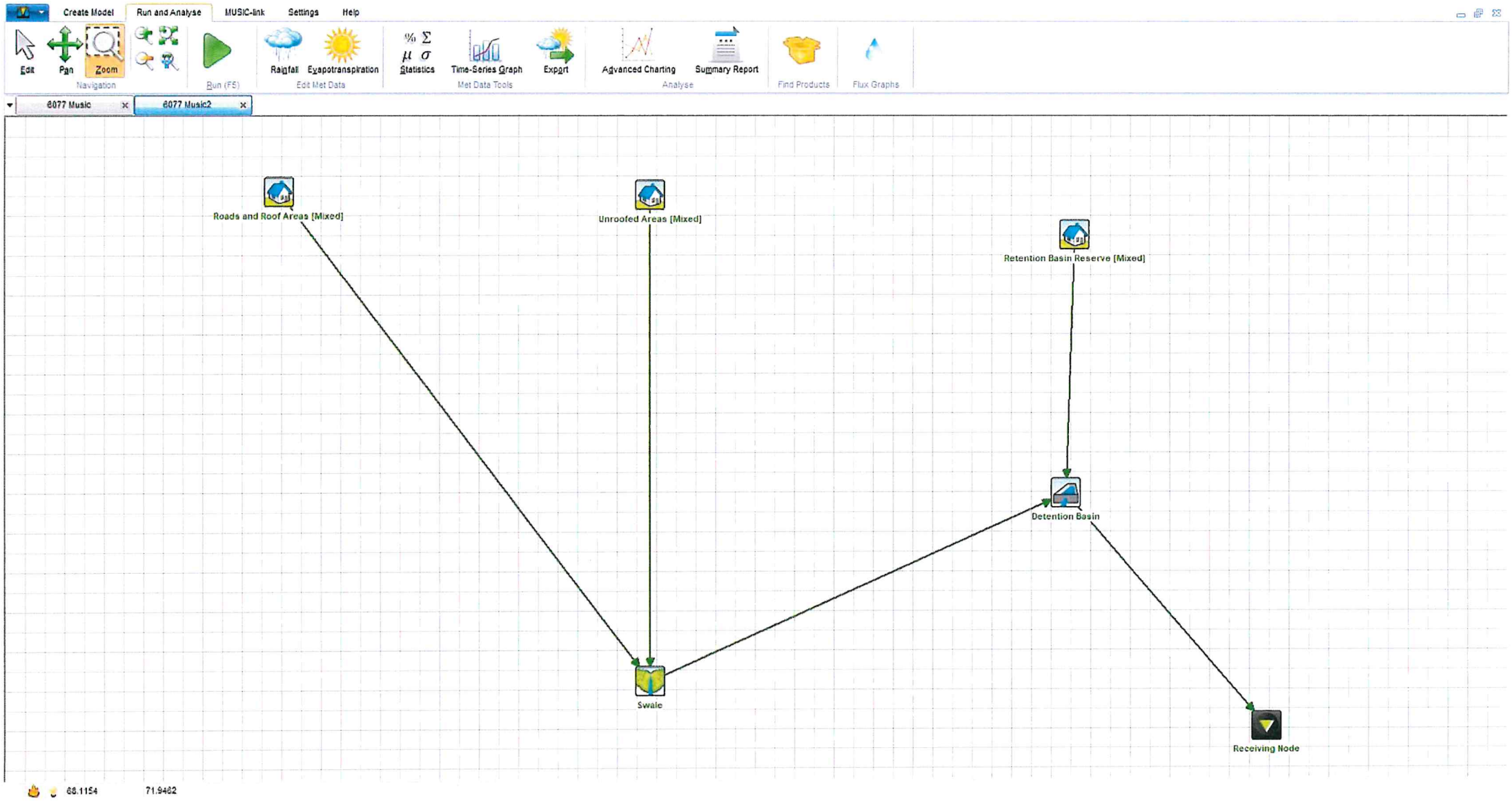
COUNTY OF MOIRA
PARISH OF STRATHMERTON
CROWN ALLOTMENT· 212B
SECTION· S
TITLE. C/T V.10116 F.247
TITLE:

SURVEYORS REF:	Sheet 1 of 1 Sheets	
6077	SCALE	SHEET SIZE
VERSION: 02	1 . 1000	A3

CLIENT· P VANDENGOOR
2 CARTER STREET
KATUNGA 3640

MEASUREMENTS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY
LENGTHS ARE IN METRES.

.PTS DRAFTED BY: JG 6077propv02.dwg


Create Model
Run and Analyse
MUSIC-link
Settings
Help
Edit
Pan
Zoom
Navigation
Run (F5)
Rainfall
Evapotranspiration
Edit Met Data
Statistics
Time-Series Graph
Export
Met Data Tools
Advanced Charting
Summary Report
Analyse
Find Products
Flux Graphs
6077 Music
6077 Music2
Roads and Roof Areas [Mixed]
Unroofed Areas [Mixed]
Retention Basin Reserve [Mixed]
Detention Basin
Swale
Receiving Node
68.1154
71.9462

Source nodes
Location,Roads and Roof Areas,Unroofed Areas,Retention Basin Reserve
ID,1,2,3
Node Type,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode
Zoning Surface Type,Mixed,Mixed,Mixed
Total Area (ha),2.109,2.295,0.342
Area Impervious (ha),1.5870225,0.706397574626866,0.0154665671641791
Area Pervious (ha),0.5219775,1.58860242537313,0.326533432835821
Field Capacity (mm),50,50,50
Pervious Area Infiltration Capacity coefficient - a,200,200,200
Pervious Area Infiltration Capacity exponent - b,1,1,1
Impervious Area Rainfall Threshold (mm/day),1,1,1
Pervious Area Soil Storage Capacity (mm),120,120,120
Pervious Area Soil Initial Storage (% of Capacity),25,25,25
Groundwater Initial Depth (mm),10,10,10
Groundwater Daily Recharge Rate (%),25,25,25
Groundwater Daily Baseflow Rate (%),5,5,5
Groundwater Daily Deep Seepage Rate (%),0,0,0
Stormflow Total Suspended Solids Mean (log mg/L),2.2,2.2,2.2
Stormflow Total Suspended Solids Standard Deviation (log mg/L),0.32,0.32,0.32
Stormflow Total Suspended Solids Estimation Method,Stochastic,Stochastic,Stochastic
Stormflow Total Suspended Solids Serial Correlation,0,0,0
Stormflow Total Phosphorus Mean (log mg/L),-0.45,-0.45,-0.45
Stormflow Total Phosphorus Standard Deviation (log mg/L),0.25,0.25,0.25
Stormflow Total Phosphorus Estimation Method,Stochastic,Stochastic,Stochastic
Stormflow Total Phosphorus Serial Correlation,0,0,0
Stormflow Total Nitrogen Mean (log mg/L),0.42,0.42,0.42
Stormflow Total Nitrogen Standard Deviation (log mg/L),0.19,0.19,0.19
Stormflow Total Nitrogen Estimation Method,Stochastic,Stochastic,Stochastic
Stormflow Total Nitrogen Serial Correlation,0,0,0
Baseflow Total Suspended Solids Mean (log mg/L),1.1,1.1,1.1
Baseflow Total Suspended Solids Standard Deviation (log mg/L),0.17,0.17,0.17
Baseflow Total Suspended Solids Estimation Method,Stochastic,Stochastic,Stochastic
Baseflow Total Suspended Solids Serial Correlation,0,0,0
Baseflow Total Phosphorus Mean (log mg/L),-0.82,-0.82,-0.82
Baseflow Total Phosphorus Standard Deviation (log mg/L),0.19,0.19,0.19
Baseflow Total Phosphorus Estimation Method,Stochastic,Stochastic,Stochastic
Baseflow Total Phosphorus Serial Correlation,0,0,0
Baseflow Total Nitrogen Mean (log mg/L),0.32,0.32,0.32
Baseflow Total Nitrogen Standard Deviation (log mg/L),0.12,0.12,0.12
Baseflow Total Nitrogen Estimation Method,Stochastic,Stochastic,Stochastic
Baseflow Total Nitrogen Serial Correlation,0,0,0
Flow based constituent generation - enabled,Off,Off,Off
Flow based constituent generation - flow file, , ,
Flow based constituent generation - base flow column, , ,
Flow based constituent generation - pervious flow column, , ,
Flow based constituent generation - impervious flow column, , ,
Flow based constituent generation - unit, , ,
OUT - Mean Annual Flow (ML/yr),6.33,3.46,0.214
OUT - TSS Mean Annual Load (kg/yr),1.27E3,602,20.5
OUT - TP Mean Annual Load (kg/yr),2.63,1.32,59.0E-3
OUT - TN Mean Annual Load (kg/yr),18.2,9.50,0.527
OUT - Gross Pollutant Mean Annual Load (kg/yr),231,135,2.05
Rain In (ML/yr),9.6759,10.5292,1.56906
ET Loss (ML/yr),3.36297,7.12308,1.36646
Deep Seepage Loss (ML/yr),0,0,0
Baseflow Out (ML/yr),0.202785,0.609048,0.12496

Imp. Stormflow Out (ML/yr),6.09099,2.73964,0.0658485
Perv. Stormflow Out (ML/yr),0.0381352,0.114536,0.0234995
Total Stormflow Out (ML/yr),6.12913,2.85418,0.089348
Total Outflow (ML/yr),6.33191,3.46322,0.214308
Change in Soil Storage (ML/yr),-0.0189957,-0.0570519,-0.0117054
TSS Baseflow Out (kg/yr),2.75763,8.27244,1.69942
TSS Total Stormflow Out (kg/yr),1263.85,593.864,18.7557
TSS Total Outflow (kg/yr),1266.6,602.136,20.4551
TP Baseflow Out (kg/yr),0.0337609,0.101494,0.0207838
TP Total Stormflow Out (kg/yr),2.59985,1.21732,0.0381934
TP Total Outflow (kg/yr),2.63361,1.31881,0.0589772
TN Baseflow Out (kg/yr),0.439751,1.32312,0.271065
TN Total Stormflow Out (kg/yr),17.714,8.17322,0.25564
TN Total Outflow (kg/yr),18.1538,9.49634,0.526704
GP Total Outflow (kg/yr),231.269,135.352,2.14879

No Imported Data Source nodes

USTM treatment nodes
Location,Swale,Detention Basin
ID,4,5
Node Type,SwaleNode,DetentionBasinNode
Lo-flow bypass rate (cum/sec),0,0
Hi-flow bypass rate (cum/sec), ,100
Inlet pond volume, ,0
Area (sqm), ,2122
Initial Volume (m^3), ,
Extended detention depth (m),0.5,1.5
Number of Rainwater tanks, ,
Permanent Pool Volume (cubic metres), ,0
Proportion vegetated, ,0
Equivalent Pipe Diameter (mm), ,150
Overflow weir width (m),60,2
Notional Detention Time (hrs), ,13.8
Orifice Discharge Coefficient, ,0.6
Weir Coefficient, ,1.7
Number of CSTR Cells,10,1
Total Suspended Solids - k (m/yr),8000,8000
Total Suspended Solids - C* (mg/L),20,20
Total Suspended Solids - C** (mg/L),14,20
Total Phosphorus - k (m/yr),6000,6000
Total Phosphorus - C* (mg/L),0.13,0.13
Total Phosphorus - C** (mg/L),0.13,0.13
Total Nitrogen - k (m/yr),500,500
Total Nitrogen - C* (mg/L),1.4,1.4
Total Nitrogen - C** (mg/L),1.4,1.4
Threshold Hydraulic Loading for C** (m/yr),3500,3500
Horizontal Flow Coefficient, ,
Reuse Enabled,Off,Off
Max drawdown height (m), ,
Annual Demand Enabled,Off,Off
Annual Demand Value (ML/year), ,
Annual Demand Distribution, ,
Annual Demand Monthly Distribution: Jan, ,
Annual Demand Monthly Distribution: Feb, ,
Annual Demand Monthly Distribution: Mar, ,
Annual Demand Monthly Distribution: Apr, ,

Annual Demand Monthly Distribution: May, ,
Annual Demand Monthly Distribution: Jun, ,
Annual Demand Monthly Distribution: Jul, ,
Annual Demand Monthly Distribution: Aug, ,
Annual Demand Monthly Distribution: Sep, ,
Annual Demand Monthly Distribution: Oct, ,
Annual Demand Monthly Distribution: Nov, ,
Annual Demand Monthly Distribution: Dec, ,
Daily Demand Enabled,Off,Off
Daily Demand Value (ML/day), ,
Custom Demand Enabled,Off,Off
Custom Demand Time Series File, ,
Custom Demand Time Series Units, ,
Filter area (sqm), ,
Filter perimeter (m), ,
Filter depth (m), ,
Filter Median Particle Diameter (mm), ,
Saturated Hydraulic Conductivity (mm/hr), ,
Infiltration Media Porosity, ,
Length (m),554,
Bed slope,0.002,
Base Width (m),1,
Top width (m),6,
Vegetation height (m),0.15,
Vegetation Type, ,
Total Nitrogen Content in Filter (mg/kg), ,
Orthophosphate Content in Filter (mg/kg), ,
Is Base Lined?, ,
Is Underdrain Present?, ,
Is Submerged Zone Present?, ,
Submerged Zone Depth (m), ,
B for Media Soil Texture,-9999,-9999
Proportion of upstream impervious area treated, ,
Exfiltration Rate (mm/hr),0,0
Evaporative Loss as % of PET, ,100
Depth in metres below the drain pipe, ,
TSS A Coefficient, ,
TSS B Coefficient, ,
TP A Coefficient, ,
TP B Coefficient, ,
TN A Coefficient, ,
TN B Coefficient, ,
Sfc, ,
S*, ,
Sw, ,
Sh, ,
Emax (m/day), ,
Ew (m/day), ,
IN - Mean Annual Flow (ML/yr),9.80,10.1
IN - TSS Mean Annual Load (kg/yr),1.87E3,160
IN - TP Mean Annual Load (kg/yr),3.95,1.34
IN - TN Mean Annual Load (kg/yr),27.6,16.0
IN - Gross Pollutant Mean Annual Load (kg/yr),366,2.05
OUT - Mean Annual Flow (ML/yr),9.84,9.04
OUT - TSS Mean Annual Load (kg/yr),139,182
OUT - TP Mean Annual Load (kg/yr),1.28,1.18
OUT - TN Mean Annual Load (kg/yr),15.4,13.2

OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00,0.00
Flow In (ML/yr),9.78904,10.051
ET Loss (ML/yr),0,1.01979
Infiltration Loss (ML/yr),0,0
Low Flow Bypass Out (ML/yr),0,0
High Flow Bypass Out (ML/yr),0,0
Orifice / Filter Out (ML/yr),9.83423,9.03942
Weir Out (ML/yr),0.00261245,0
Transfer Function Out (ML/yr),0,0
Reuse Supplied (ML/yr),0,0
Reuse Requested (ML/yr),0,0
% Reuse Demand Met,0,0
% Load Reduction,-0.488349,10.0646
TSS Flow In (kg/yr),1868.74,159.706
TSS ET Loss (kg/yr),0,0
TSS Infiltration Loss (kg/yr),0,0
TSS Low Flow Bypass Out (kg/yr),0,0
TSS High Flow Bypass Out (kg/yr),0,0
TSS Orifice / Filter Out (kg/yr),138.855,181.908
TSS Weir Out (kg/yr),0.395318,0
TSS Transfer Function Out (kg/yr),0,0
TSS Reuse Supplied (kg/yr),0,0
TSS Reuse Requested (kg/yr),0,0
TSS % Reuse Demand Met,0,0
TSS % Load Reduction,92.5484,-13.902
TP Flow In (kg/yr),3.95242,1.34364
TP ET Loss (kg/yr),0,0
TP Infiltration Loss (kg/yr),0,0
TP Low Flow Bypass Out (kg/yr),0,0
TP High Flow Bypass Out (kg/yr),0,0
TP Orifice / Filter Out (kg/yr),1.28341,1.18332
TP Weir Out (kg/yr),0.00125413,0
TP Transfer Function Out (kg/yr),0,0
TP Reuse Supplied (kg/yr),0,0
TP Reuse Requested (kg/yr),0,0
TP % Reuse Demand Met,0,0
TP % Load Reduction,67.4967,11.9321
TN Flow In (kg/yr),27.65,15.9724
TN ET Loss (kg/yr),0,0
TN Infiltration Loss (kg/yr),0,0
TN Low Flow Bypass Out (kg/yr),0,0
TN High Flow Bypass Out (kg/yr),0,0
TN Orifice / Filter Out (kg/yr),15.438,13.2251
TN Weir Out (kg/yr),0.0077869,0
TN Transfer Function Out (kg/yr),0,0
TN Reuse Supplied (kg/yr),0,0
TN Reuse Requested (kg/yr),0,0
TN % Reuse Demand Met,0,0
TN % Load Reduction,44.1383,17.2001
GP Flow In (kg/yr),365.946,2.05183
GP ET Loss (kg/yr),0,0
GP Infiltration Loss (kg/yr),0,0
GP Low Flow Bypass Out (kg/yr),0,0
GP High Flow Bypass Out (kg/yr),0,0
GP Orifice / Filter Out (kg/yr),0,0
GP Weir Out (kg/yr),0,0
GP Transfer Function Out (kg/yr),0,0

GP Reuse Supplied (kg/yr),0,0
GP Reuse Requested (kg/yr),0,0
GP % Reuse Demand Met,0,0
GP % Load Reduction,100,100
PET Scaling Factor, ,

No Generic treatment nodes

Other nodes
Location,Receiving Node
ID,6
Node Type,ReceivingNode
IN - Mean Annual Flow (ML/yr),9.04
IN - TSS Mean Annual Load (kg/yr),182
IN - TP Mean Annual Load (kg/yr),1.18
IN - TN Mean Annual Load (kg/yr),13.2
IN - Gross Pollutant Mean Annual Load (kg/yr),0.00
OUT - Mean Annual Flow (ML/yr),9.04
OUT - TSS Mean Annual Load (kg/yr),182
OUT - TP Mean Annual Load (kg/yr),1.18
OUT - TN Mean Annual Load (kg/yr),13.2
OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00
% Load Reduction,9.69
TSS % Load Reduction,90.4
TN % Load Reduction,53.1
TP % Load Reduction,70.5
GP % Load Reduction,100

Links
Location,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link
Source node ID,1,5,3,4,2
Target node ID,4,6,5,5,4
Muskingum-Cunge Routing,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed
Muskingum K, , , , ,
Muskingum theta, , , , ,
IN - Mean Annual Flow (ML/yr),6.33,9.04,0.214,9.84,3.46
IN - TSS Mean Annual Load (kg/yr),1.27E3,182,20.5,139,602
IN - TP Mean Annual Load (kg/yr),2.63,1.18,59.0E-3,1.28,1.32
IN - TN Mean Annual Load (kg/yr),18.2,13.2,0.527,15.4,9.50
IN - Gross Pollutant Mean Annual Load (kg/yr),231,0.00,2.05,0.00,135
OUT - Mean Annual Flow (ML/yr),6.33,9.04,0.214,9.84,3.46
OUT - TSS Mean Annual Load (kg/yr),1.27E3,182,20.5,139,602
OUT - TP Mean Annual Load (kg/yr),2.63,1.18,59.0E-3,1.28,1.32
OUT - TN Mean Annual Load (kg/yr),18.2,13.2,0.527,15.4,9.50
OUT - Gross Pollutant Mean Annual Load (kg/yr),231,0.00,2.05,0.00,135

Catchment Details
Catchment Name,6077 Music2
Timestep,6 Minutes
Start Date,11/07/2002
End Date,18/03/2013 11:54:00 PM
Rainfall Station, Yarrawonga Rainfall
ET Station,User-defined monthly PET
Mean Annual Rainfall (mm), 459
Mean Annual ET (mm), 1497

	A	B	C	D	E	F	G	H	I	J	K	L
1	Project :		**Numurkah Rd**									
2	Town Location:		**Katunga**									
3	Temporal Pattern Zone:		MB_Increments									
4		*For Retardation caculation enter here :*										
5			*Catchment area*				3.74	*ha*				
6			*Volumetric runoff coefficient*				0.4					
7			AEP				1	%				
8			*Frequency*			*1 in*	100		*years*			
9			*Retardation required for no outfall condition*							1724.93	m^3	
10			*& for outfall discharge via pump station*									
11			*At a pump flowrate of*						4.49	l/sec		
12			*Retardation required for this outflow*							1399.16	m^3	
13												