CONCEPTUAL STORMWATER DRAINAGE QUALITY MODELLING REPORT

for

Proposed Rural Tourist Facility, Oval and Community Building Lots 3 & 4 DP 260256 Blackhead Road, Blackhead

Prepared for

Prepared for R & R Caravan Parks Pty Ltd

J Donnatuoni and P & J Lettieri

July 2008

Project: 5198

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ENGINEERS AUSTRALIA
CHARTERED MEMBER

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Land and Environment Court Practice Note: Class 1 Development Appeals

In providing this Statement of Evidence, I confirm that I have read and am aware of my obligations under the ***Land and Environment Court Practice Note: Class 1 Development Appeals*** and Schedule 7 of the ***Uniform Civil Procedure Rules***.

1. Introduction

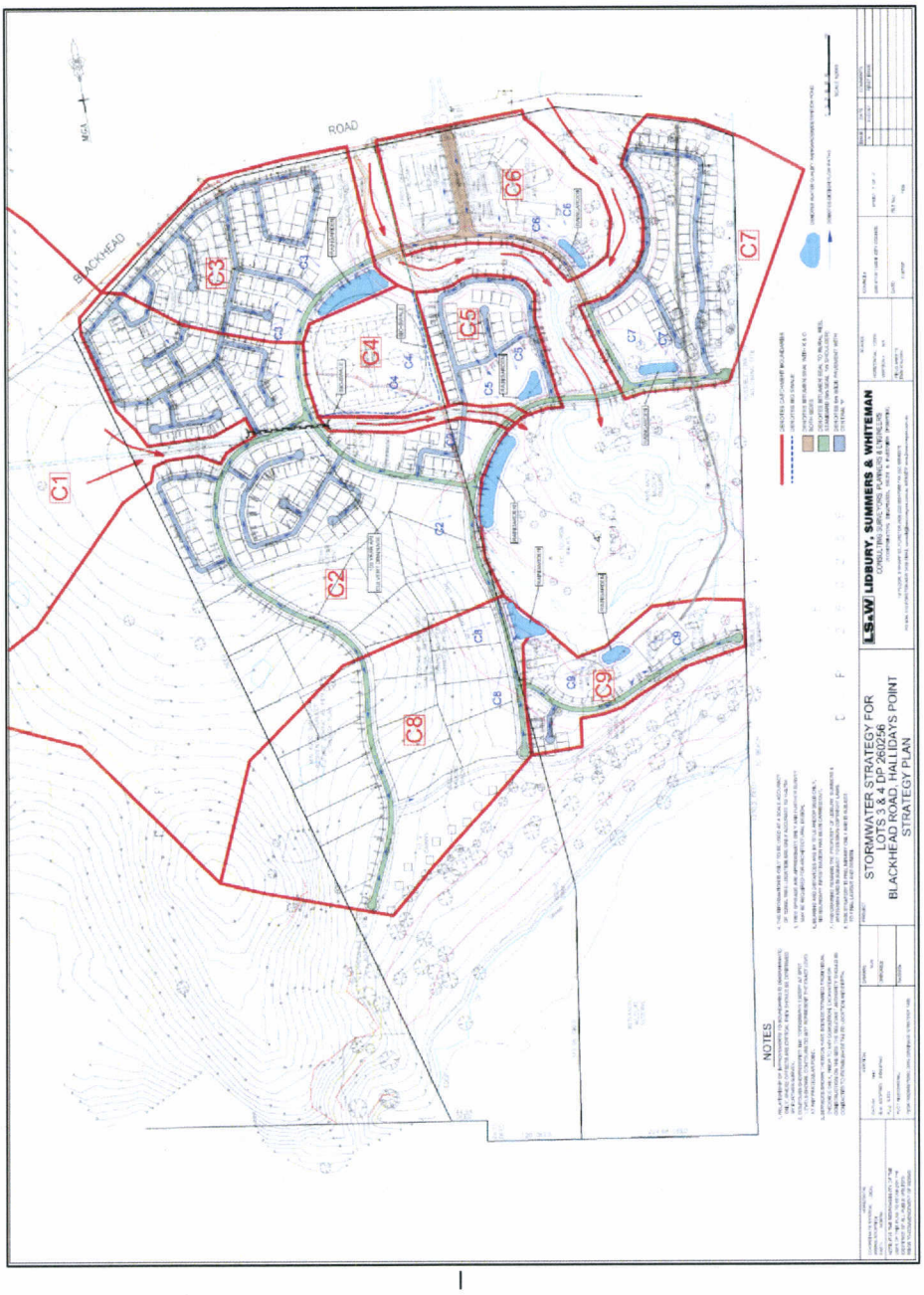
R & R Caravan Parks Pty Ltd commissioned Coastplan Group Pty Ltd in July 2008 to undertake conceptual stormwater drainage quality modelling for the proposed rural tourist facility, oval and community building at Lots 3 & 4 DP 260256 Blackhead Road, Blackhead.

The scope of work for this report involves the preparation of conceptual model, "MUSIC" for the purpose of assessing the effectiveness of stormwater drainage quality treatment facilities within the proposed development site, in order to ensure that the quality of the stormwater runoff from the developed site can be achieved.

It is understood that the stormwater drainage quantity management facilities have been addressed by LSW Lidbury, Summers & Whiteman. Catchment area plans and proposed stormwater quantity measures included in this report have been extracted from LSW's report.

2. Catchment Details

Catchment details, areas and impervious area percentages, were used in tis report as per the information supplied in the Stormwater Strategy by LSW. The catchment area was divided into eight (8) sub catchments as shown on the map on the following page. Catchment area labelled C1 is not included in the model as the runoff from this catchment is from another development site, which is believed to have its own stormwater treatment facility.



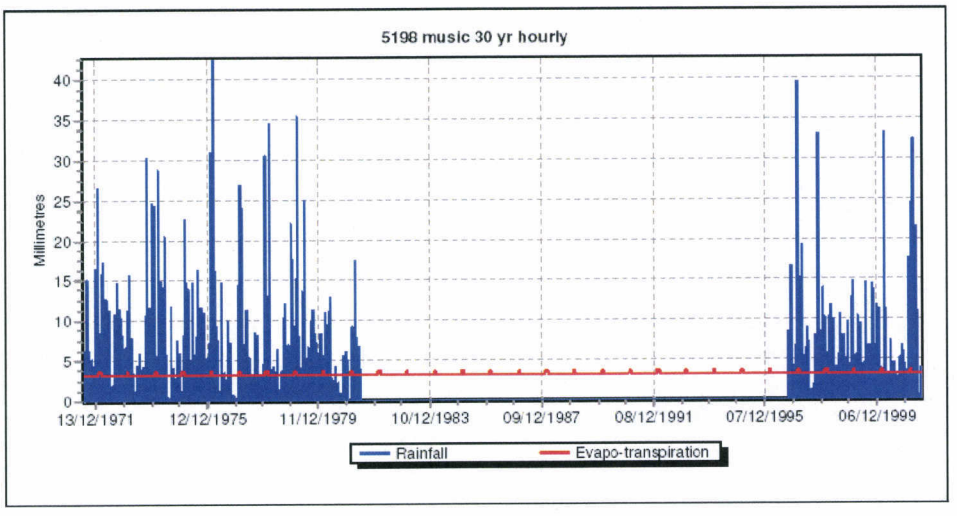
Source: LSW's report 7539 dated 31 July 2007

3. MUSIC Model

A stormwater concept quality model "MUSIC" was established to estimate the effectiveness of the proposed management tools in removal of typical urban subdivision pollutants.

The rainfall figures used in the model were based on the Bureau of Meteorology record for Taree – 6 minutes rainfall from 18/6/1964 to 4/7/2001.

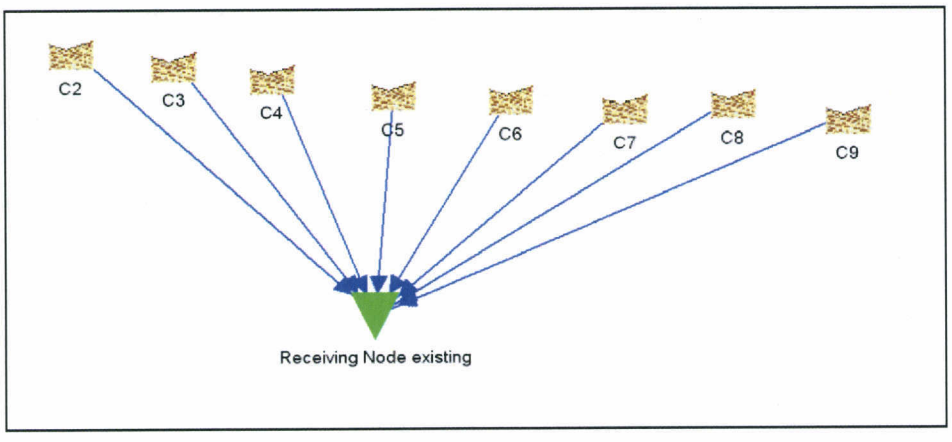
The hourly time step and 30 year figures were used as a rainfall template in the MUSIC model.



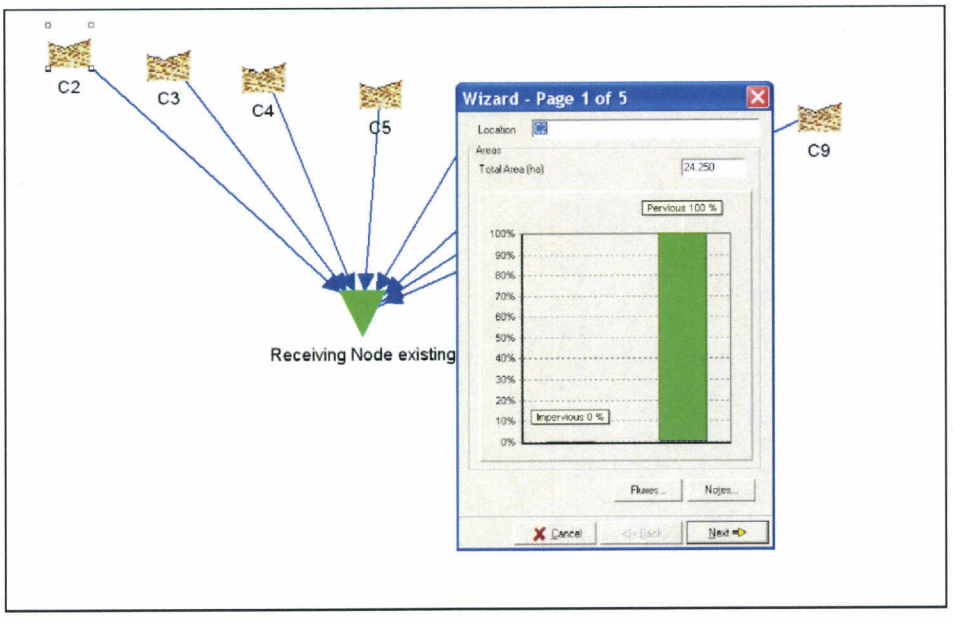
The model's nodes were established using the same node identification as per the stormwater strategy report.

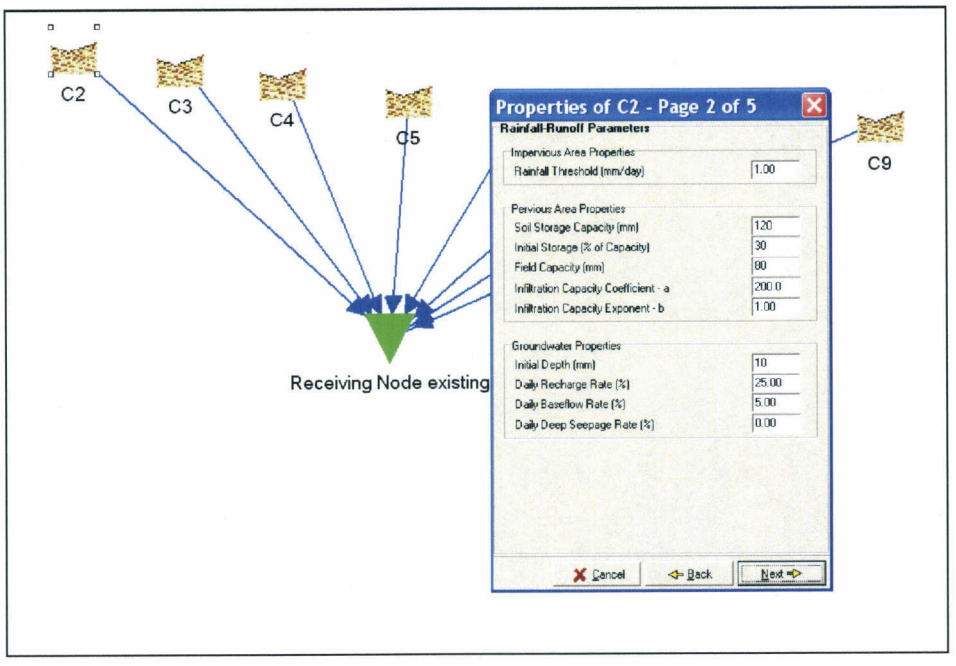
The existing catchment was modeled as "agriculture" type node with the model's pollutant generation as per the model's standard method with 100% pervious percentage for each node.

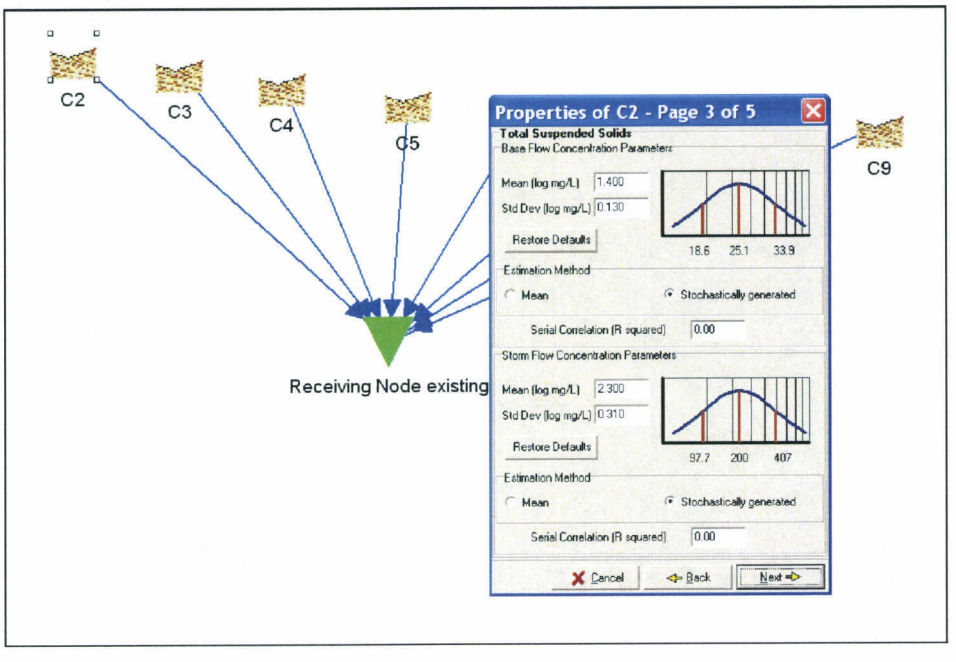
The diagram on the following page shows the existing catchment network.

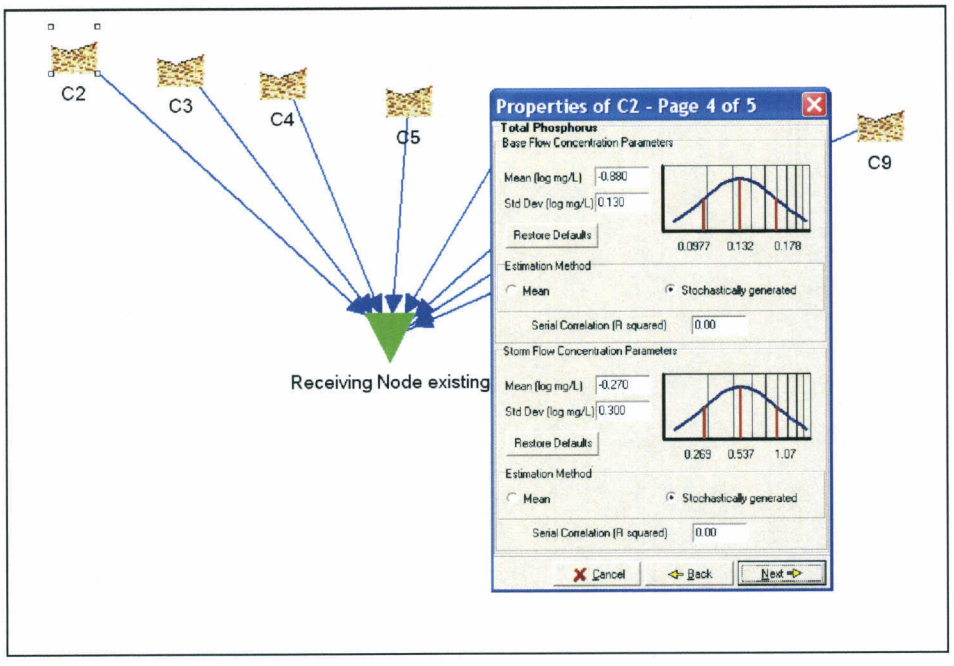


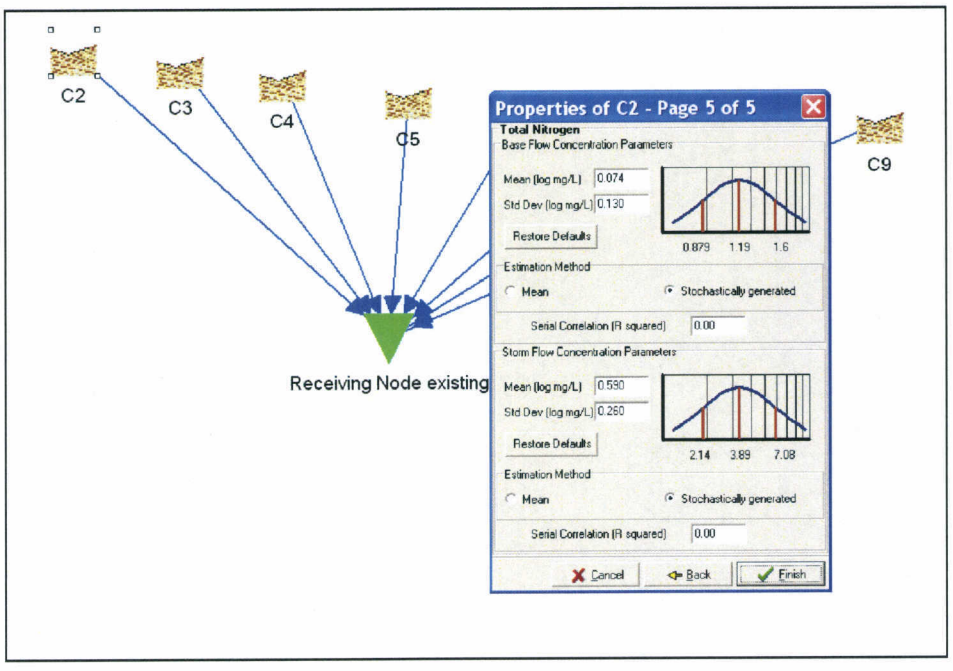
The details used for each node of the existing catchment are as follows



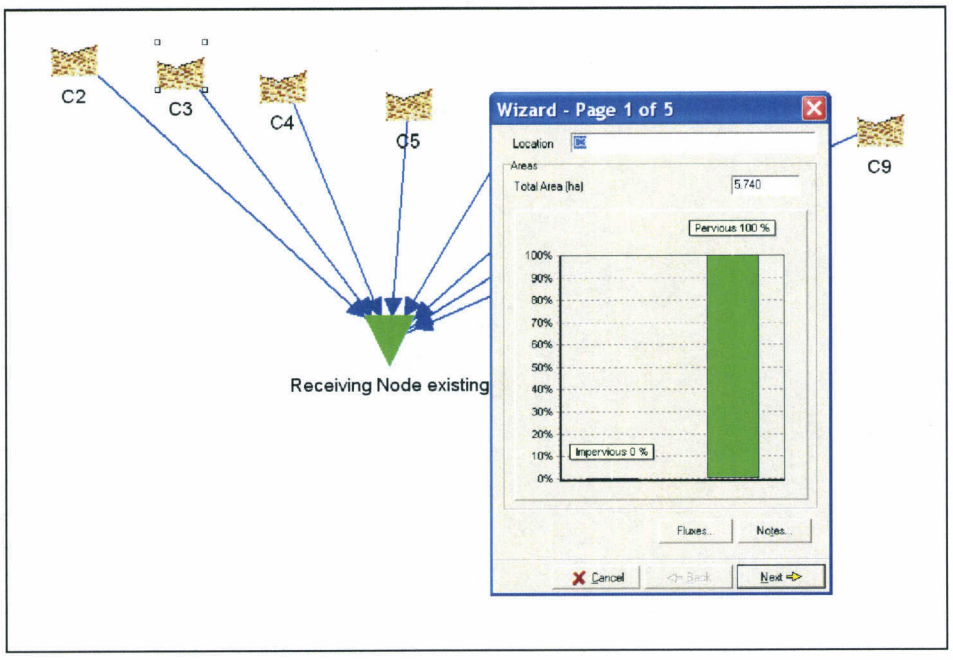


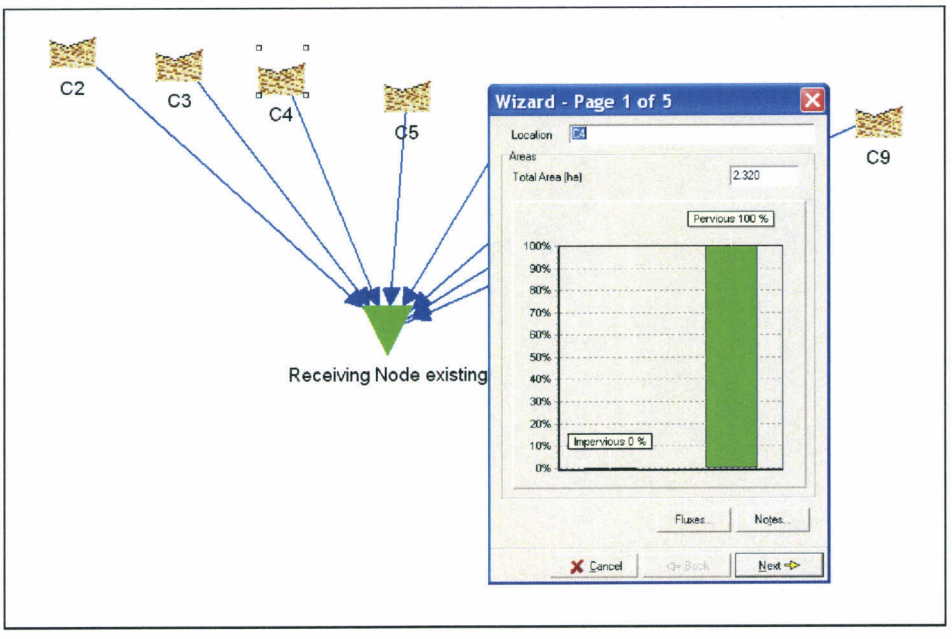


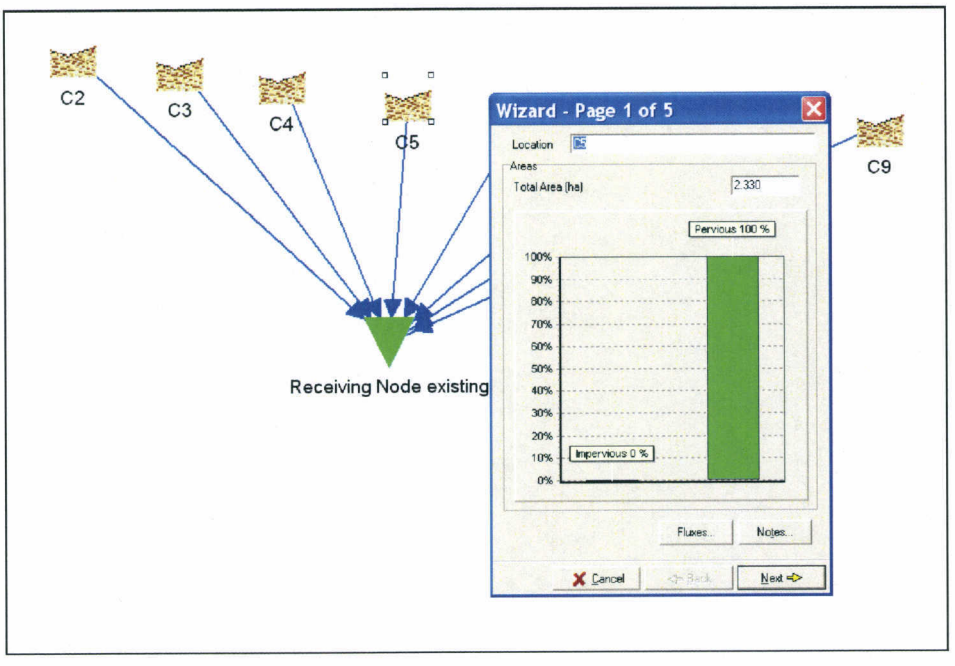


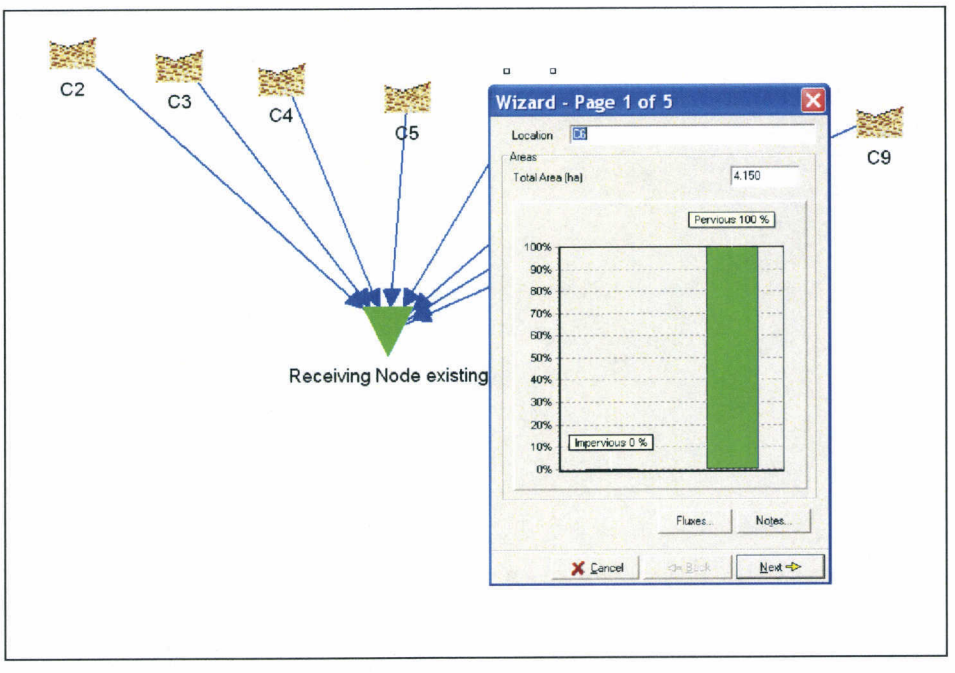


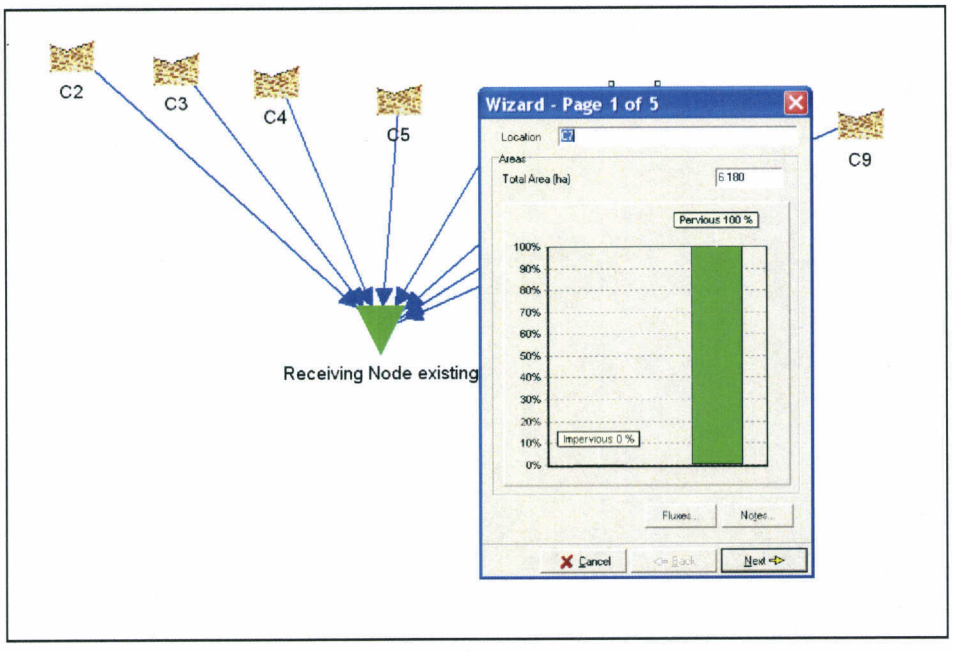
The catchment properties for the remainder of the existing catchment model are the same as the above node.

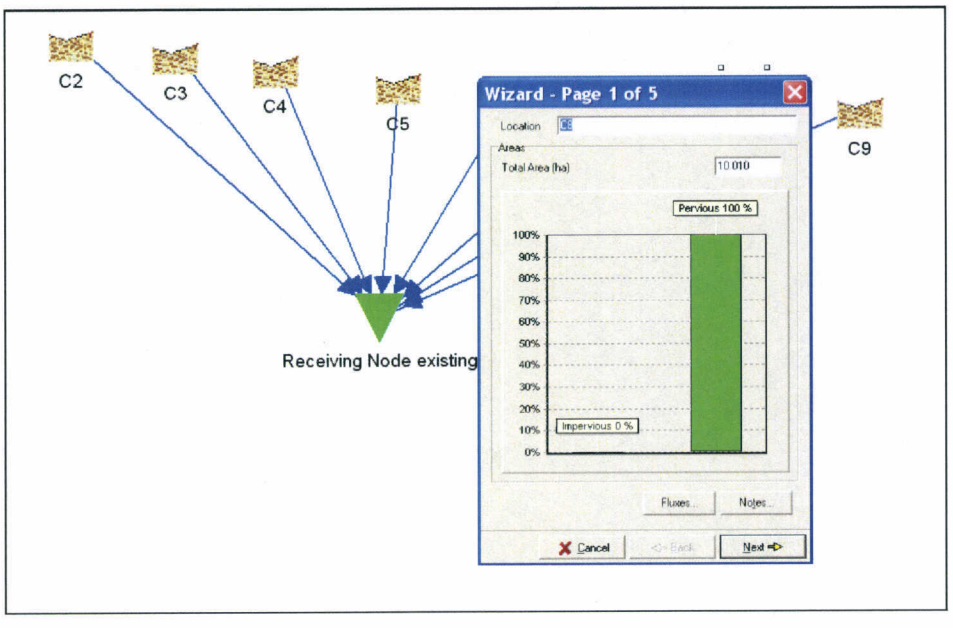


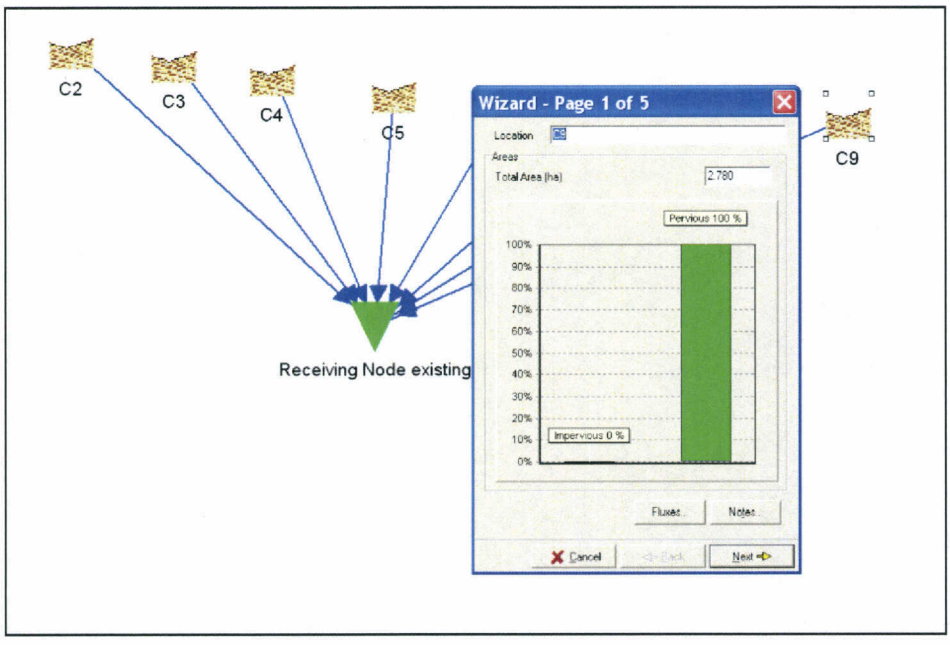




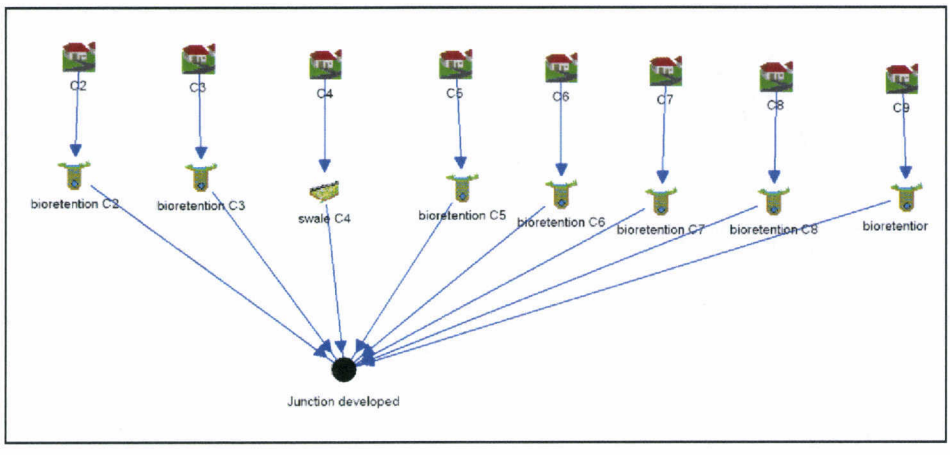






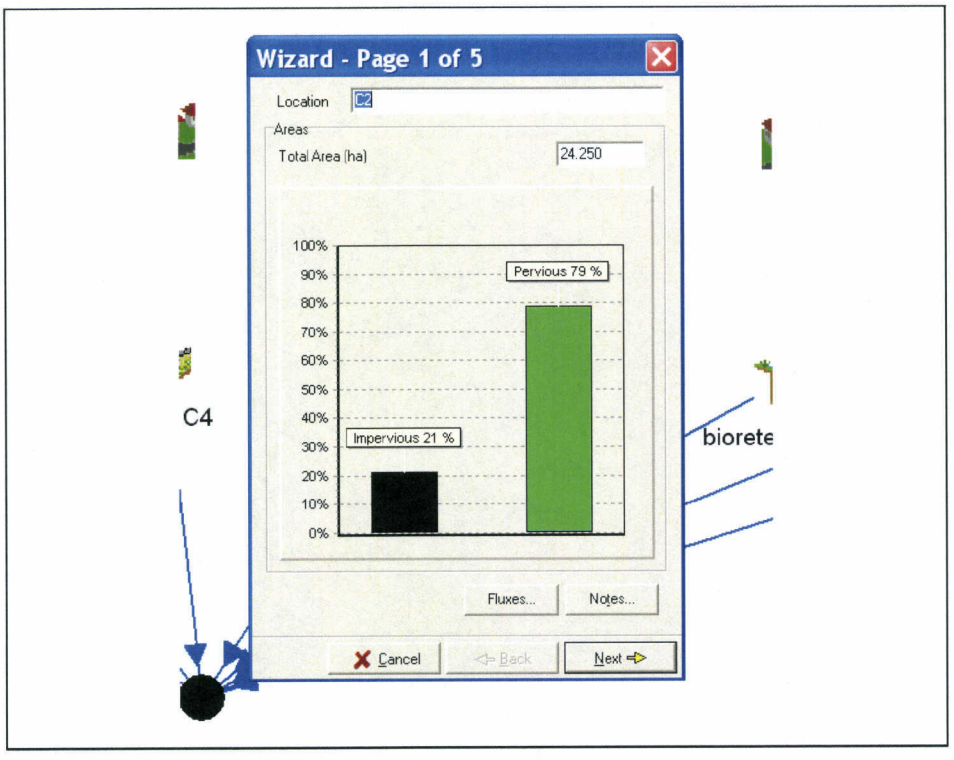


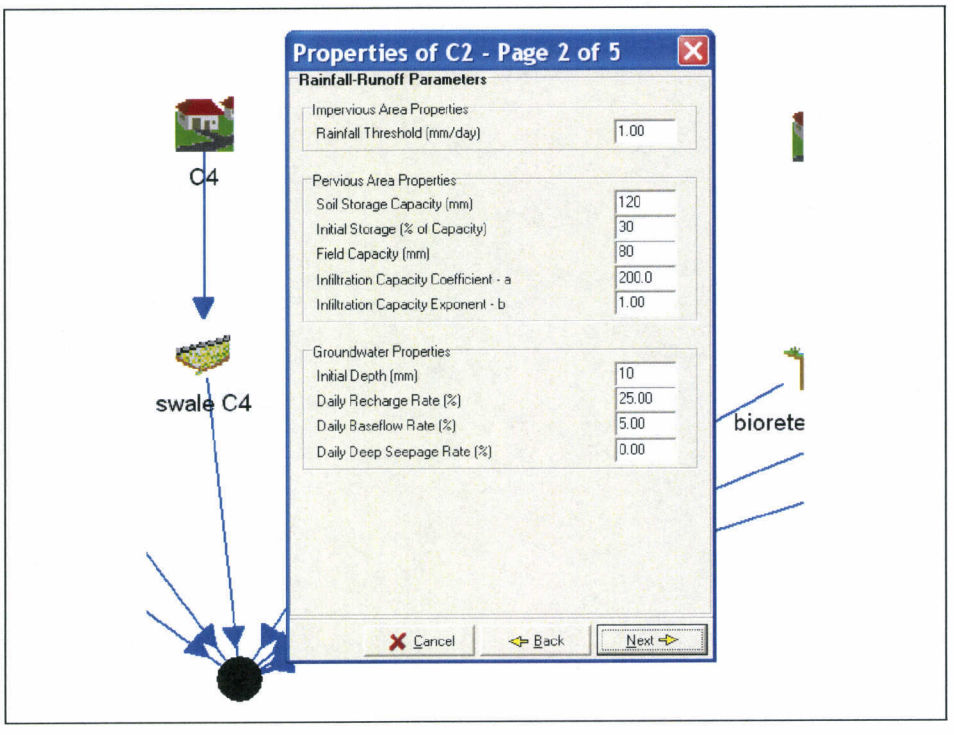
The developed catchment network is shown on the following figure.

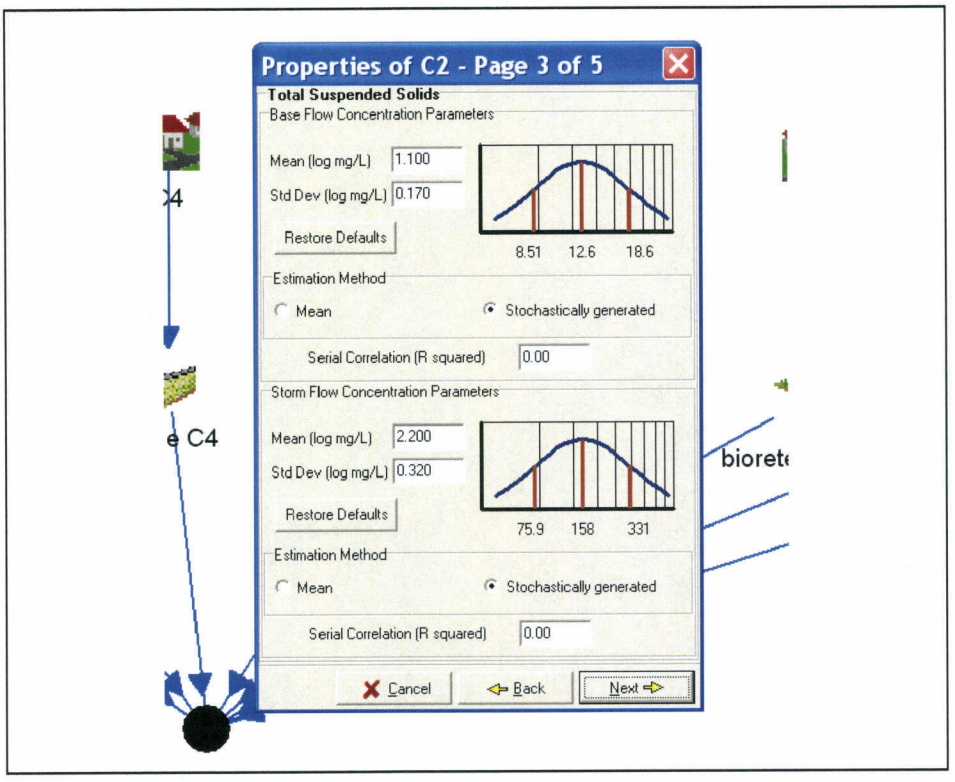


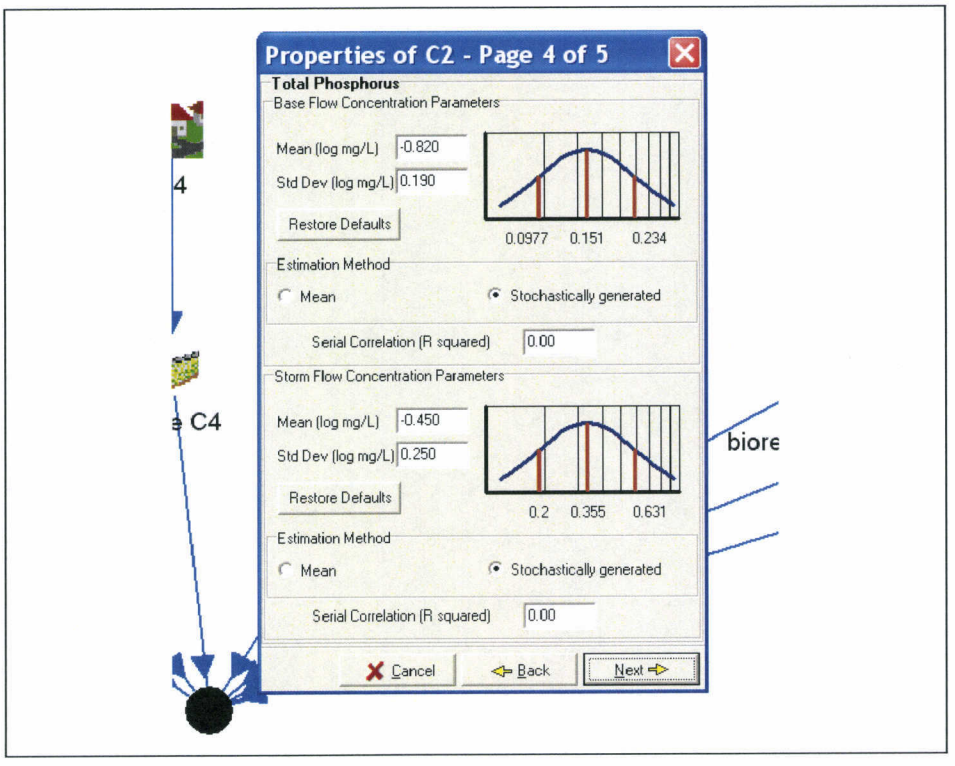
The pollutant loading for each node is the same as the model's default figures.

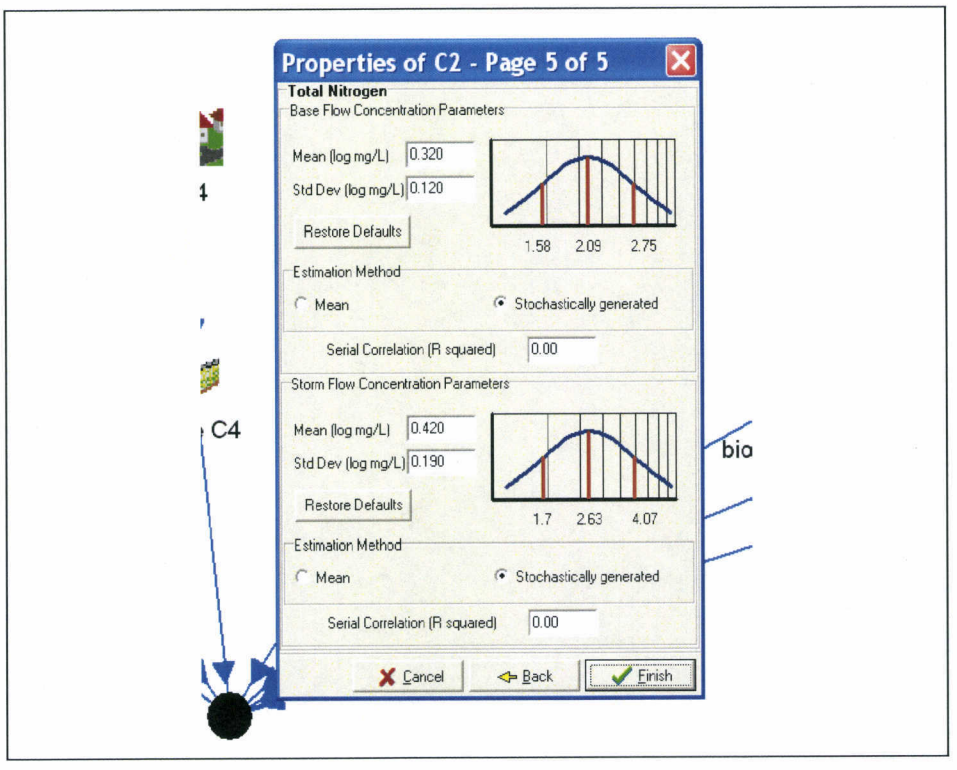
The percentage impervious area for each node is shown in the following diagrams.

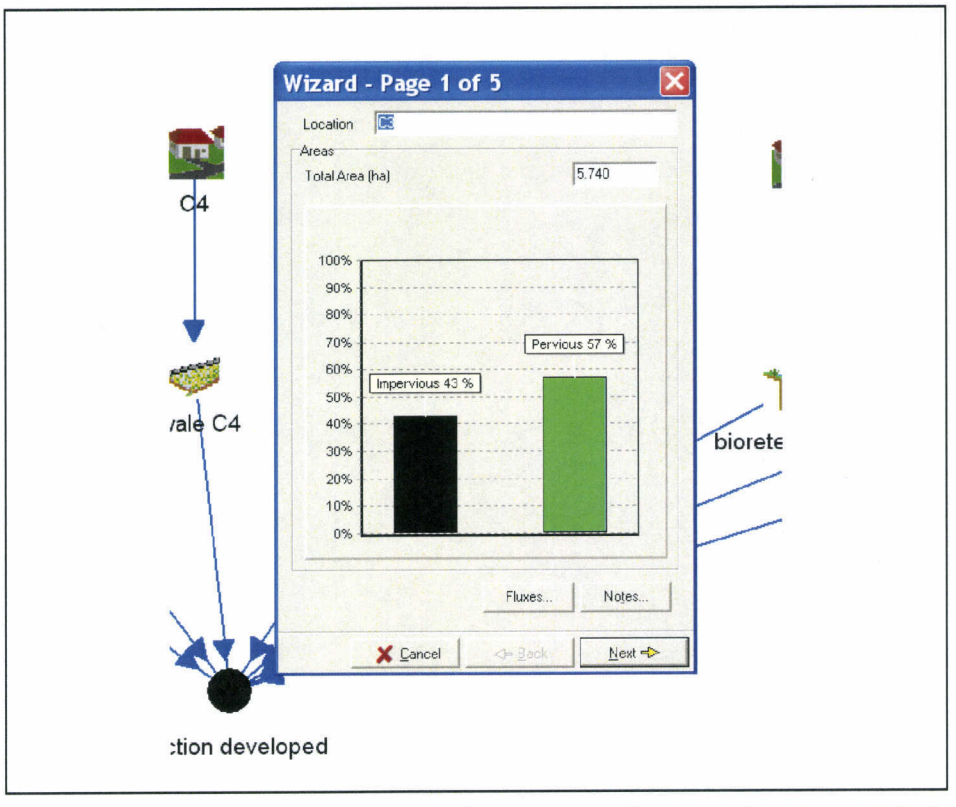




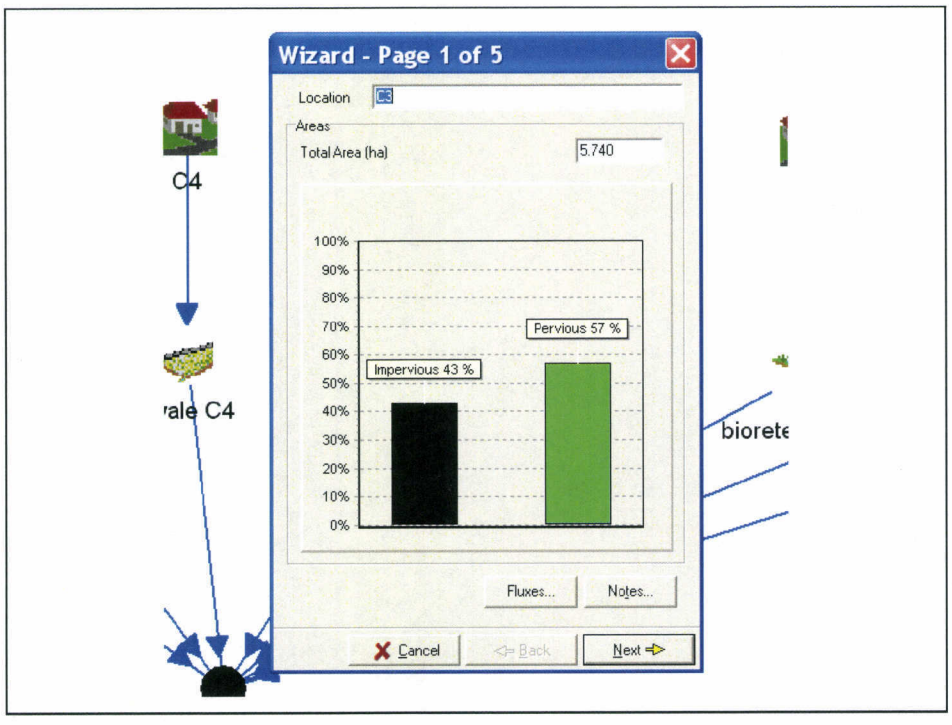


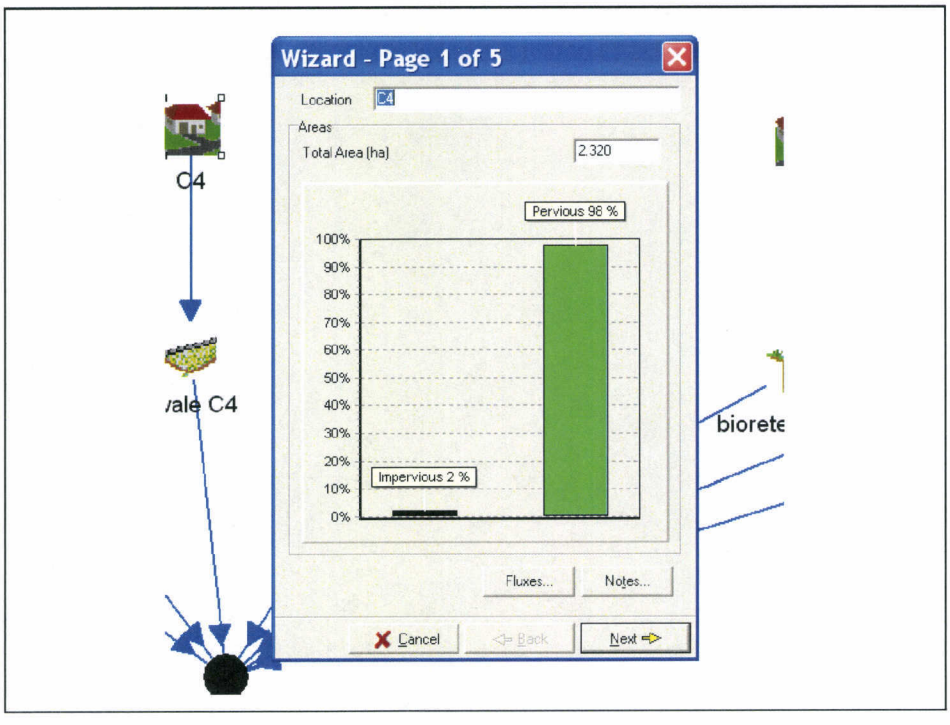


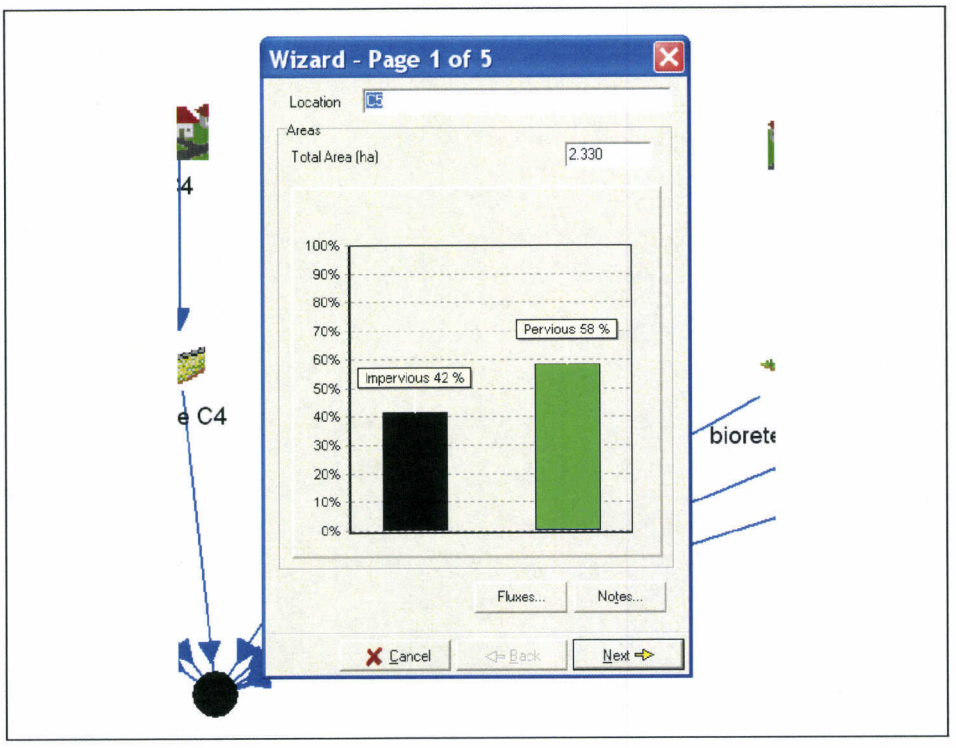


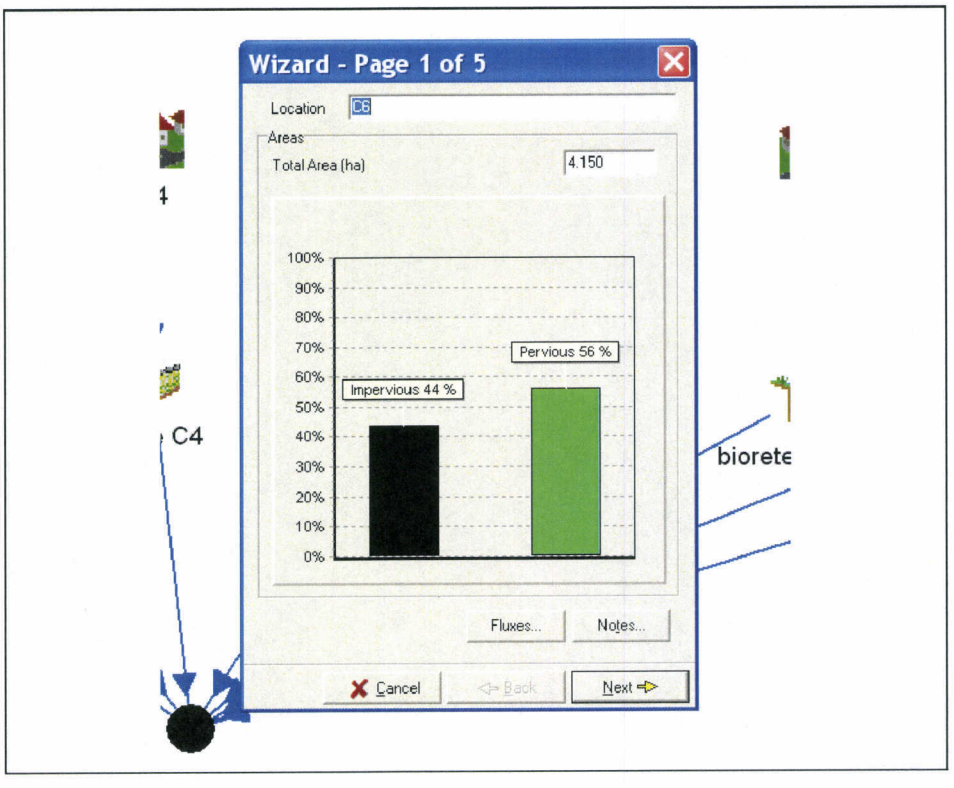


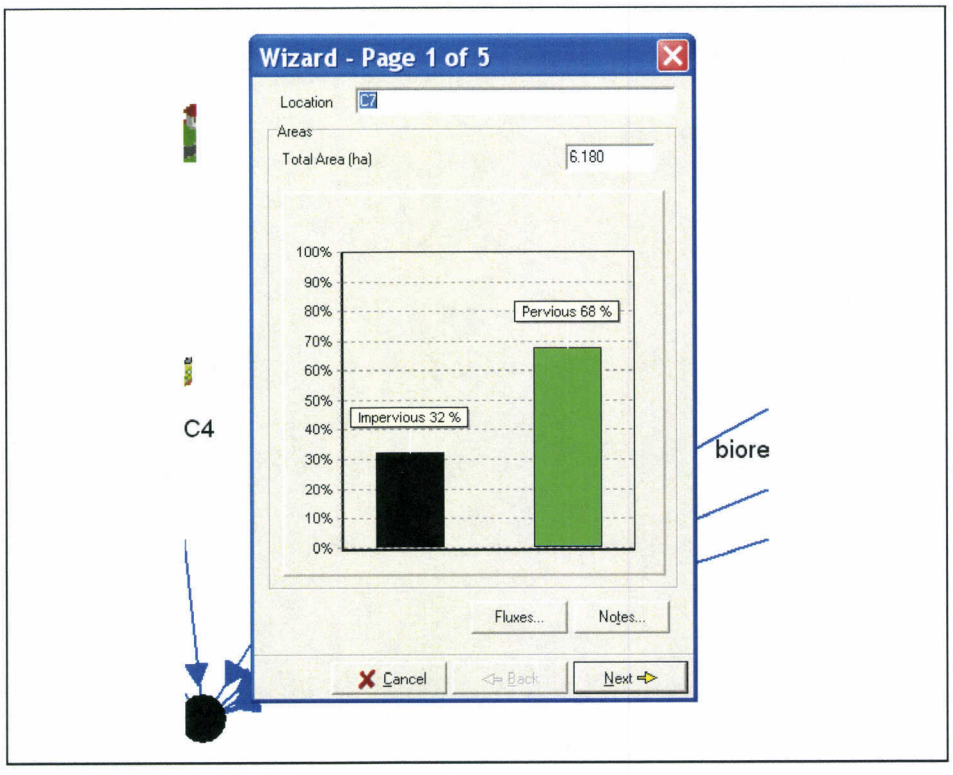
The catchment properties for the remainder of the developed catchment model are the same as the above node

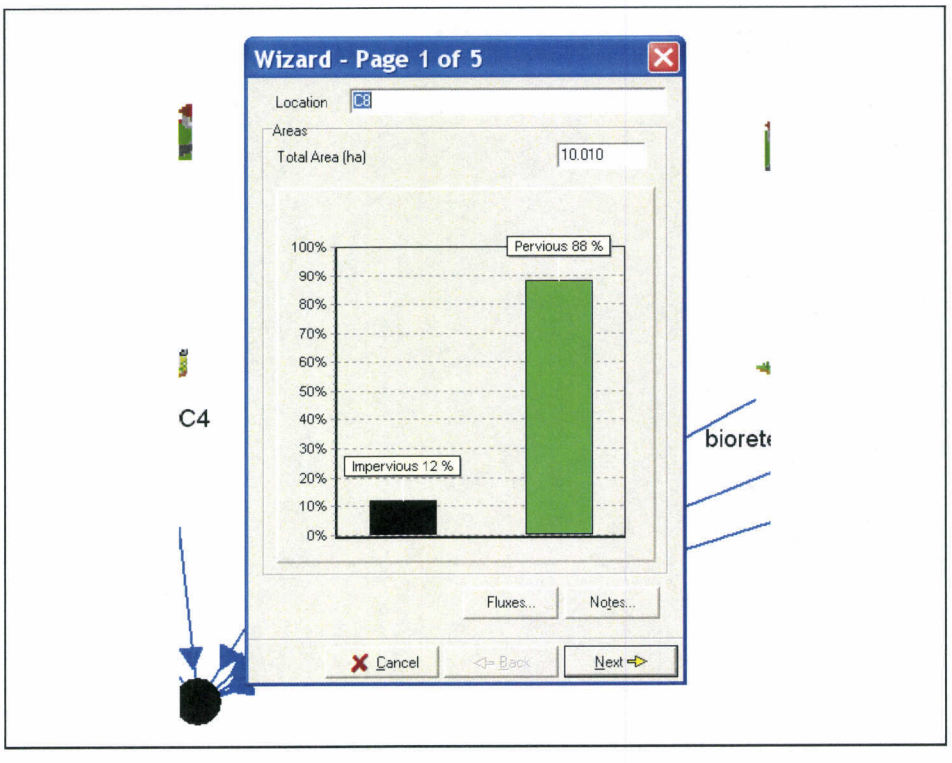


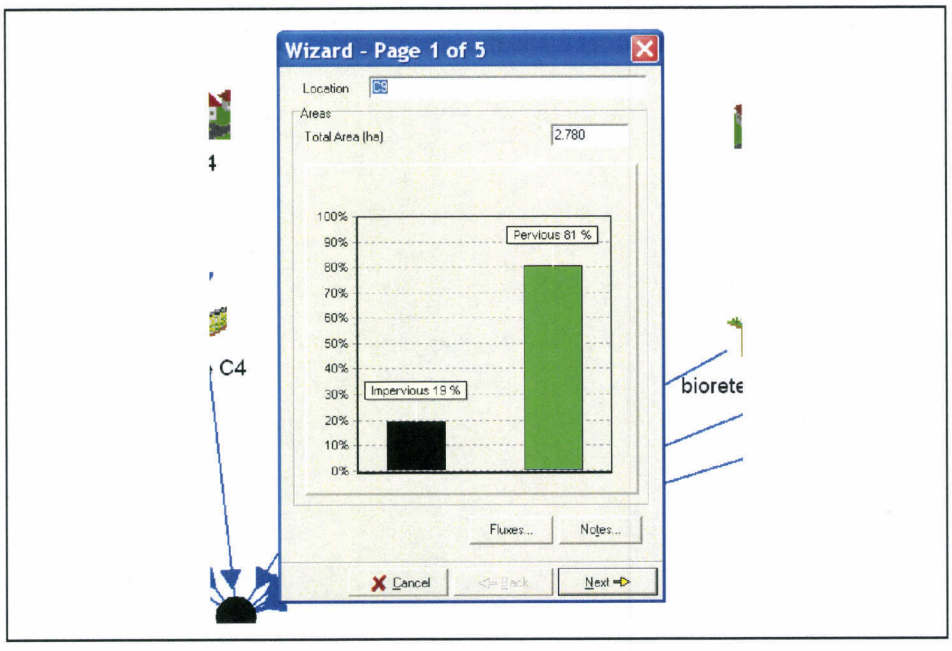






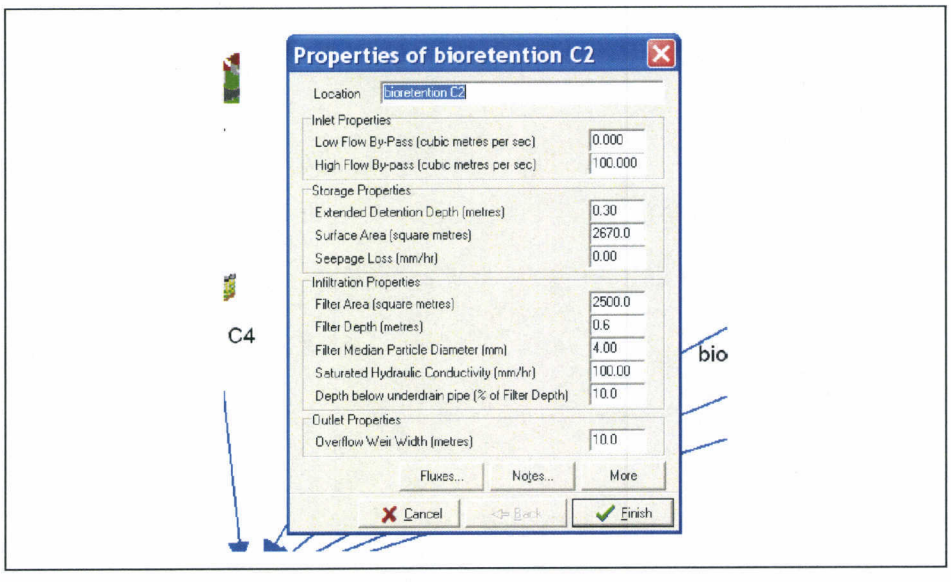


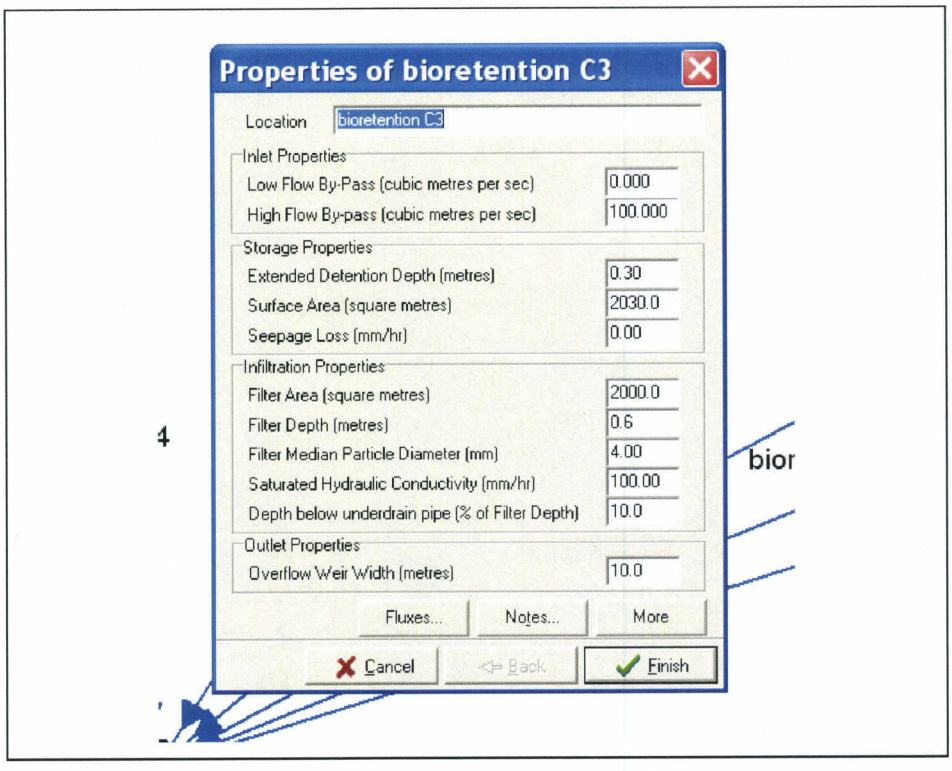


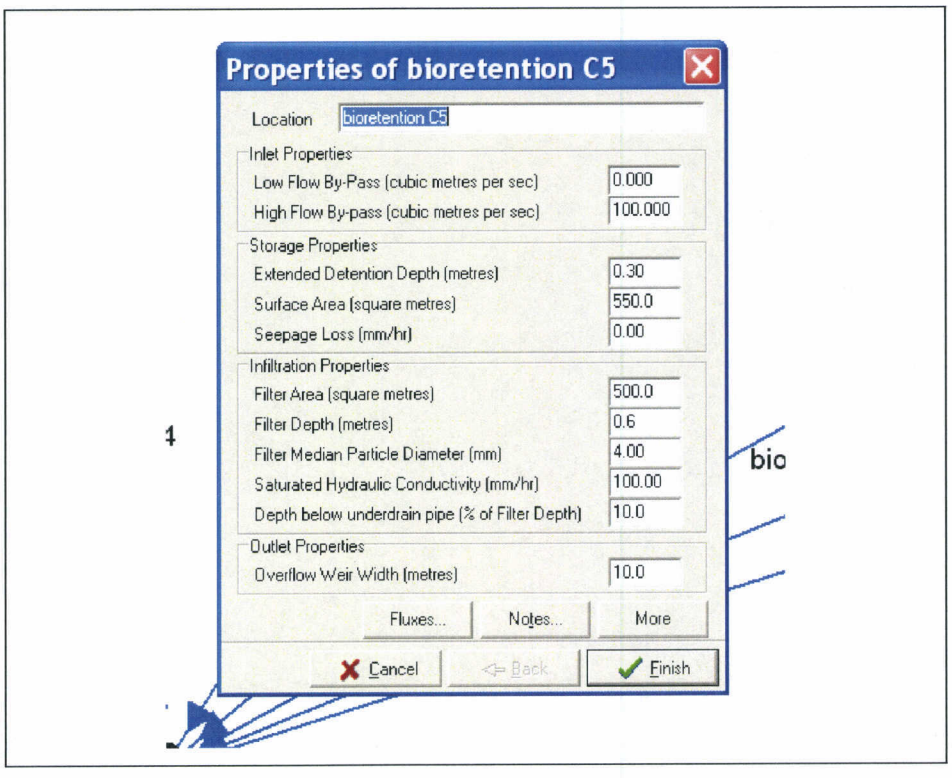


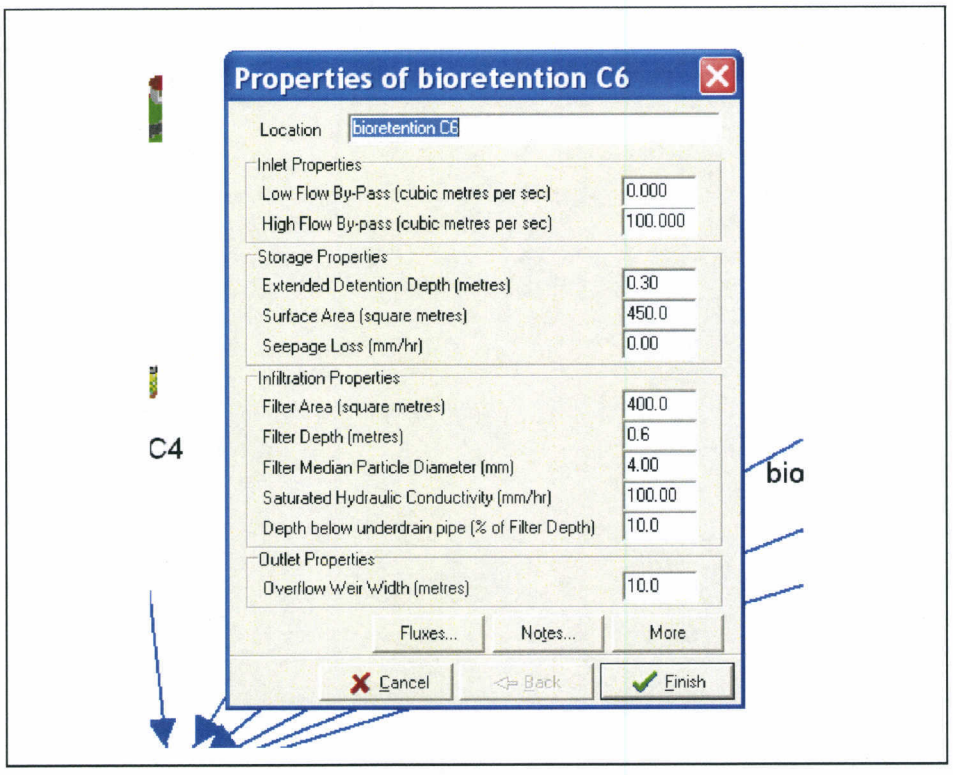
The treatment nodes were created for each node as follows.

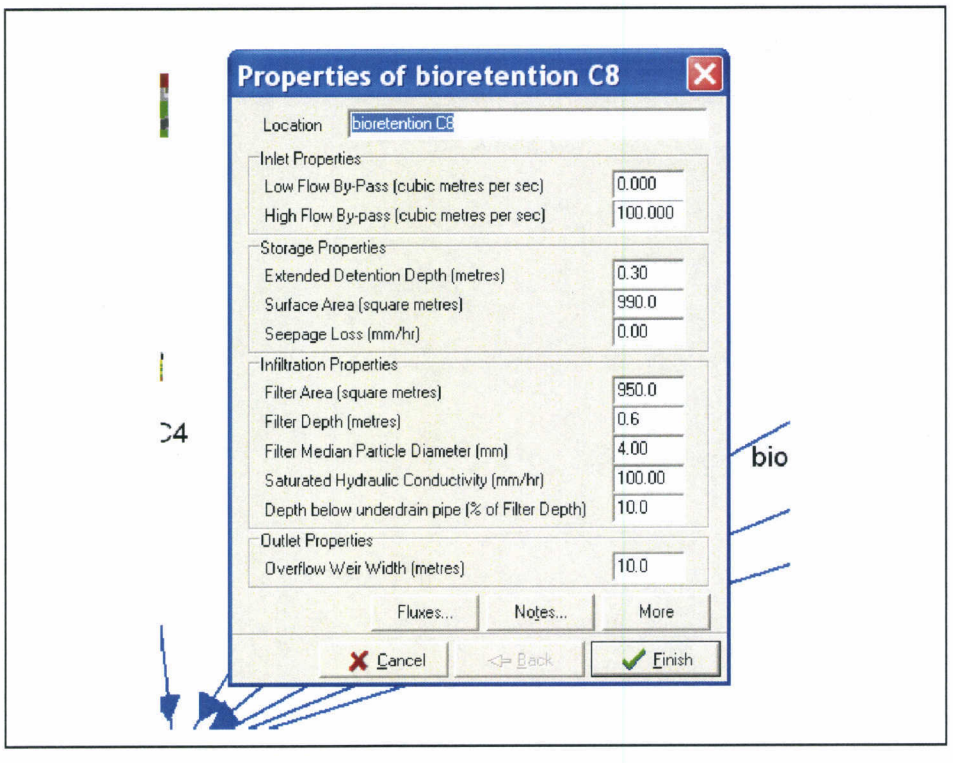
For the bioretention system, the storage depth for each section is set at 0.3m below the basin pipe outlet. The depth of the filtration medium is 0.6m. There will be slotted agricultural pipe to drain the filtration medium. This pipe is assumed not to affect the detention function of the detention basin above the bioretention system, as the discharge from the medium will be very slow releasing.

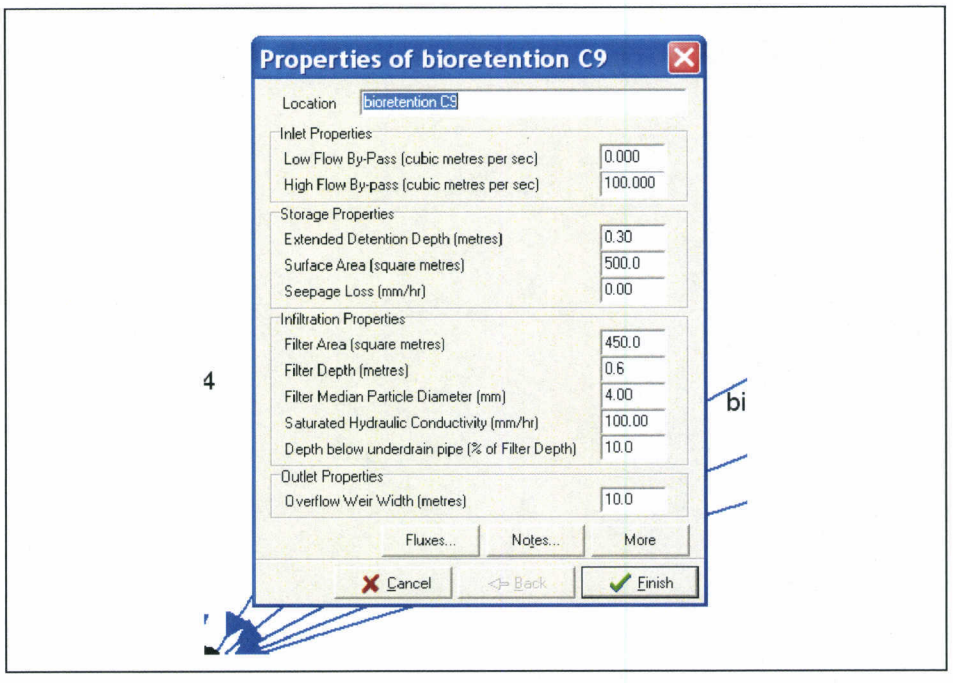












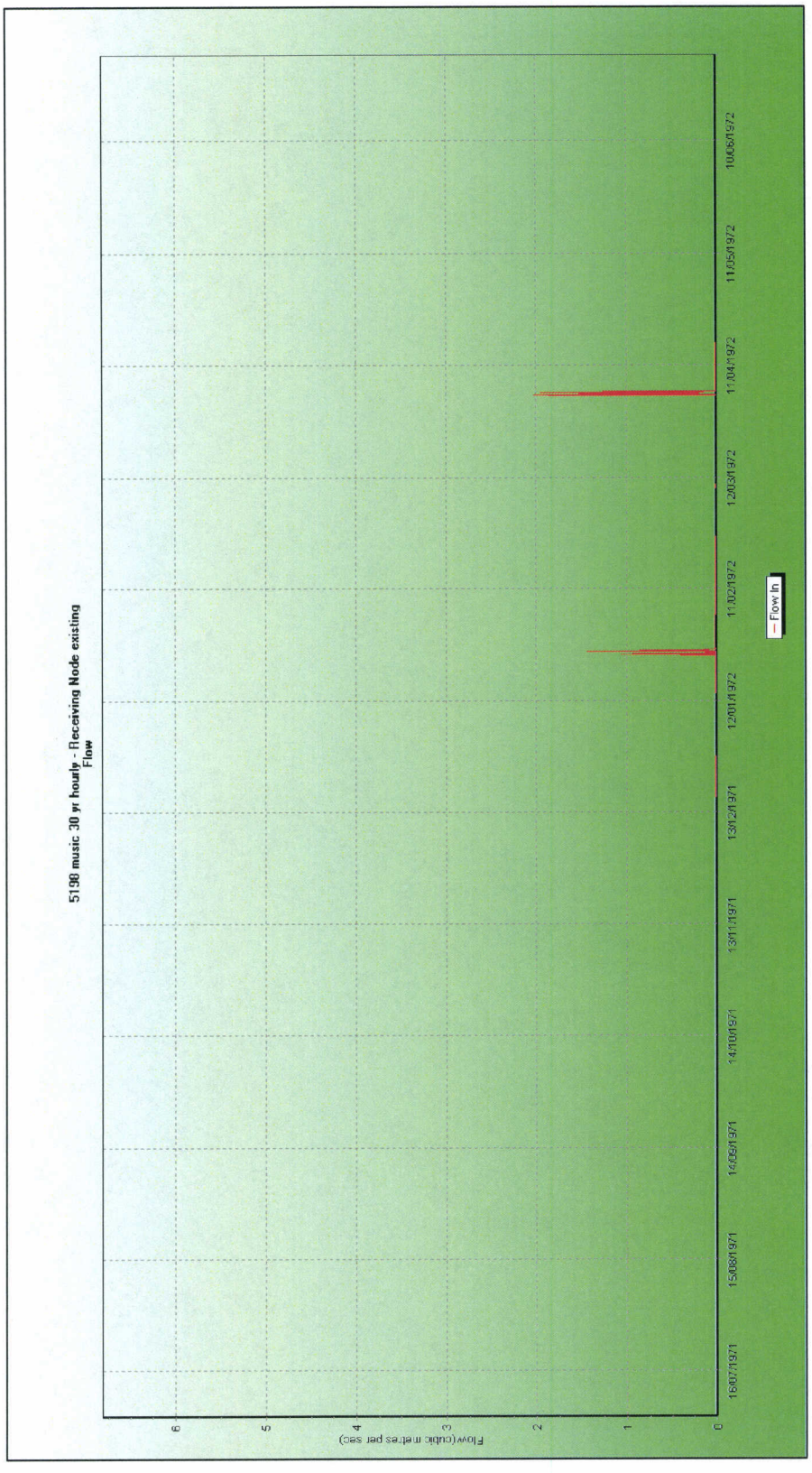
4. Model Results

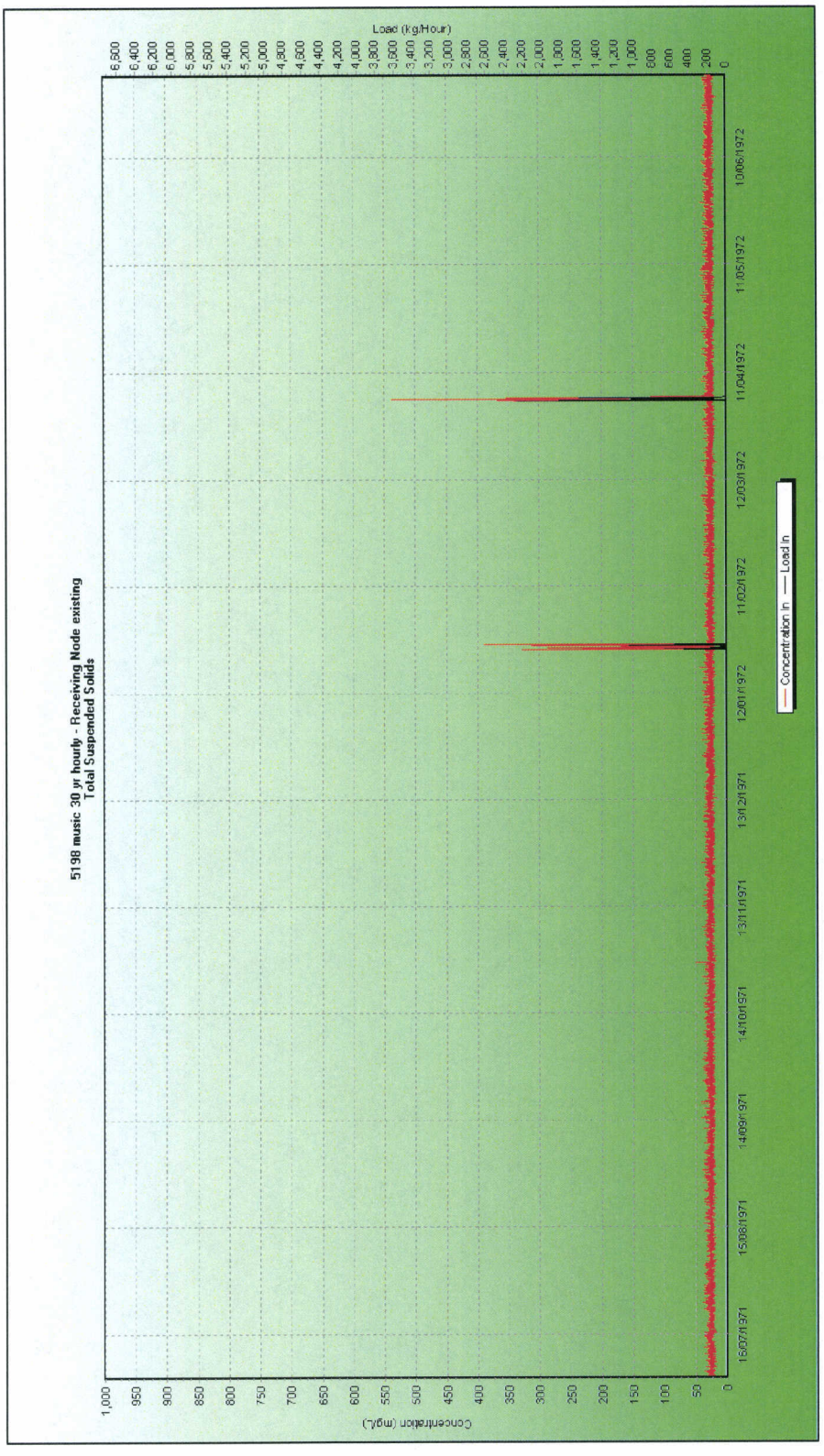
The model result shows the existing catchment pollutant loading is as follows

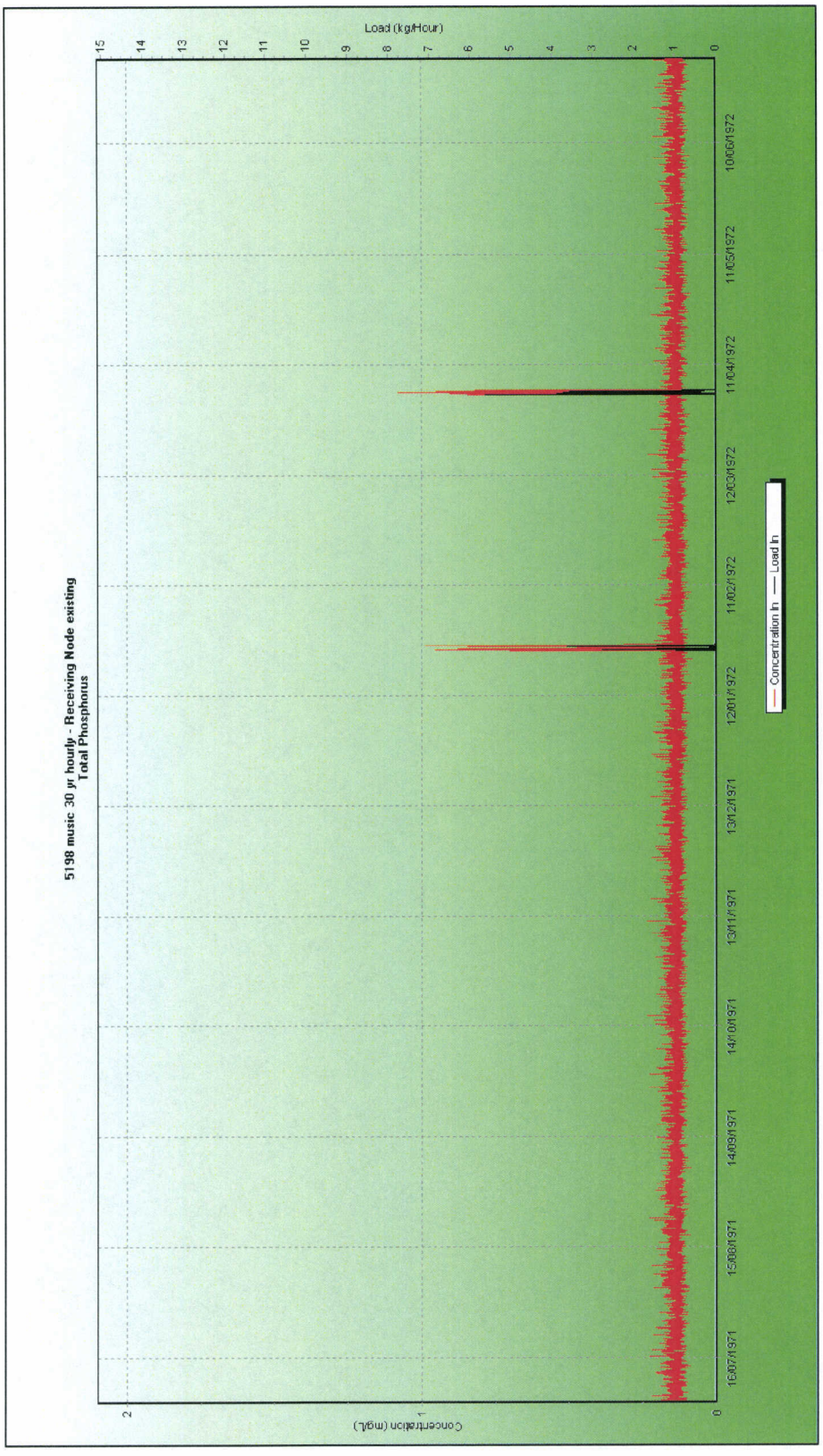
Downstream Node:

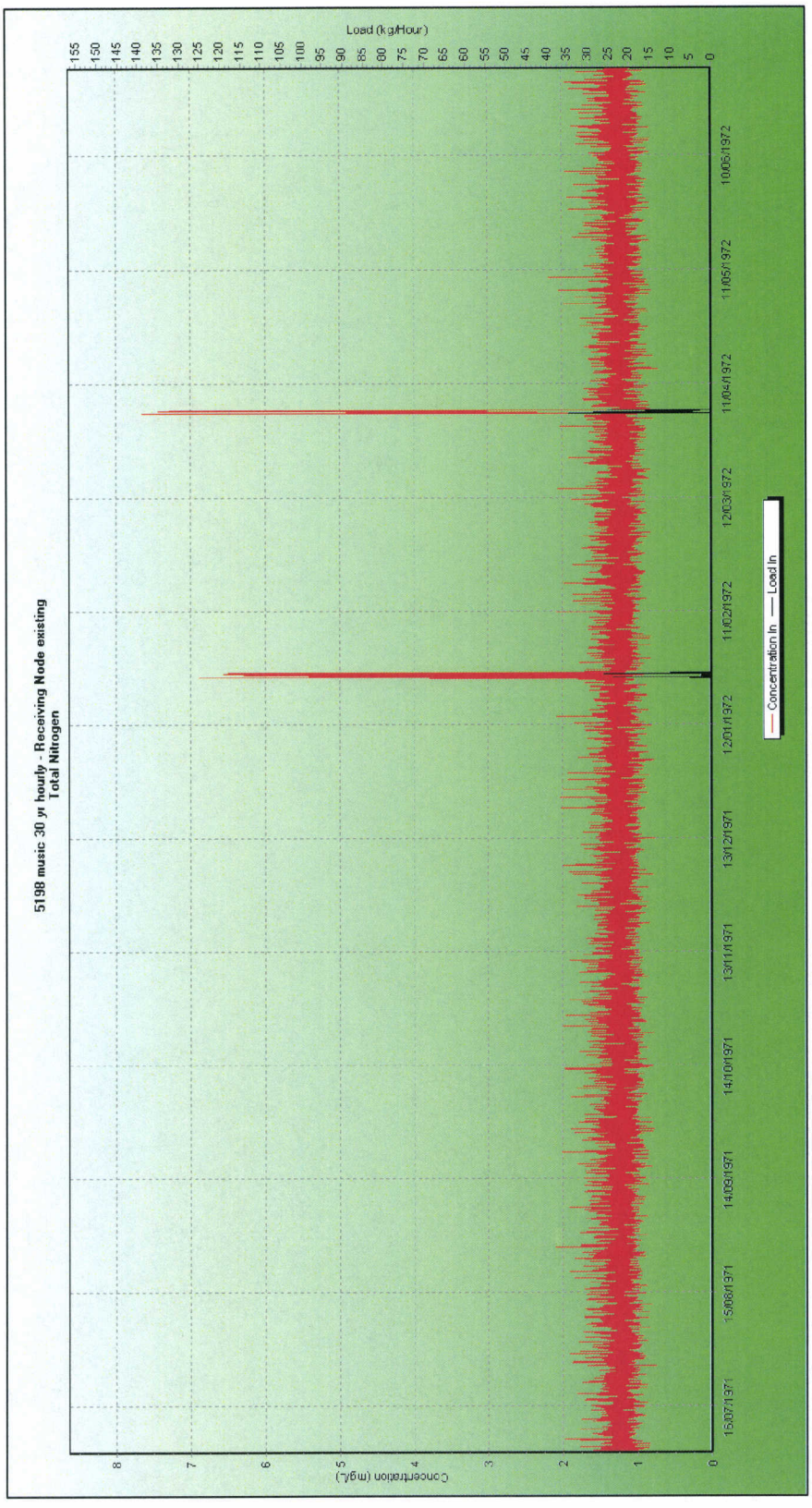
Flow (ML/yr)	99.9
Total Suspended Solids (kg/yr)	15.0E3
Total Phosphorus (kg/yr)	42.9
Total Nitrogen (kg/yr)	299
Gross Pollutants (kg/yr)	0.00

The graphs on the following pages represent pollutant loading for the existing catchment.









The model results for the proposed development are as follows:

Node Bioretention C2:

	Source	Residual	% Removal
Flow (ML/yr)	59.3	59.3	0.0
Total Suspended Solids (kg/yr)	8.63E3	1.42E3	83.5
Total Phosphorus (kg/yr)	20.5	7.70	62.4
Total Nitrogen (kg/yr)	162	110	32.3
Gross Pollutants (kg/yr)	1.19E3	0.00	100.0

Node Bioretention C3:

Flow (ML/yr)	18.3	18.3	0.0
Total Suspended Solids (kg/yr)	3.22E3	394	87.8
Total Phosphorus (kg/yr)	6.97	2.35	66.4
Total Nitrogen (kg/yr)	51.1	31.0	39.3
Gross Pollutants (kg/yr)	463	0.00	100.0

Node Swale C4:

Flow (ML/yr)	4.17	4.17	0.0
Total Suspended Solids (kg/yr)	524	76.9	85.3
Total Phosphorus (kg/yr)	1.30	0.584	55.0
Total Nitrogen (kg/yr)	10.6	7.77	26.5
Gross Pollutants (kg/yr)	6.28	0.00	100.0

Node Bioretention C5:

Flow (ML/yr)	7.36	7.36	0.0
Total Suspended Solids (kg/yr)	1.35E3	155	88.5
Total Phosphorus (kg/yr)	2.88	0.919	68.0
Total Nitrogen (kg/yr)	20.5	12.7	38.1
Gross Pollutants (kg/yr)	185	0.00	100.0

Node Bioretention C6:

	Source	Residual	% Removal
Flow (ML/yr)	13.4	13.4	0.0
Total Suspended Solids (kg/yr)	2.41E3	349	85.5
Total Phosphorus (kg/yr)	5.13	1.72	66.5
Total Nitrogen (kg/yr)	37.9	24.5	35.3
Gross Pollutants (kg/yr)	340	0.00	100.0

Node Bioretention C7:

Flow (ML/yr)	17.4	17.4	0.0
Total Suspended Solids (kg/yr)	2.93E3	466	84.1
Total Phosphorus (kg/yr)	6.44	2.28	64.6
Total Nitrogen (kg/yr)	48.1	32.0	33.5
Gross Pollutants (kg/yr)	413	0.00	100.0

Node Bioretention C8:

Flow (ML/yr)	21.4	21.4	0.0
Total Suspended Solids (kg/yr)	3.38E3	798	76.4
Total Phosphorus (kg/yr)	7.54	3.20	57.6
Total Nitrogen (kg/yr)	55.8	38.8	30.4
Gross Pollutants (kg/yr)	302	0.00	100.0

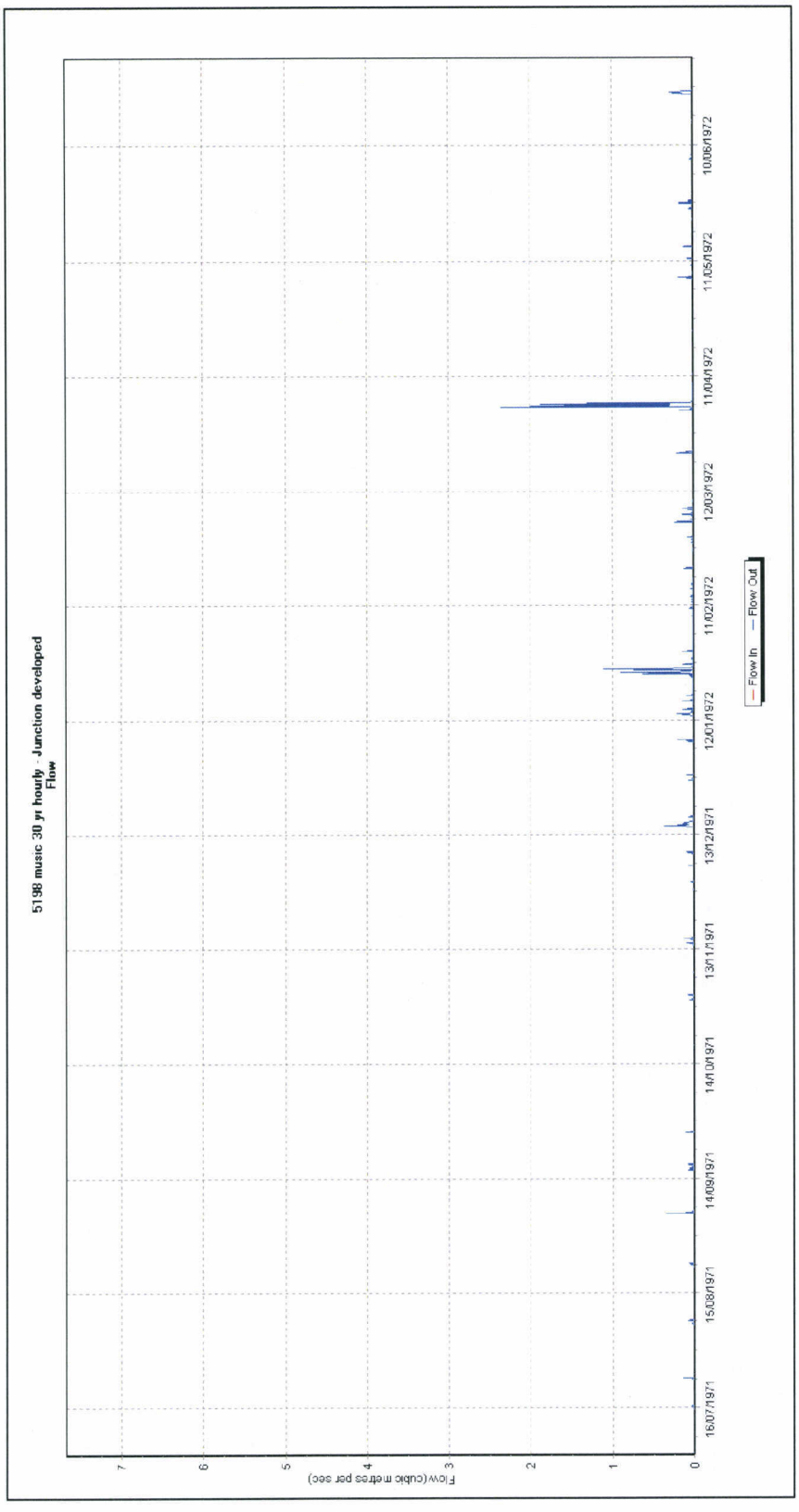
Node Bioretention C9:

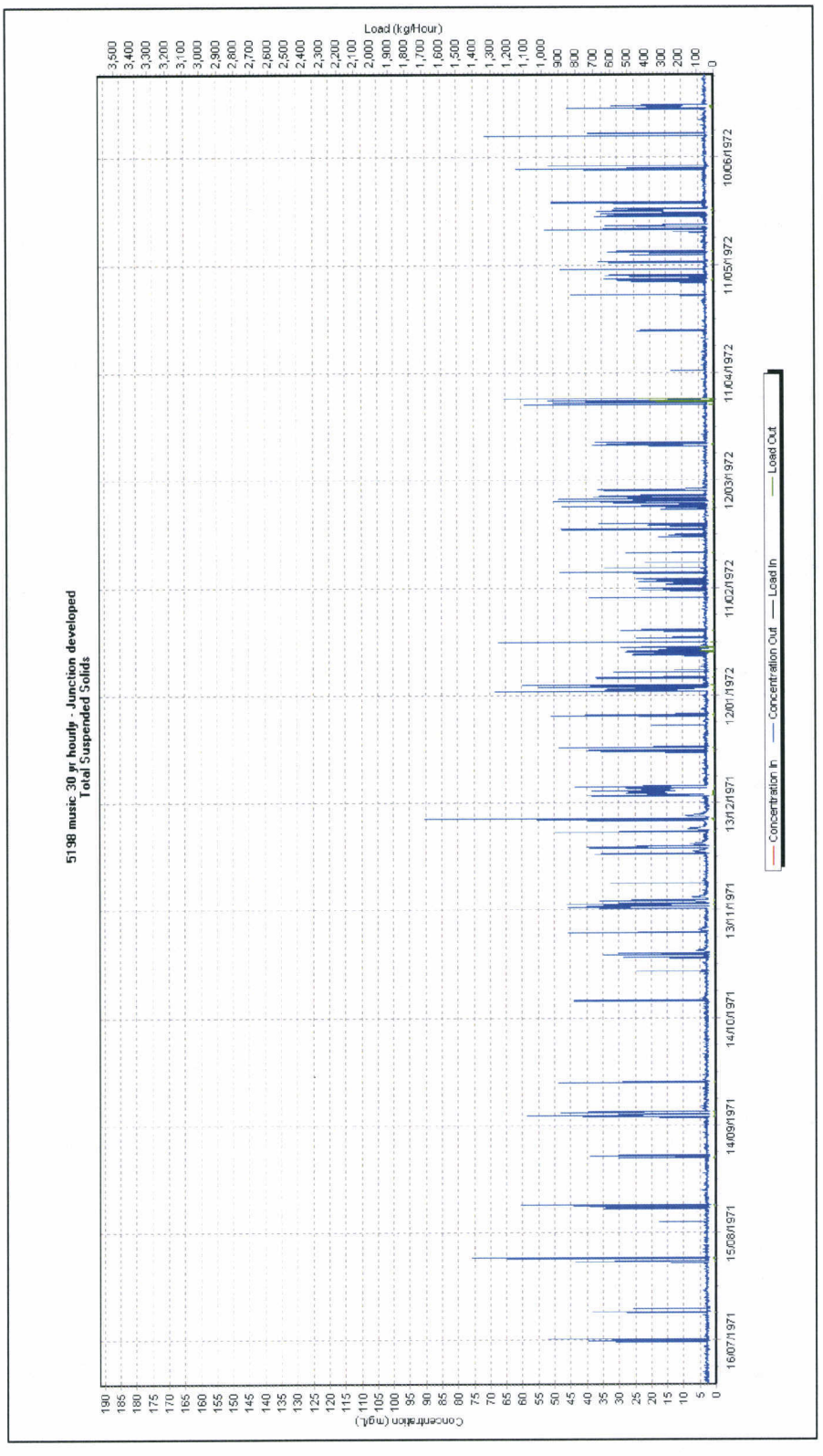
Flow (ML/yr)	6.60	6.61	0.0
Total Suspended Solids (kg/yr)	1.00E3	149	85.1
Total Phosphorus (kg/yr)	2.20	0.807	63.3
Total Nitrogen (kg/yr)	18.1	11.8	35.0
Gross Pollutants (kg/yr)	126	0.00	100.0

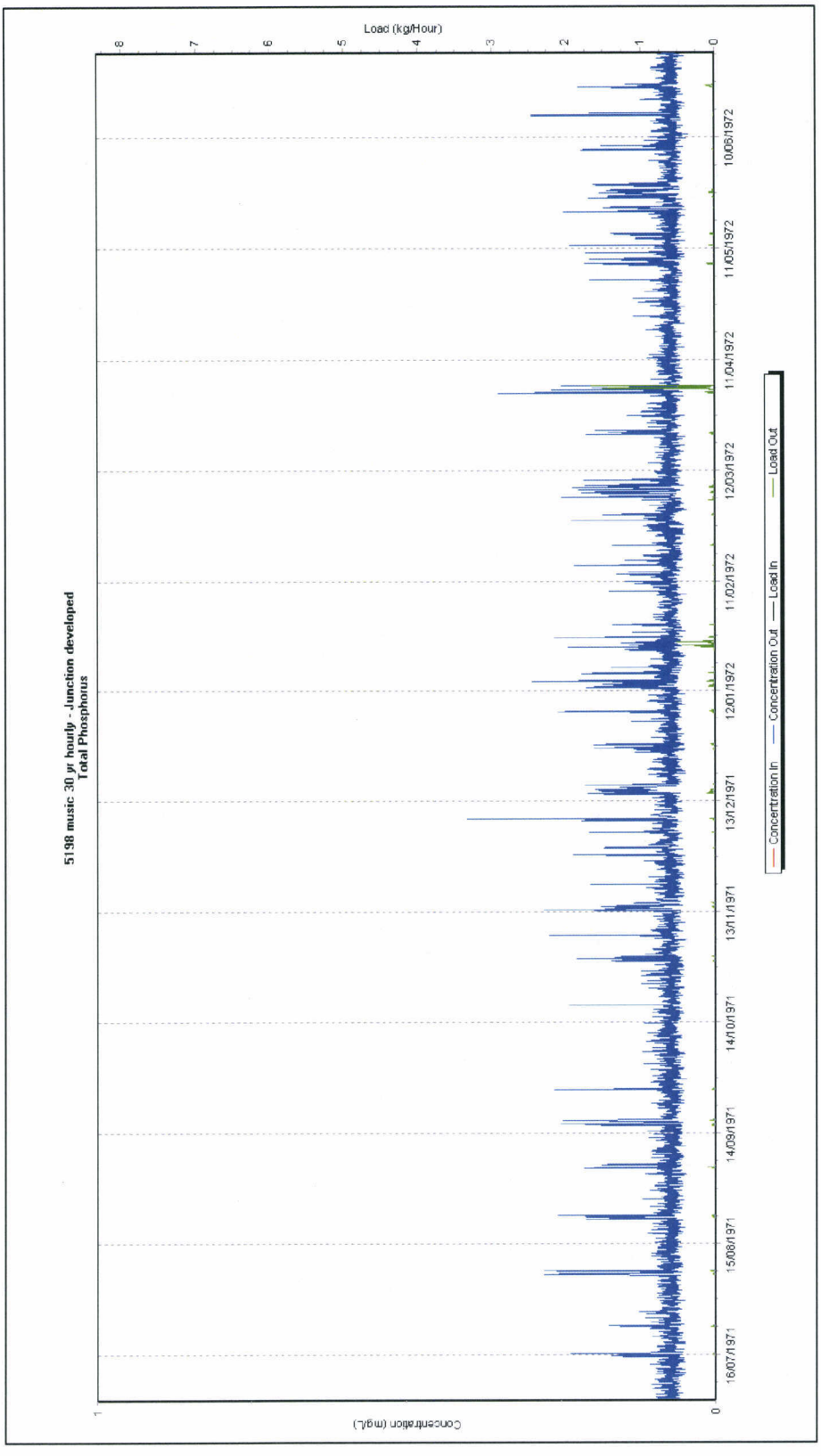
Receiving Node:

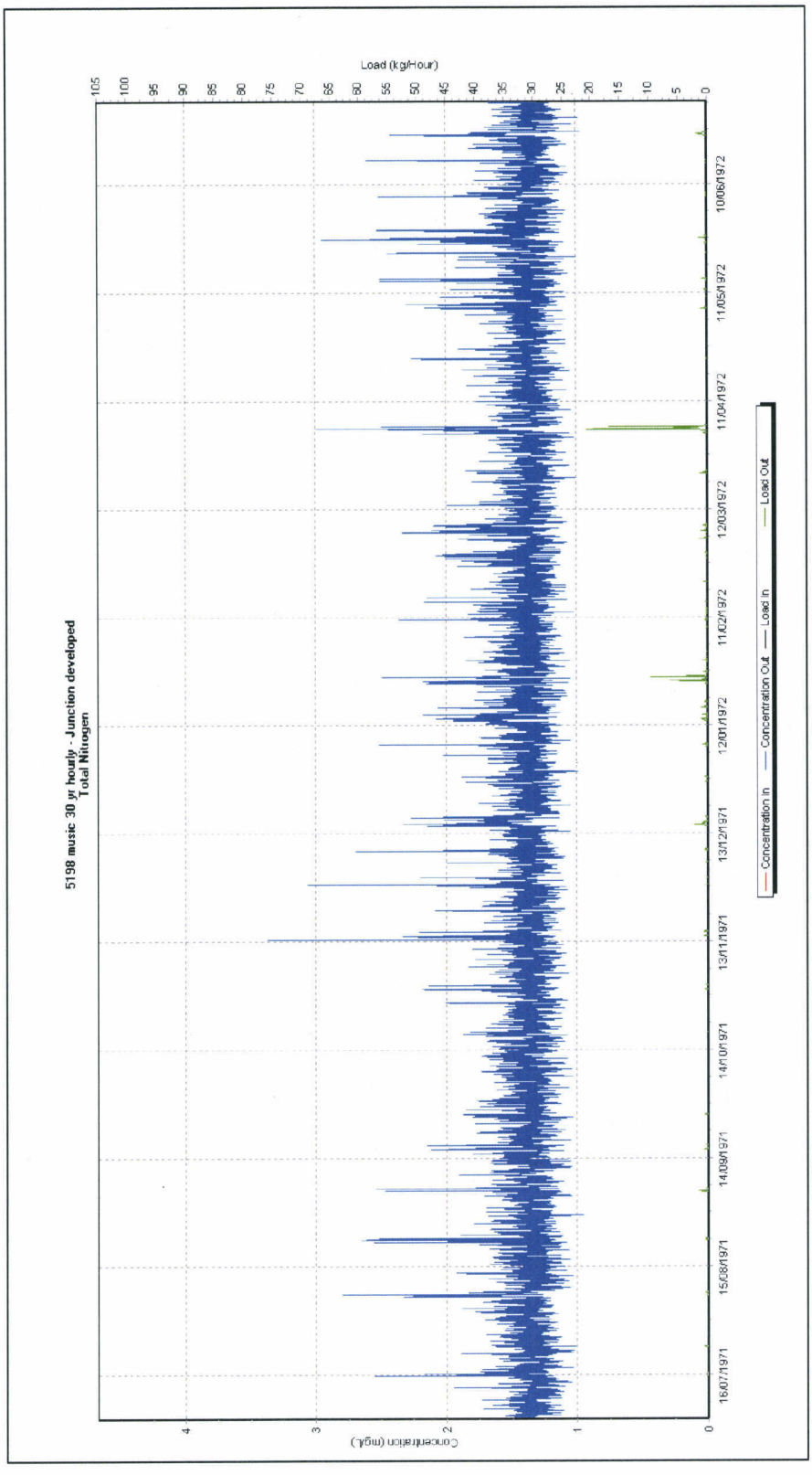
Flow (ML/yr)	148	148	0.0
Total Suspended Solids (kg/yr)	23.4E3	3.81E3	83.7
Total Phosphorus (kg/yr)	52.9	19.6	63.1
Total Nitrogen (kg/yr)	404	268	33.6
Gross Pollutants (kg/yr)	3.03E3	0.00	100.0

The following graphs show pollutant loading from the developed catchment.









5 Summary

The following table represents the summary of concept basins sizing in relation to stormwater quality. The shown preliminary sizes are only for the purpose of assessing that the quality management tools can achieve quality target controls which are set by Greater Taree City Council. These pollutant removal targets are matching pollutant loading from the developed catchment to existing levels. This conceptual modelling is subject to detailed geotechnical investigation and detailed design.

Node	filter surface area M2
C2	2500
C3	2000
C5	400
C6	400
C7	530
C8	950
C9	450

Detention depth is 0.3m and medium depth is 0.6m.

For node C4: swale length is 100m, longitudinal slope is 0.5%, bed width is 1m and top width is 11m.

The above stormwater quality treatment tools will achieve the following treatment levels in comparison to the existing runoff quality.

		Existing Source	Developed		
			Source	Residual	% Removal
Flow	*ml/yr*	**99.9**	148	**148**	0
TSS	*kg/yr*	**15000**	23.400	**3810**	83.7
TP	*kg/yr*	**42.9**	52.9	**19.6**	63.1
TN	*kg/yr*	**299**	404	**268**	33.6
GP	*kg/yr*	**0**	3030	**0**	100

H. Ibrahim

Hany Ibrahim

BEng, MIEAust, CPEng