

THE COUNCIL OF CAMDEN

CONTRIBUTIONS PLAN NO. 3

AMENDED FEBRUARY 1998

UPPER NARELLAN CREEK CATCHMENT

(TRUNK DRAINAGE & WATER QUALITY FACILITIES)

**This Plan was adopted by Council on 23 February 1998,
and came into force on 4 March 1998**

**Prepared by: Strategic Planning Section
File: TC/3408/8**

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EXECUTIVE SUMMARY

This Plan consists of:

- an Introduction;
- Part 1 - Administration and Accounting;
- Part 2 - Demonstration of Nexus; and
- Part 3 - Sub Catchment Works

In the **Introduction**, the principles of s.94 of the Environmental Planning and Assessment Act are summarised.

In **Part 1 - Administration and Accounting**, matters relating to the Plan as a whole are addressed.

The **name of this Plan** is Contributions Plan No. 3: Upper Narellan Creek Catchment (Trunk Drainage and Water Quality Facilities).

The **purpose of this Plan** is to provide a funding strategy that enables Council to levy contributions on new residential, commercial and industrial subdivision or development in order to:

- acquire land for trunk drainage and water quality facilities;
- construct trunk drainage and water quality facilities; and
- provide supporting professional services.

The **area of this Plan** is the Upper Narellan Creek drainage catchment and this is shown in Figure 1. The catchment is subdivided into six **sub catchments** shown in Figure 2. Each sub catchment is further subdivided into **precincts**.

This Plan also has a **relationship to other plans** such as Local Environmental Plans and Development Control Plans.

Apportionment of costs is determined separately for trunk drainage and water quality for each precinct and is summarised in Figure 3.

The formula for the calculation of **contribution rates** is given and the rates are summarised in Figure 4.

The formula for the **indexation of contribution rates** is also given. Indexation will be to the Roads and Traffic Authority Road Cost Index on a quarterly basis.

Contributions may be made as either **monetary contributions, land contributions, or works in kind contributions**.

Payment of monetary contributions will be made prior to the release of the linen plan of subdivision or prior to the issue of building approval, depending on the type of development application made.

A deferred or periodic payment of a contribution maybe accepted subject to a bank guarantee.

Separate **accounting records** are maintained for this Plan and at the end of each financial year an **Annual Statement** is prepared.

A **Contributions Register** is also maintained which details the nature, purpose and amount of contributions paid towards this Plan.

A **review** of this Plan will take place at the end of each stage of the works schedules or at a lesser time if considered necessary.

In **Part 2 - Demonstration of Nexus**, the relationship between subdivision and development, stormwater runoff and the consequent need for drainage infrastructure and water quality controls, is discussed.

Relevant studies are listed which provide drainage and water quality strategies and technical data to support this Plan.

The three different types of nexus ie **causal nexus**, **physical nexus** and **temporal nexus** are explained as they apply to this Plan.

Residential subdivision at full development within the catchment is estimated at 11,550 lots with a population of 37,100.

Commercial development will take place on 40 hectares within the Narellan Town Centre and on 12.5 hectares within the Mount Annan District Centre.

Industrial development will take place on 28 hectares at Narellan and 223 hectares at Smeaton Grange.

Urbanisation of drainage catchments by way of subdivision and development has a significant impact on the natural water flow. Much of the land becomes covered by **impervious areas** which increase the quantity of stormwater runoff with the potential for flooding, erosion, sediment transportation and pollution.

To mitigate against the hazards of increased stormwater runoff, different **infrastructure types** are used in combination with open space and habitat conservation. They include:

- drainage channels;
- low flow pipes;
- spillways/drop structures;
- culverts;
- detention basins;
- inlets and outlets to basins;
- gross pollutant traps;
- water pollution control ponds; and
- inlets and outlets to ponds.

An **infrastructure strategy** for the management of stormwater runoff from the Upper Narellan Creek catchment is incorporated into this Plan as follows:

- trunk drainage is provided within the catchment so that the developed urban peak discharge at Kirkham Lane does not exceed the equivalent pre-developed peak discharge for floods with average recurrence intervals of 5, 20 and 100 years;
- trunk drainage is provided at Harrington Park for the runoff generated by that precinct a for some upstream precincts which do not provide their own drainage;
- water quality controls are provided at Currans Hill and Mount Annan for the pollutants generated by those precincts;
- water quality controls are provided at Harrington Park for the pollutants generated by that precinct and for those upstream precincts which do not provide their own water quality;
- water quality controls are provided downstream from Harrington Park at Narellan for the pollutants generated by those precincts; and
- a multiple use system is provided within the catchment that balances the competing demands of open space use, environmental concerns, aesthetic considerations and economic benefits.

Part 3 - Sub Catchment Works, addresses the trunk drainage and water quality works required within the catchment as a result of subdivision and development and the increased stormwater runoff.

Works schedules to the year 2004 for all sub catchments and precincts are summarised in Figure 5.

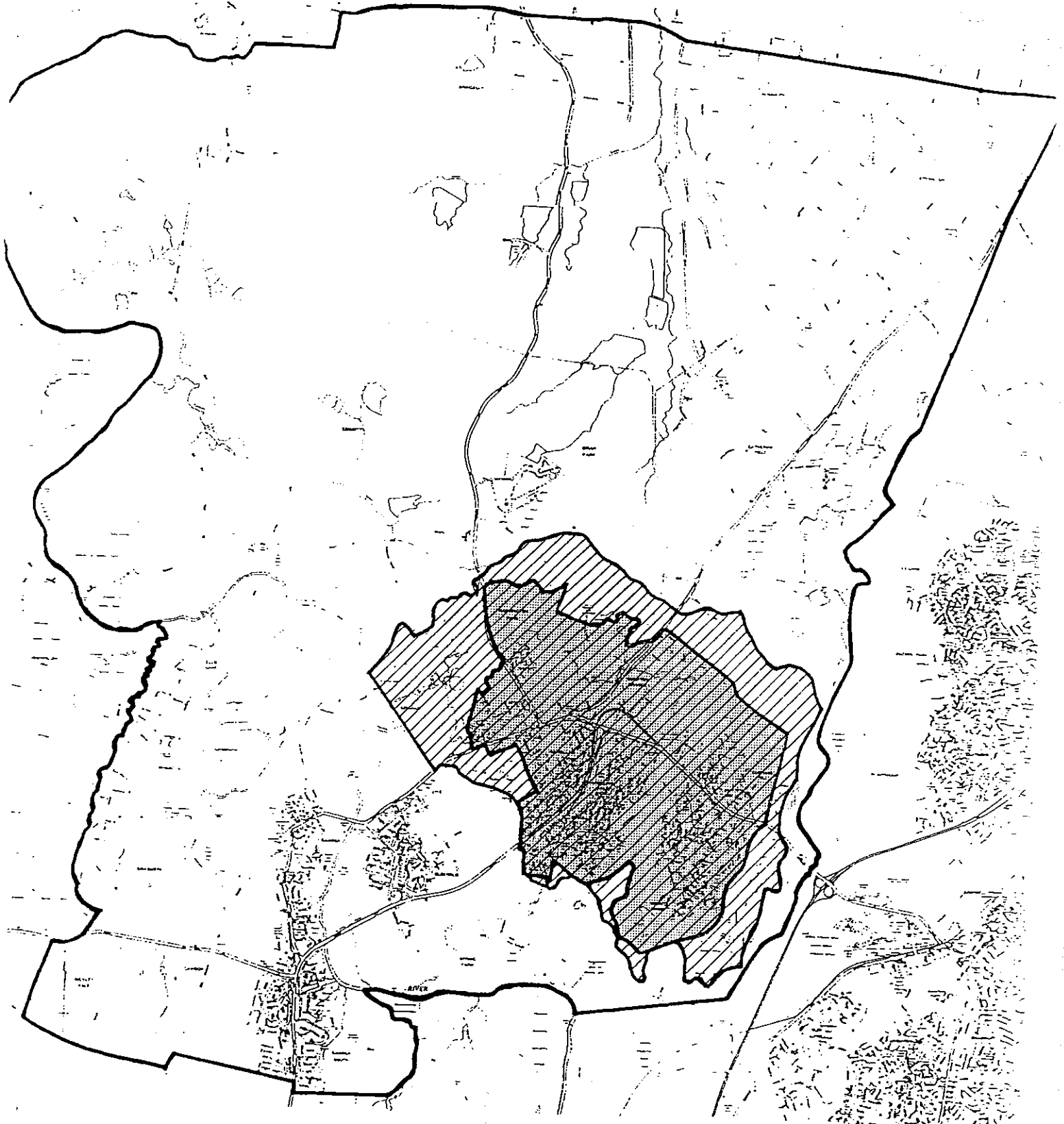
A **description and location** of the works is given for each sub catchment, precinct by precinct. The works are indicated on maps and listed in works schedules for each sub catchment.

Formulae are given where there is an **apportionment of costs** between precincts.


There is a need for Council to engage consultants from time to time as part of the implementation and review of the Plan. **Professional services** includes the following:

- review of the Plan;
- review of trunk drainage works;
- land valuations; and
- legal advice.

FIGURE 1: UPPER NARELLAN CREEK CATCHMENT



 AREA OF UPPER NARELLAN CREEK CATCHMENT

 AREA TO WHICH THIS PLAN APPLIES
(NON CONTRIBUTING AREAS EXCLUDED)

 COUNCIL BOUNDARY

FIGURE 2: DRAINAGE SUB CATCHMENTS



FIGURE 3 : APPORTIONMENT OF ALL TRUNK DRAINAGE & WATER QUALITY COSTS

(1) SUB CATCHMENT	(2) PRECINCT	(3) AREA (ha)	(4) WEIGHTING FACTOR	(5) FACTORED AREA (ha)	(8) TRUNK DRAINAGE						(12) WATER QUALITY			
					(6) OWN PRECINCT		(7) SA NARELLAN CK.		(10) SA TRIBUTARY No.1		(11) OWN PRECINCT		(14) FOR PRECINCT 6A	
					%	DOST	F ₁₀ %	DOST	%	COST	%	DOST	F _{WQ} %	COST
1	1A	189.10	1.55	291.56	100%	\$ 8,029,961	0%	\$ -	0%	\$ -	0%	\$ -	24.1%	\$ 1,806,194
	1B	95.64	1	95.64	100%	\$ 531,931	0%	\$ -	0%	\$ -	100%	\$ 531,931	0.0%	\$ -
	1C	54.09	1	54.09	100%	\$ 937,300	0%	\$ -	0%	\$ -	0%	\$ -	4.6%	\$ 335,028
	1D	13.38	1	13.38	100%	\$ 389,270	0%	\$ -	0%	\$ -	0%	\$ -	1.1%	\$ 82,890
	1E	36.50	1	36.50	100%	\$ 424,462	0%	\$ -	0%	\$ -	0%	\$ -	3.2%	\$ 238,509
	1F	134.20	1	134.20	100%	\$ 868,301	0%	\$ -	0%	\$ -	100%	\$ 868,301	0.0%	\$ -
	1G	104.60	1	104.60	100%	\$ 1,187,175	0%	\$ -	0%	\$ -	100%	\$ 367,382	0.0%	\$ -
	1H	62.30	1	62.30	100%	\$ 686,400	0%	\$ -	0%	\$ -	0%	\$ -	4.3%	\$ 324,000
	1I	25.30	1	25.30	100%	\$ -	0%	\$ -	0%	\$ -	0%	\$ -	2.1%	\$ 156,734
	1J	26.69	1.55	41.35	100%	\$ 749,846	0%	\$ -	0%	\$ -	0%	\$ -	3.4%	\$ 256,190
	1K	16.90	1	16.90	31.4%	\$ 207,407	0%	\$ -	0%	\$ -	0%	\$ -	1.6%	\$ 117,086
SUB TOTAL		761.79	-	849.91	-	\$ 14,616,872	0%	\$ -	0%	\$ -	-	\$ 1,787,614	44.3%	\$ 9,916,840
2	2A	44.60	1.55	69.13	100%	\$ 797,423	18.8%	\$ 181,332	0%	\$ -	0%	\$ -	5.7%	\$ 428,263
SUB TOTAL		44.60	-	69.13	-	\$ 797,423	18.8%	\$ 181,332	0%	\$ -	\$ -	\$ -	5.7%	\$ 428,263
3	3A	18.24	1.55	28.27	100%	\$ 44,000	7.7%	\$ 74,169	0%	\$ -	0%	\$ -	2.3%	\$ 176,146
	3B	189.00	1	189.00	100%	\$ 3,607,650	0%	\$ -	0%	\$ -	0%	\$ -	15.7%	\$ 1,170,862
	3C	11.90	1	11.90	-	\$ -	0%	\$ -	0%	\$ -	-	\$ -	1.0%	\$ 73,721
	3D	9.78	1	9.70	-	\$ -	0%	\$ -	0%	\$ -	-	\$ -	0.8%	\$ 60,092
	3E	4.20	1.55	6.51	-	\$ -	0%	\$ -	0%	\$ -	-	\$ -	0.5%	\$ 40,330
SUB TOTAL		233.04	-	245.98	-	\$ 3,681,880	7.7%	\$ 74,169	0%	\$ -	\$ -	\$ -	20.9%	\$ 1,620,168
4	4A	78.00	1	78.00	100%	\$ 99,918	0%	\$ -	0%	\$ -	100%	\$ 160,000	-	\$ -
	4B	39.90	1	39.90	-	\$ -	0%	\$ -	0%	\$ -	-	\$ -	3.3%	\$ 247,182
	4C	12.61	1.55	19.55	100%	\$ 313,674	0%	\$ -	0%	\$ -	0%	\$ -	1.6%	\$ 121,103
	4D	3.90	1.55	6.05	100%	\$ 200,000	0%	\$ -	0%	\$ -	0%	\$ -	0.5%	\$ 37,449
	4E	3.30	1.55	5.12	100%	\$ 345,280	0%	\$ -	0%	\$ -	0%	\$ -	0.4%	\$ 31,688
	4F	10.40	1.55	16.12	100%	\$ 151,922	0%	\$ -	0%	\$ -	0%	\$ -	1.3%	\$ 99,864
SUB TOTAL		148.11	-	164.79	-	\$ 1,711,912	0%	\$ -	0%	\$ -	\$ -	\$ 160,000	7.2%	\$ 687,266
5	5A	256.50	1	256.50	100%	\$ 3,495,527	69.7%	\$ 672,614	100%	\$ 591,413	0%	\$ -	21.2%	\$ 1,689,027
	5B	14.33	1	14.33	-	\$ -	3.9%	\$ 37,588	0%	\$ -	0%	\$ -	1.2%	\$ 86,775
SUB TOTAL		270.83	-	270.83	-	\$ 3,495,527	73.6%	\$ 710,202	100%	\$ 591,413	-	\$ -	22.4%	\$ 1,775,802
6	6A	40.60	1.55	62.93	100%	\$ 34,600	0.0%	\$ -	0%	\$ -	100%	\$ 63,000	0.0%	\$ -
	6B	11.58	1.55	17.95	100%	\$ 255,537	0.0%	\$ -	0%	\$ -	100%	\$ 132,109	0.0%	\$ -
	6C	30.20	1	30.20	100%	\$ 329,147	0.0%	\$ -	0%	\$ -	100%	\$ 116,971	0.0%	\$ -
SUB TOTAL		82.38	-	111.08	-	\$ 619,284	0.0%	\$ -	0%	\$ -	\$ -	\$ 312,080	0.0%	\$ -
TOTAL		1621	-	1731	-	\$ 24,820,878	100%	\$ 966,893	100%	\$ 631,416	-	\$ 2,228,894	100%	\$ 7,480,131

- (1) Is the sub catchment number
- (2) Is the precinct number
- (3) Is the precinct area, "a_p"
- (4) Is the weighting factor, "k"
- (5) Is the factored area, a_f = k × a_p
- (6) Is the percentage contribution for trunk drainage works within each precinct
- (7) Is the cost of trunk drainage works within each precinct from the Works Schedule.
- (8) Is the percentage factored trunk drainage area for work for Narellan Creek within precinct 6A by precincts 2A, 3A, 5A and 6B
where: $F_{10} = (a_f / a) \times 100$
- (9) Is the developed trunk drainage cost payable for work for Narellan Creek within Precinct 6A by Precincts 2A, 3A, 5A and 6B
where: $(9) = (8) \times \text{Total developed cost apportionment for Narellan Creek from Figure 16}$
- (10) Is the percentage contribution for Tributary No.1 trunk drainage works within Precinct 6A
- (11) Is the cost of Tributary No.1 trunk drainage works within Precinct 6A
- (12) Is the percentage contribution for water quality facilities within each precinct
- (13) Is the cost of water quality control works within each precinct from the Works Schedule.
- (14) Is the percentage factored water quality facilities area for works within precinct 6A by all precincts except for precincts 1B, 1F, 1G, 4A, 6A, 6B & 6C
 $F_{WQ} = (a_f / a) \times 100$
- (15) Is the cost of water quality facilities payable for works within precinct 6A by all precincts except precinct 1B, 1F, 1G, 4A, 6A, 6B & 6C

FIGURE 4 : CONTRIBUTION RATES : FEBRUARY 1998

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SUB CATCHMENT	PRECINCT	OWN PRECINCT	FOR PRECINCT 5A			PROF. SERVICES	TOTAL RATE PER HA.
		TRUNK DRAINAGE & WATER QUALITY	NARELLAN CREEK	TRIBUTARY # 1	WATER QUALITY		
1	1A	\$ 42,690	\$ -	\$ -	\$ 9,602	\$ 139	\$ 52,432
	1B	\$ 11,135	\$ -	\$ -	\$ -	\$ 139	\$ 11,275
	1C	\$ 15,483	\$ -	\$ -	\$ 6,195	\$ 139	\$ 21,817
	1D	\$ 29,093	\$ -	\$ -	\$ 6,195	\$ 139	\$ 35,428
	1E	\$ 11,025	\$ -	\$ -	\$ 6,195	\$ 139	\$ 17,359
	1F	\$ 12,940	\$ -	\$ -	\$ -	\$ 139	\$ 13,080
	1G	\$ 14,834	\$ -	\$ -	\$ -	\$ 139	\$ 14,973
	1H	\$ 16,566	\$ -	\$ -	\$ 6,195	\$ 139	\$ 22,900
	1I	\$ -	\$ -	\$ -	\$ 6,195	\$ 139	\$ 6,334
	1J	\$ 45,115	\$ -	\$ -	\$ 9,602	\$ 139	\$ 54,857
	1K	\$ 10,974	\$ -	\$ -	\$ 6,195	\$ 139	\$ 17,308
2	2A	\$ 17,879	\$ 4,066	\$ -	\$ 9,602	\$ 139	\$ 31,687
3	3A	\$ 2,412	\$ 4,066	\$ -	\$ 9,602	\$ 139	\$ 16,220
	3B	\$ 19,089	\$ -	\$ -	\$ 6,195	\$ 139	\$ 25,424
	3C	\$ -	\$ -	\$ -	\$ 6,195	\$ 139	\$ 6,334
	3D	\$ -	\$ -	\$ -	\$ 6,195	\$ 139	\$ 6,334
	3E	\$ -	\$ -	\$ -	\$ 9,602	\$ 139	\$ 9,742
4	4A	\$ 3,204	\$ -	\$ -	\$ -	\$ 139	\$ 3,343
	4B	\$ -	\$ -	\$ -	\$ 6,195	\$ 139	\$ 6,334
	4C	\$ 24,887	\$ -	\$ -	\$ 9,602	\$ 139	\$ 34,629
	4D	\$ 51,282	\$ -	\$ -	\$ 9,602	\$ 139	\$ 61,024
	4E	\$ 119,541	\$ -	\$ -	\$ 9,602	\$ 139	\$ 129,283
	4F	\$ 67,571	\$ -	\$ -	\$ 9,602	\$ 139	\$ 77,312
5	5A	\$ 13,628	\$ 2,623	\$ 2,306	\$ 6,195	\$ 139	\$ 24,891
	5B	\$ -	\$ 2,623	\$ -	\$ 6,195	\$ 139	\$ 8,957
6	6A	\$ 2,401	\$ -	\$ -	\$ -	\$ 139	\$ 2,541
	6B	\$ 33,475	\$ -	\$ -	\$ -	\$ 139	\$ 33,615
	6C	\$ 14,772	\$ -	\$ -	\$ -	\$ 139	\$ 14,912

- (1) is the sub catchment number
(2) is the precinct number
(3) is the trunk drainage & water quality rate for each precinct
(4) is the developed trunk drainage rate for Narellan Creek within precinct 5A by precincts 2A,3A,5A and 5B
(5) is the trunk drainage rate for Tributary No. 1 within precinct 5A by Precinct 5A.
(6) is the rate of water quality facilities for works within precinct 5A by all precincts except 1B, 1F, 1G, 4A, 6A, 6B & 6C
(7) is the rate of professional services apportioned to all precincts from Figure 5
(8) is the total contribution rate for each precinct

FIGURE 5 : SUMMARY OF WORKS SCHEDULES

SUB CATCHMENT	PRECINCT	TRUNK DRAINAGE & WATERQUALITY			TOTAL
		STAGE 1	STAGE 2	STAGE 3	
		COMPLETED JUN 97	JUL 1997-JUN 2000	JUL 2001-JUN 2004	
1	1A	\$ 4,168,912	\$ 2,158,268	\$ 1,702,781	\$ 8,029,961
	1B	\$ 1,063,862	\$ -	\$ -	\$ 1,063,862
	1C	\$ -	\$ 471,200	\$ 366,100	\$ 837,300
	1D	\$ -	\$ 389,270	\$ -	\$ 389,270
	1E	\$ -	\$ 424,462	\$ -	\$ 424,462
	1F	\$ 1,736,602	\$ -	\$ -	\$ 1,736,602
	1G	\$ -	\$ -	\$ 1,554,557	\$ 1,554,557
	1H	\$ -	\$ 866,400	\$ -	\$ 866,400
	1I	\$ -	\$ -	\$ -	\$ -
	1J	\$ -	\$ 749,848	\$ 661,224	\$ 1,411,072
	1K	\$ -	\$ -	\$ -	\$ -
2	2A	\$ -	\$ 797,423	\$ -	\$ 797,423
3	3A	\$ -	\$ 44,000	\$ -	\$ 44,000
	3B	\$ 2,607,764	\$ 949,866	\$ 50,230	\$ 3,607,860
	3C	\$ -	\$ -	\$ -	\$ -
	3D	\$ -	\$ -	\$ -	\$ -
	3E	\$ -	\$ -	\$ -	\$ -
4	4A	\$ 249,918	\$ -	\$ -	\$ 249,918
	4B	\$ -	\$ -	\$ -	\$ -
	4C	\$ 18,791	\$ 295,083	\$ -	\$ 313,874
	4D	\$ -	\$ 200,000	\$ -	\$ 200,000
	4E	\$ -	\$ 346,280	\$ -	\$ 346,280
	4F	\$ -	\$ 443,440	\$ 307,500	\$ 750,940
5	5A	\$ 258,124	\$ 11,869,517	\$ 405,323	\$ 12,532,963
	5B	\$ -	\$ -	\$ -	\$ -
6	6A	\$ -	\$ 97,500	\$ -	\$ 97,500
	6B	\$ -	\$ 387,646	\$ -	\$ 387,646
	6C	\$ -	\$ 446,118	\$ -	\$ 446,118
SUB TOTAL		\$ 10,103,973	\$ 20,936,321	\$ 5,047,714	\$ 36,088,007
PROFESSIONAL SERVICES		\$ 2,361	\$ 143,000	\$ 68,000	\$ 213,361
TOTAL		\$ 10,106,334	\$ 21,079,321	\$ 5,115,714	\$ 36,301,368

INTRODUCTION

Section 94 of the Environmental Planning and Assessment Act, 1979 (EP&A Act) (as amended) enables Council to levy contributions for public facilities and infrastructure required as a consequence of development.

The power to levy a contribution relies on there being a link (nexus) between new development and the increased demand for facilities and infrastructure created by that development. This may be demonstrated through:

- causal nexus (what);
- spatial or physical nexus (where); and
- temporal nexus (when).

Generally, contributions can be levied for:

- capital costs (including land acquisition);
- public facilities; and
- public infrastructure.

Contributions can also be levied for:

- road maintenance (excessive wear and tear caused by new development);
- costs of planning studies that result in the adoption of a Contributions Plan (CP) and;
- salary costs of s.94 staff where the costs are non-recurrent.

The contribution is imposed by way of a condition of development consent. The contribution may be a combination of some or all of the following:

- land dedication;
- monetary contribution; or
- material public benefit (including works in kind).

Contributions can only be levied under a CP made in accordance with the Environmental, Planning and Assessment Regulation, 1994.

The preparation of a CP and the levying of contributions under that Plan are discretionary powers of Council.

PART 1

ADMINISTRATION AND ACCOUNTING

1. ADMINISTRATION AND ACCOUNTING

1.1 Name of the Plan

This Plan has been prepared in accordance with the provisions of s.94 of the EP & A Act and Part 4 of the Regulation and may be referred to as Contributions Plan (CP) No. 3:Upper Narellan Creek Catchment (Trunk Drainage and Water Quality Facilities).

1.2 Purpose of the Plan

The purpose of this Plan is to provide a funding strategy to enable Council to levy contributions on new residential, commercial and industrial subdivision or development within the Upper Narellan Creek drainage catchment in order to:

- acquire land for trunk drainage and water quality facilities;
- construct trunk drainage and water quality facilities; and
- provide supporting professional services.

1.3 Objectives of the Plan

The objectives of this Plan are to:

- meet Council's obligations under the Environmental Planning & Assessment Act and the Regulation;
- complement the aims and objectives of relevant Local Environmental Plans and Development Control Plans;
- demonstrate the nexus ie the link between new residential, commercial and industrial subdivision and development and the increased demand for trunk drainage and water quality facilities;
- provide works schedules for the required facilities and services with an estimate of their cost and staging over a period of eight years;
- apportion costs between contributing precincts;
- provide formulas for the calculation of contribution rates; and
- indicate the method of payment and timing of contributions.

1.4 Area of the Plan

Upper Narellan Creek Catchment

The Plan applies to the urban area within the Upper Narellan Creek catchment as shown in Figure 1.

Narellan Creek is a tributary of the Hawkesbury-Nepean River system and the upper reaches of the creek form a drainage catchment of approximately 2400ha within the Camden Local Government Area (LGA).

The urban area will eventually be subdivided and developed for residential, commercial and industrial purposes.

Within the urban area there are contributing areas and non contributing areas. The non contributing areas comprise:

- rural land;
- regional open space;
- special use areas such as a church, school or golf course; and
- gazetted State Arterial Roads.

This leaves a contributing area of 1531 ha.

Sub Catchments

The Upper Narellan Creek catchment is subdivided into six sub catchments as shown in Figure 2. They are based on tributaries which flow into Narellan Creek.

Precincts

Each sub catchment is further subdivided into precincts as shown in various Figures in Part 3. They are based on:

- the boundaries of residential, commercial or industrial land;
- common stormwater run-off and retardation criteria; and
- common water quality management criteria.

The precincts are situated within the localities of Smeaton Grange, Currans Hill, Mount Annan, Narellan Vale, Narellan and Harrington Park.

1.5 Relationship to Other Plans

Local Environmental Plans (LEP's)

The area of this Plan is affected by a number of zones that allow a range of residential, commercial and industrial development to occur with appropriate urban infrastructure such as trunk drainage and water quality facilities.

The following LEP's apply to the area of this Plan:

- LEP No. 39 (1986);
- LEP No. 46 (1989);
- LEP No. 47 (1990); and
- LEP No. 74.

Copies of these LEP's are available from Council's offices.

Development Control Plans (DCP's)

The area of this Plan is affected by a number of DCP's that provide objectives and standards for residential, commercial and industrial development and associated infrastructure such as trunk drainage and water quality facilities.

The following DCP's apply to the area of this Plan:

- DCP No. 7:Camden Views Estate (1991);
- DCP No. 21:Narellan, Morshead & Tobruk Roads (1986);
- DCP No. 23:Narellan Road, Narellan (1986);
- DCP No. 29:Richardson Road, Narellan (1988);
- DCP No. 32:Landcom Precinct 1, Narellan Release Area (1988);
- DCP No. 34:Smeaton Grange Industrial Area (1990);
- DCP No. 55:Medium Density Code (1989);
- DCP No. 57:Industrial Code (1991);
- DCP No. 58:Residential Code (1995);
- DCP No. 59:Narellan Vale & Mount Annan (1996);
- DCP No. 61:Mount Annan (1991);
- DCP No. 62:Welling & Mount Annan Drives, Mount Annan (1993);
- DCP No. 64:Mount Annan (1992);
- DCP No. 65:Somerset Avenue & Queen Street, Narellan (1993);
- DCP No. 69:Harrington Park (1996);
- DCP No. 70:Model Village, Narellan (1992);
- DCP No. 78:Dual Occupancy Code (1994);
- DCP No. 80:Narellan Service Centre (1994);
- DCP No. 86:Currans Hill (1997);
- DCP No. 87: "The Cascades", Mount Annan (1996);
- DCP No. 88:Mount Annan District Centre (1995); and

- DCP No. 89:Somerset Avenue, Narellan:Commercial Zones (1996).

Copies of these DCP's are available from Council's offices.

This Plan supersedes clauses in the above DCP's that refer to contributions for trunk drainage and water quality.

Contributions Plans (CP's)

This Plan supersedes CP No. 3 adopted by Council on 23 December 1993.

1.6 Apportionment of Costs

Apportionment ensures that new development is only levied for that portion of demand (and therefore cost) which it actually creates.

In this Plan, apportionment of costs is determined separately for trunk drainage and water quality, for each contributing precinct. This is discussed in more detail in Part 3.

The apportionment of all trunk drainage and water quality costs is summarised in Figure 3.

1.7 Calculation of Contribution Rates

Contribution rates per hectare required to fund the works and services are calculated as follows:

$$C = \frac{X_1}{a_p} + \frac{A_{TD}}{a_p} + \frac{A_{WQ}}{a_p} + \frac{X_2}{a_t}$$

Where:

C is the total contribution rate for each precinct;

X₁ is the sum of trunk drainage and water quality work costs within each precinct;

A_{TD} is the apportioned cost of trunk drainage works within precinct 5A;

A_{WQ} is the apportioned cost of water quality facilities in precinct 5A;

X₂ is the total cost of professional services;

a_p is the precinct area; and

a_t is the catchment area.

1.8 Indexation of Contribution Rates

Contributions will be indexed quarterly to the Roads and Traffic Authority (RTA) Road Cost Index under its category of "Development Sydney Operations – Road" in accordance with the formula:

$$CR = C_c \times \frac{RCI_2}{RCI_1}$$

Where:

C_R is the revised contribution required at the time of payment;

C_C is the contribution indicated on the Development Consent;

RCI_2 is the Road Cost Index at the time of payment; and

RCI_1 is the Road Cost Index at the time of calculating C_C .

1.9 Good and Services Tax

In circumstances where the cost of providing the public amenities and services identified in this Plan is increased as a result of Council becoming obliged to pay Goods and Services Tax (GST) for the supply of these public amenities and services, the contribution rate payable under this Plan will be increased by an equivalent amount.

1.10 Types of Contributions

Monetary Contributions

When a Development Consent is issued for new subdivision or development, it will contain a condition indicating the monetary contribution payable, subject to indexation.

Land Contributions

Contributions of land may be accepted in lieu of monetary contributions. The land must:

- be included in the works schedules; and
- have a value agreed to in writing between Council and the developer prior to transfer to Council

The agreed value will be offset against contributions required under this Plan. If no land is to be developed and all contributions due by the developer have been paid, the agreed value will be reimbursed by Council.

Should the agreed value differ from the estimated cost in the works schedules, then:

- neither Council nor the developer may claim credit or reimbursement for the difference; and
- the plan will be amended to incorporate the agreed value and the contribution rates adjusted accordingly.

Works in Kind Contributions

Contributions of works in kind may be accepted in lieu of monetary contributions. The works in kind must:

- be set out in an agreement in writing between Council and the developer prior to commencement;
- be included in the works schedules;
- have an agreed value with any variations approved by both parties;
- be in accordance with agreed standards, specifications and programs for completion;
- have an appropriate defects liability period; and
- be subject to a bank guarantee.

The agreed value will be offset against contributions required under this Plan. If no further land is to be developed and all contributions due by the developer have been paid, the agreed value will be reimbursed by Council.

Should the agreed value differ from the estimated cost in the works schedules, then:

- neither Council nor the developer may claim credit or reimbursement for the difference; and
- the Plan will be amended to incorporate the agreed value and the contribution rates adjusted accordingly.

1.11 Timing of Payment

Payment of monetary contributions will be made:

- prior to the release of the linen plan for Development Applications for subdivision; or
- prior to the issue of building approval for Development Applications for new buildings.

1.12 Deferred or Periodic Payments

Monetary contributions may be deferred or paid by periodic instalments:

- where the developer intends to make a land or works in kind contributions; or
- in other circumstances outlined in writing by the developer and determined by Council on the merits of the case.

Except for Crown Authorities, deferred or periodic payments will only be accepted where a bank guarantee is lodged with the following conditions:

- the guarantee indicates the works to which it applies;
- the guarantee will be for the contribution amount/agreed value plus the estimated amount of compound interest foregone by Council for the period of deferral;
- the period of deferral will be as agreed where a land or works in kind contribution is to be made, and in merit cases, as approved by Council;
- the bank guarantee may be called up if:
 - monetary payment has not been made;
 - land has not been transferred; or
 - works in kind have not been completed by the end of the period of deferral; and
- the bank guarantee will be discharged when:
 - full monetary payment has been made;
 - land transfer has been made; or
 - works in kind have been completed.

The following formula will apply to bank guarantees:

$$G = C + C (I \times Y)$$

Where:

- G is the guarantee amount (rounded to the nearest dollar).
- C is the contribution due (rounded to the nearest dollar).
- I is the compound interest rate estimated by Council over the period; and
- Y is the period of deferral (in years).

1.13 Accounting and Financial Information

Accounting Records

Council maintains separate accounting records for this Plan which indicate:

- the items of works as listed in the works schedules;
- the contributions received under the Plan; and
- the amounts spent in accordance with the Plan.

Annual Statement

At the end of each financial year, Council prepares an Annual Statement for this Plan. The Annual Statement may form part of Council's Annual Report and indicates:

- opening and closing balances for the year;
- total contributions received under the Plan;
- total expenditure in accordance with the Plan; and
- outstanding obligations under the Plan.

Copies of the Statement and/or Report are available from Council's offices.

Contributions Register

Council maintains a Contributions Register which indicates:

Development Consents which require a s.94 contribution;

- the purpose and the amount of the contribution required;
- the CP under which the contribution is required; and
- the amount and date that the contribution was paid.

Inspection of the Contributions Register is available on request.

1.14 Review of the Plan

This Plan will be reviewed at the end of each Stage of the works schedules or at a lesser time if considered necessary. Among other things, the reviews will consider:

- the rate and the of subdivision and development;
- the potential for further subdivision and development;
- the cost and standard of works already carried out; and

- the estimated cost, standard and priority of proposed works and services.

Amendments to the Plan may require it to be publicly exhibited. Any written submission will be considered by Council prior to adoption of an amended Plan.

PART 2

DEMONSTRATION OF NEXUS

2. DEMONSTRATION OF NEXUS

2.1 Relevant Studies

Nexus is demonstrated in this Plan and in the following studies:

- Elderslie - Narellan Project: Trunk Drainage Master Plan (Sinclair Knight & Partners Pty Ltd, 1982);
- Narellan Creek Tributary Flood Policy (Insearch Ltd, 1984);
- Smeaton Grange Industrial Area and Narellan District Centre:Trunk Drainage Strategy Study (Willing & Partners Pty Ltd, 1987);
- Narellan Project 144, Southern Sub Catchment:Trunk Drainage & Water Quality Management Study (Willing & Partners Pty Ltd, 1988);
- Trunk Drainage Design Report for Development Control Plan No. 31 (Hardcastle & Richards Pty Ltd, 1988);
- Narellan Project 144, Northern Sub Catchment:Trunk Drainage Strategy Study (Willing Partners Pty Ltd, 1989);
- Lot 102 Narellan Road, Narellan:Trunk Drainage Preliminary Design Report (Willing & Partners Pty Ltd, 1989);
- Lot 22 Narellan Road, Narellan:Trunk Drainage Preliminary Design Report (Willing & Partners Pty Ltd 1989);
- Smeaton Grange Industrial Development:Floodway Design (Sinclair Knight & Partners Pty Ltd, 1989);
- Report to Sinclair Knight & Partners on Geotechnical Investigation for Proposed Drainage Channels at Smeaton Grange Estate, Smeaton Grange NSW (Jeffrey & Katsaukas Pty Ltd, 1989);
- Narellan Trunk Drainage Investigation (GF Murphy Consulting, 1990);
- Narellan Release Area:Social Plan & Draft Development Control Plan No. 60 (Human Accent, 1990);
- Lot 102 Narellan Road, Narellan:Retarding Basin Concept Design Report (Willing & Partners Pty Ltd, 1991);
- Trunk Drainage Review:Currans Hill Development Area, Northern Catchment (Kinhill Engineers Pty Ltd, 1992);

- Harrington Park Social Plan (Briggs & Mortar, 1994);
- Harrington Park Stage 1, Camden NSW:Trunk Drainage and Water Quality Control Plan (Sinclair Knight & Partners Pty Ltd, 1994);
- Assessment of the Harrington Park Water Quality Plan (Australian Water Technologies, 1994);
- Harrington Park Erosion & Sediment Control Strategy (Ove Arup & Partners, 1994);
- Harrington Park Open Space Study (Hassell Planning Consultants, 1994);
- Camden Community Profile (Camden Council, 1995);
- Narellan Creek Trunk Drainage Review:Effects of Medium Density Housing (Camden Council, 1995);
- Harrington Park Floodway & Water Treatment System (SMEC Australia Pty Ltd, 1996);
- Upper Narellan Creek Water Quality Management System:Environmental Impact Statement (SMEC Australia Pty Ltd, 1996);
- Study of Support Zones:Narellan Town Centre (Leyshon Consulting Pty Ltd, 1996);
- Narellan Town Centre Study:Drainage Report (The Council of Camden, 1996);
- Upper Narellan Creek Water Quality Management System - Addendum to EIS (SMEC Australia Pty Ltd, 1997);
- (Draft) Harrington Park - Tributary 1 Design (SMEC Australia Pty Ltd, 1997);
- Harrington Park - Tributary 1 Wetland Complex. Operations and Maintenance Manual (SMEC Australia Pty Ltd, 1997); and
- Upper Narellan Creek Water Quality System Assessment (SMEC Australia Pty Ltd, 1997).

Copies of these reports are available from Council's offices.

2.2 Causal Nexus (“What”)

The potential for further subdivision and development will increase the impervious surface area of the drainage catchment and result in increased stormwater runoff. Drainage and water quality works and infrastructure will therefore be required to cater for this increased runoff.

The nexus between potential subdivision and development and the required infrastructure has been established having regard to:

- the type and extent of subdivision and development;
- the expected increase in population;
- the expected impacts on environmental quality;
- the capacity of existing infrastructure in the area; and
- the extent to which the proposed works will meet the needs and expectations of the population.

This Plan provides schedules of works which are required as a consequence of subdivision and development. The works have already been carried out or will be carried out in the future within the Upper Narellan Creek Catchment.

2.3 Physical Nexus (“Where”)

This Plan identifies the location of drainage and water quality works and infrastructure and the precincts that contribute to such works.

The location of works has been determined having regard to:

- natural drainage flows;
- land contours; and
- the manner in which need is best satisfied.

2.4 Temporal Nexus (“When”)

Only those drainage and water quality works and infrastructure which are required as a consequence of subdivision and development to the year 2004 are included in the works schedules. Staging the provision of these works is based on the potential lot yield and the availability of contribution funds.

The works schedules identify:

- completed works as at Jun 1997 (Stage 1);
- estimated works 1997 - 2000 (Stage 2); and
- estimated works 2001 - 2004 (Stage 3).

Staging of the works allows time for the design, tendering and construction to take place and for any variations in the rate of subdivision and development.

2.5 Subdivision and Development

Residential

The locality of Narellan is an established residential area of around 700 lots and an estimated population of 2000 persons.

The potential for further residential subdivision and development is limited to dual occupancies and some medium density adjacent to the Narellan Town Centre.

The Narellan Release Area embraces the localities of Smeaton Grange, Currans Hill, Mount Annan, Narellan Vale and part of Narellan.

Subdivision of the Release Area began in 1986. As at June 1997, more than half of its ultimate potential of 8000 lots had been developed with a mix of single dwellings, dual occupancies and integrated housing.

Estimated population at full development by the year 2004 is around 26,000 persons.

The Harrington Park Release Area embraces a small existing residential area known locally as Struggletown, as well as the largely undeveloped area of Harrington Park Estate.

There is some potential for further residential subdivision and development of vacant land in the Struggletown area with either single dwellings or integrated housing.

Subdivision of the Estate area began in 1994. As at June 1997, 400 lots had been developed for single dwellings and integrated housing.

Ultimate potential of the Release Area is estimated at around 2850 lots with a mix of single dwellings and integrated housing.

Estimated population at full development is around 9,100 persons.

Commercial

Within the retail hierarchy of regional, district and local centres, the Narellan Town Centre is expected to develop to district centre status.

As at June 1997, retail and commercial (non retail) floor space together with service trades, was developed over an area of 17 hectares.

An additional 23 hectares of land will be required as the centre develops to its ultimate potential with a core retail and commercial area and fringe retail and service trades areas.

The Mount Annan District Centre is also expected to develop to district centre status within the retail hierarchy.

As at June 1997, one hectare was developed for retail purposes with ultimate development expected over 12.5 hectares. Service trades development is not envisaged for this centre.

Industrial

Industrial development has taken place over an area of 15 hectares over many years in the Grahams Hill Road area.

There is potential for a further 13 hectares of industrial development which will require additional trunk drainage and water quality facilities.

Industrial development has also taken place at Smeaton Grange where around 223 hectares of land is zoned for industrial purposes. As at June 1997, around half of this land was developed.

2.6 Stormwater Runoff

Impervious Areas

Urbanisation of drainage catchments by way of subdivision and development has a significant impact on the surface and subsurface natural water flow. Much of the land becomes covered by impervious areas such as roads, driveways, car parks and buildings.

Impervious areas increase the quantity of stormwater runoff with the potential for flooding, erosion, sediment transportation and pollution, both within the catchment itself and in upstream and downstream catchments.

Infrastructure Types

To mitigate against the potential hazards of increased stormwater runoff due to the urbanisation of drainage catchments, there is a requirement for drainage systems to collect, store and discharge runoff in combination with open space, water quality controls and habitat conservation in a multiple use approach. This can be achieved by the construction of:

- drainage channels (either grass or concrete lined) to convey runoff;
- low flow pipes with grated inlets located within channels;
- spillways or drop structures to reduce the slope and flow velocities in channels;
- culverts beneath roads to convey runoff;

- detention basins (either wet or dry) to temporarily store runoff and discharge it at a controlled rate;
- inlets and outlets to basins;
- gross pollutant traps to reduce pollutant loads in runoff by settling coarse sediment and intercepting trash and debris;
- water pollution control ponds designed as a wetland to reduce pollutant loads in runoff such as sediments and nutrients; and
- inlets and outlets to ponds.

Infrastructure Strategy

An infrastructure strategy for the management of stormwater runoff from the Upper Narellan Creek catchment is incorporated into this Plan as follows:

- trunk drainage is provided within the catchment so that the developed urban peak discharge at Kirkham Lane does not exceed the equivalent pre-developed peak discharge, for flood events with average recurrence intervals of 5, 20 and 100 years;
- trunk drainage is provided within most of the contributing precincts for the runoff generated by those precincts;
- trunk drainage is provided for Narellan Creek within precinct 5A for the runoff generated by that precinct and for upstream precincts 2A, 3A and 5B;
- water quality controls are provided in precincts 1B, 1F, IG, 4A, 6A, 6B and 6C for the pollutants generated by those precincts;
- water quality controls are provided in precinct 5A for the pollutants generated by that precinct and for those upstream precincts not providing their own water quality; and
- a multiple use system is provided that balances the competing demands of open space use, environmental concerns, aesthetic considerations and economic benefits.

PART 3

SUB CATCHMENT WORKS

3. SUB CATCHMENT WORKS

3.1 Sub Catchment 1

Description and Location of Works

The sub catchment area and associated precincts are shown in Figures 6 and 7 and the works are indicated in Figure 8.

This sub catchment consists of a contributing area of nine residential precincts, one commercial precinct and one industrial precinct.

The non contributing areas comprise rural land and regional open space in Mount Annan and Currans Hill, the Mount Annan Botanical Gardens, the church seminary in Smeaton Grange and land zoned for arterial road along Narellan Road and Camden Valley Way.

Stormwater runoff from this sub catchment is conveyed to sub catchment 5.

Precinct 1A

This is an industrial precinct within the Smeaton Grange Industrial area being developed by the Business Land Group and others.

Trunk drainage works completed as at June 1997 was the main channel to convey stormwater to precinct 5A.

Trunk drainage works proposed are grass lined channels, with a concrete invert and a box culvert at Camden Valley Way to convey stormwater to precinct 5A.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 1B

This is a residential precinct at Currans Hill and Mount Annan being developed by Landcom.

All trunk drainage and water quality works are completed. They are a wet detention basin, a gross pollutant trap and a grass lined channel with a low flow pipe to convey stormwater to precinct 1A and downstream. These were undertaken by Landcom as a works in kind contribution.

Precinct 1C

This is a residential precinct at Currans Hill which is yet to be developed by Landco (NSW) Pty Ltd and Nepean Engineering.

Trunk drainage works proposed are two dry detention basins. Stormwater is conveyed to precinct 1A and downstream.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 1D

This is a residential precinct at Currans Hill being developed by Landco (NSW) Pty Limited.

All trunk drainage works are completed. They are a concrete pipe and a grass lined channel with a low flow pipe to convey stormwater to precinct 1B and downstream. These were undertaken by Landco as a works in kind contribution.

Water quality facilities prepared for this precinct are a wet detention basin and a grass pollutant trap.

Precinct 1E

This is a residential precinct at Mount Annan developed by A V Jennings Limited.

All trunk drainage works are completed. They are a dry detention basin and a concrete pipe to convey stormwater to precinct 1B and downstream. These were undertaken by Jennings as a works in kind contribution.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 1F

This is a residential precinct at Mount Annan being developed by Landcom.

Trunk drainage and water quality works completed as at June 1997 were wet and dry detention basins, a gross pollutant trap and a grass lined channel with a low flow pipe to convey stormwater to precinct 1I and downstream. These were undertaken by Landcom as a works in kind contribution.

Precinct 1G

This is a residential precinct at Mount Annan which is yet to be developed by Landcom.

Trunk drainage works proposed are a wet detention basin and grass lined channels to convey stormwater to precinct 1F and downstream.

Water quality facilities for this precinct are a wet detention basin and a gross pollutant trap.

Precinct 1H

This is a residential precinct at Mount Annan which is being developed by the Bradman Corporation and others.

Trunk drainage works proposed are wet detention basins and the upgrading of the creek flowing through the precinct with a channel to convey stormwater to precinct 1J and downstream.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 1I

This is a residential precinct at Mount Annan being developed by Landcom and others.

All trunk drainage works are completed. They are a dry detention basin and a grass lined channel with a low flow pipe to convey stormwater to precinct 1J and downstream.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 1J

This is a commercial precinct at Mount Annan forming the District Centre and the proposed indoor recreation centre. It is being developed by the Business Land group, Council and others.

Trunk drainage works proposed are a sedimentation basin, box culverts and a grass lined channel to convey stormwater to precinct 1A and downstream.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 1K

This is a residential precinct at Mount Annan which is largely undeveloped.

Trunk drainage works proposed for this precinct are provided downstream in precinct 1J.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Apportionment of Costs

Trunk Drainage

Except for precincts 1J and 1K, all precincts in sub catchment 1 contribute all of the cost of trunk drainage works within their own precincts.

Precinct 1K has no trunk drainage works but contributes proportionally towards the cost of trunk drainage in precinct 1J. The apportionment of cost is based on the factored precinct area. The works that are apportioned between precinct 1J and 1K are:

- grass-lined Channel A;
- grass-lined Channel B; and
- culvert under Holdsworth Drive.

Precinct 1J therefore contributes all of the cost of trunk drainage works within its precinct and proportionally with precinct 1K to the above trunk drainage works.

The apportionment of trunk drainage cost is derived from the following formula:

$$A_{TD3} = x \times \frac{a_f}{\sum a_f}$$

Where:

A_{TD3} is the apportioned cost of the above trunk drainage works;

x is the trunk drainage cost in precinct 1J for the above works;

a_f is the factored precinct area; and

$\sum a_f$ is the sum of the factored precincts 1J and 1K

Water Quality

Precincts 1B, 1F and 1G contribute all of the cost of water quality facilities within their own precincts.

These precincts are therefore responsible for the total cost of water quality which is fully provided in each precinct. There are no apportioned costs for works in precinct 5A.

All the other precincts in sub catchment 1 do not have water quality facilities and therefore contribute proportionally to the cost of such facilities downstream in precinct 5A. The apportionment of cost is based on the factored precinct areas and is derived from the following formula:

$$A_{WQ1} = F_{WQ} \times W_2$$

Where:

A_{WQ1} is the apportioned cost of water quality facilities for these precincts;

F_{WQ} is the fraction derived from the following formula:

$$F_{WQ} = \left[\frac{a_f}{\Sigma a_f} \right]$$

and, $a_f = k \times a_p$

Where:

k is the weighting factor used for industrial, commercial and high density residential precincts as compared to residential precincts;

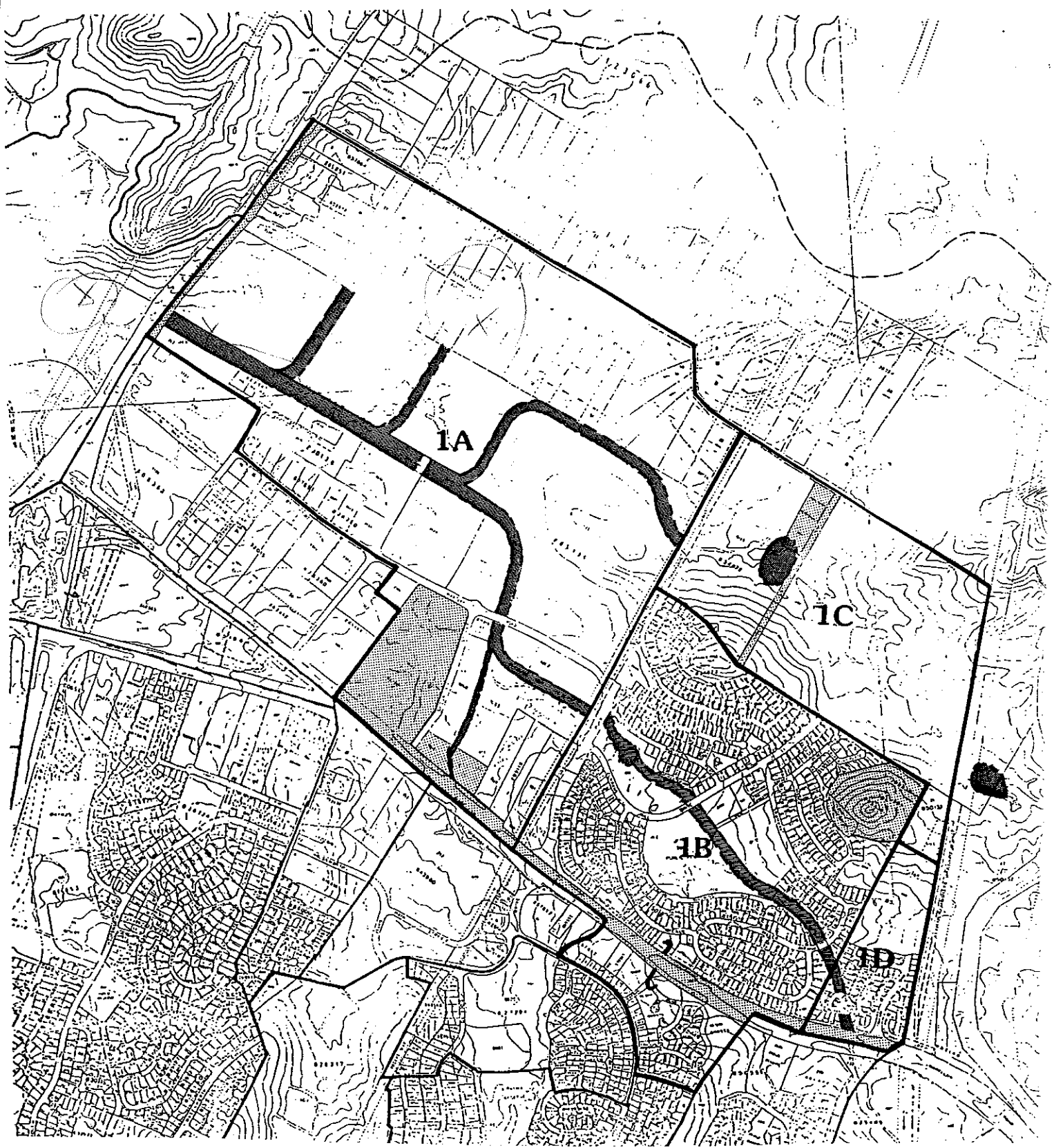
a_p is the precinct area;

a_f is the factored precinct area;

Σa_f is the sum of the factored precinct areas subject to apportionment for water quality facilities in precinct 5A;

W_2 is the total cost of water quality facilities in precinct 5A.

FIGURE 6:PRECINCTS 1A - 1D





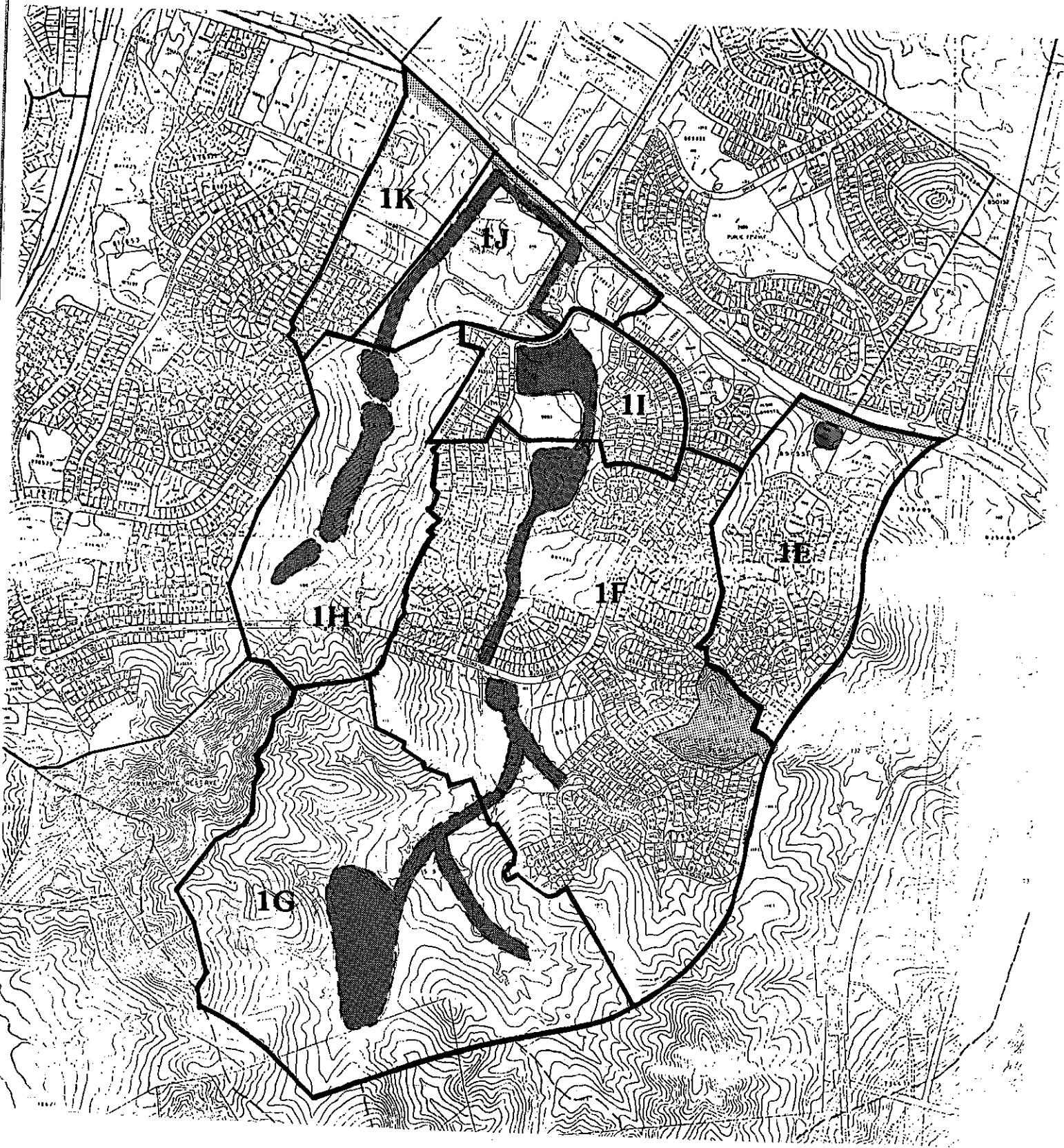
-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS

FIGURE 7:PRECINCTS 1E - 1K





-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS

FIGURE 8 : WORKS SCHEDULE : SUB CATCHMENT 1

PRECINCT	ITEM OF WORKS	STAGE 1 COMPLETED JUN 97	STAGE 2 JUL 1997-JUN 2000	STAGE 3 JUL 2001-JUN 2004	TOTAL
1A (INDUSTRIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR MAIN CHANNEL	Non s.94			\$ -
	LAND ACQUISITION FOR CHANNEL - H	Non s.94			\$ -
	LAND ACQUISITION FOR CHANNEL - I			\$ 26,778	\$ 26,778
	LAND ACQUISITION FOR CHANNEL - J			\$ 10,578	\$ 10,578
	LAND ACQUISITION FOR CHANNEL - K			\$ 10,578	\$ 10,578
	LAND ACQUISITION FOR CHANNEL - L			\$ 9,348	\$ 9,348
	GRASS LINED MAIN CHANNEL WITH CONCRETE INVERT	\$ 2,441,784			\$ 2,441,784
	DROP STRUCTURES	\$ 360,000			\$ 360,000
	GRASS LINED CHANNEL - H WITH CONCRETE INVERT	\$ 1,367,128			\$ 1,367,128
	GRASS LINED CHANNEL - I WITH CONCRETE INVERT		\$ 1,658,268		\$ 1,658,268
	GRASS LINED CHANNEL - J WITH CONCRETE INVERT			\$ 568,879	\$ 568,879
	GRASS LINED CHANNEL - K WITH CONCRETE INVERT			\$ 568,879	\$ 568,879
	GRASS LINED CHANNEL - L WITH CONCRETE INVERT			\$ 505,740	\$ 505,740
BOX CULVERT AT CAMDEN VALLEY WAY		\$ 500,000		\$ 500,000	
SUB TOTAL	\$ 4,168,912	\$ 2,168,268	\$ 1,702,781	\$ 8,029,961	
WATER QUALITY					
NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ 4,168,912	\$ 2,168,268	\$ 1,702,781	\$ 8,029,961	
1B (RESIDENTIAL)	TRUNK DRAINAGE & WATER QUALITY				
	LAND ACQUISITION FOR WET DETENTION BASIN	Non s.94			
	WET DETENTION BASIN				
	STORMWATER CHANNEL WITH LOWFLOW PIPE	\$ 1,083,862			\$ 1,083,862
GROSS POLLUTANT TRAP					
TOTAL PRECINCT WORKS	\$ 1,083,862	\$ -	\$ -	\$ 1,083,862	
1C (RESIDENTIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR DRY DETENTION BASINS & CHANNELS			\$ 128,000	\$ 128,000
	DRY DETENTION BASIN 1 (Down stream)		\$ 471,200		\$ 471,200
	DRY DETENTION BASIN 2 (Up Stream)			\$ 240,100	\$ 240,100
	SUB TOTAL TRUNK DRAINAGE	\$ -	\$ 471,200	\$ 368,100	\$ 839,300
	WATER QUALITY				
NO WORK WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ -	\$ 471,200	\$ 368,100	\$ 839,300	
1D (RESIDENTIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR CHANNEL	Non s.94			\$ -
	GRASS LINED CHANNEL WITH LOW FLOW PIPE		\$ 388,270		\$ 388,270
	STORMWATER CONCRETE PIPE				
SUB TOTAL	\$ -	\$ 388,270	\$ -	\$ 388,270	
WATER QUALITY					
NO WORK WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ -	\$ 388,270	\$ -	\$ 388,270	
1E (RESIDENTIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR DRY DETENTION BASIN	Non s.94			\$ -
	DRY DETENTION BASIN		\$ 424,462		\$ 424,462
	STORMWATER CONCRETE PIPE				
SUB TOTAL	\$ -	\$ 424,462	\$ -	\$ 424,462	
WATER QUALITY					
NO WORK WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ -	\$ 424,462	\$ -	\$ 424,462	
1F (RESIDENTIAL)	TRUNK DRAINAGE & WATER QUALITY				
	LAND ACQUISITION FOR DETENTION BASINS & CHANNEL	Non s.94			\$ -
	WET & DRY DETENTION BASINS				
	GRASS LINED CHANNEL WITH LOW FLOW PIPE	\$ 1,736,602			\$ 1,736,602
GROSS POLLUTANT TRAP					
TOTAL PRECINCT WORKS	\$ 1,736,602	\$ -	\$ -	\$ 1,736,602	
1G (RESIDENTIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR DETENTION BASIN & CHANNELS			\$ 128,600	\$ 128,600
	GRASS LINED CHANNEL - A			\$ 416,169	\$ 416,169
	GRASS LINED CHANNEL - B			\$ 277,035	\$ 277,035
	WET DETENTION BASIN			\$ 387,382	\$ 387,382
	SUB TOTAL	\$ -	\$ -	\$ 1,187,176	\$ 1,187,176
WATER QUALITY					
GPT AND WET BASIN	\$ -	\$ -	\$ 367,382	\$ 367,382	
TOTAL PRECINCT WORKS	\$ -	\$ -	\$ 1,554,558	\$ 1,554,558	
1H (RESIDENTIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR WET DETENTION BASINS		Non s.94		\$ -
	LAND ACQUISITION FOR CHANNEL		Non s.94		\$ -
	WET DETENTION BASINS		\$ 682,400		\$ 682,400
	CREEK UPGRADE / CHANNEL		\$ 174,000		\$ 174,000
	SUB TOTAL	\$ -	\$ 856,400	\$ -	\$ 856,400
WATER QUALITY					
NO WORK WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ -	\$ 856,400	\$ -	\$ 856,400	
1I (RESIDENTIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR DRY DETENTION BASIN & CHANNEL	Non s.94			\$ -
	DRY DETENTION BASIN				
	GRASS LINED CHANNEL WITH LOW FLOW PIPE				
SUB TOTAL	\$ -	\$ -	\$ -	\$ -	
WATER QUALITY					
NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ -	\$ -	\$ -	\$ -	
1J (COMMERCIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR PIPE & RETARDING BASIN	Non s.94			\$ -
	LAND ACQUISITION FOR GRASS LINED CHANNEL			\$ 16,830	\$ 16,830
	CONCRETE PIPE & BOX CULVERT		\$ 349,848		\$ 349,848
	SEDIMENTATION BASIN		\$ 400,000		\$ 400,000
	GRASS LINED CHANNEL - A			\$ 196,303	\$ 196,303
	GRASS LINED CHANNEL - B			\$ 162,353	\$ 162,353
	CULVERT UNDER HOLDSWORTH DRIVE			\$ 285,738	\$ 285,738
SUB TOTAL	\$ -	\$ 749,848	\$ 661,224	\$ 1,411,072	
WATER QUALITY					
NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ -	\$ 749,848	\$ 661,224	\$ 1,411,072	
1K (RESIDENTIAL)	TRUNK DRAINAGE				
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	WATER QUALITY				
NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ -	\$ -	\$ -	\$ -	
TOTAL SUBCATCHMENT WORKS		\$ 6,889,376	\$ 6,069,448	\$ 4,284,681	\$ 16,313,485

3.2 Sub Catchment 2

Description and Location of Works

The sub catchment area and associated precincts are shown in Figure 9 and the works are indicated in Figure 10.

This sub catchment consists of a contributing area of one industrial precinct.

The non contributing area comprises land zoned for arterial road along Camden Valley Way and Smeaton Grange Road.

Stormwater runoff from this sub catchment is conveyed to sub catchment 5.

Precinct 2A

This is an industrial precinct at Smeaton Grange being developed by the Business Land Group.

Trunk drainage works completed as at June 1997 were a grass lined channel with a concrete invert to convey stormwater downstream to precinct 5A.

Trunk drainage works for this precinct are also provided downstream in precinct 5A.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Apportionment of Costs

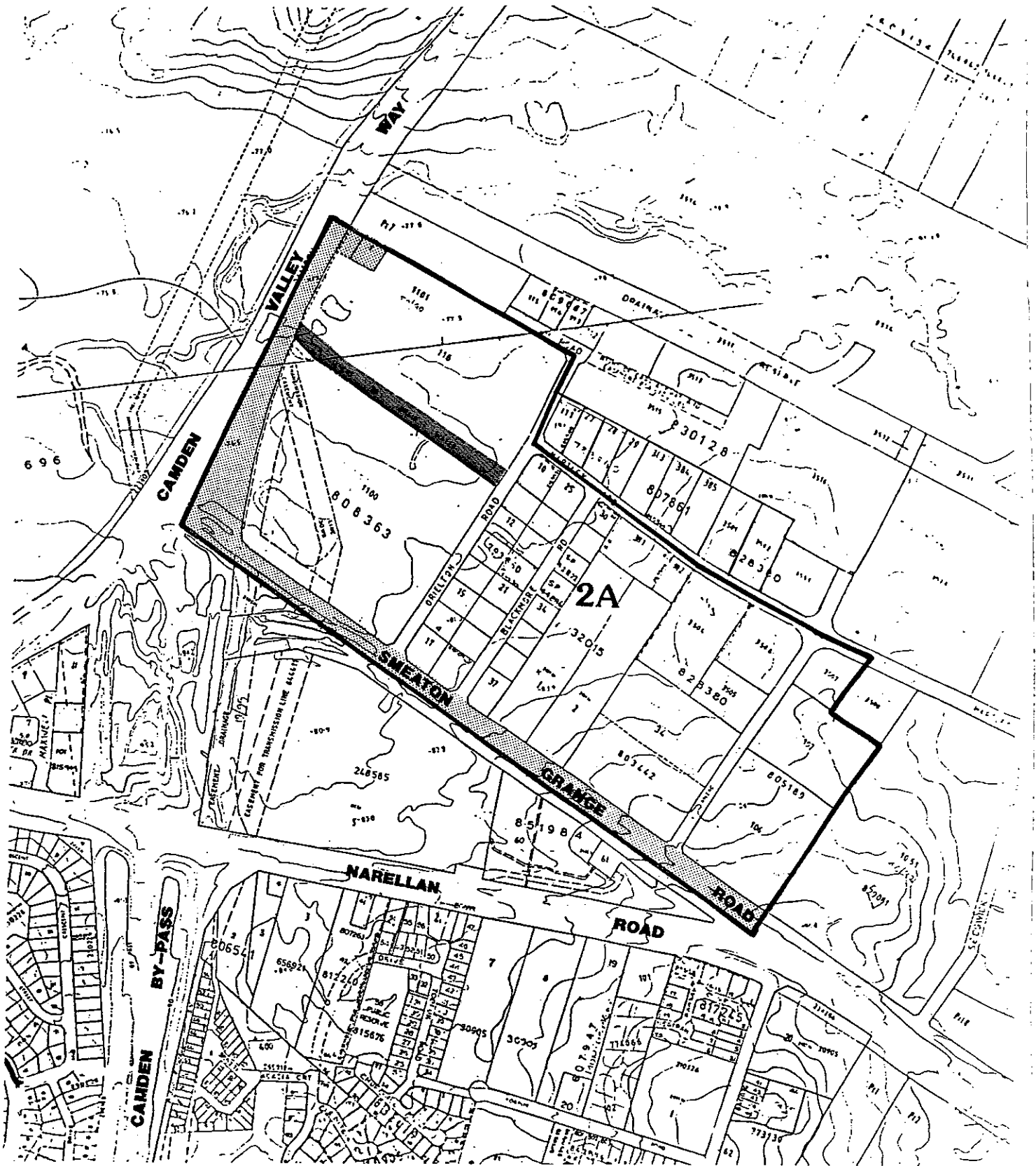
Trunk Drainage

Precinct 2A contributes all of the cost of trunk drainage works within its own precinct. It also contributes proportionally with precincts 3A, 5A and 5B to the developed flow cost of Narellan Creek within precinct 5A. The apportionment of cost is based on the factored precinct area and is derived from the formula given for Narellan Creek in precinct 5A.

Water Quality

Precinct 2A does not have water quality facilities and therefore contributes proportionally to the cost of such facilities downstream in precinct 5A. The apportionment of cost is based on the factored precinct area and derived from the formula given for sub catchment 1.

FIGURE 9:PRECINCT 2A



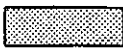

-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS

FIGURE 10 : WORKS SCHEDULE : SUB CATCHMENT 2

PRECINCT	ITEM OF WORKS	STAGE 1 COMPLETED JUN 97	STAGE 2 JUL 1997-JUN 2000	STAGE 3 JUL 2001-JUN 2004	TOTAL
2A (INDUSTRIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR CHANNEL	Non s.84			\$ -
	GRASS LINED CHANNEL WITH CONCRETE INVERT	\$ -	\$ 797,423		\$ 797,423
	SUB TOTAL	\$ -	\$ 797,423	\$ -	\$ 797,423
	WATER QUALITY				
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
TOTAL SUBCATCHMENT WORKS		\$ -	\$ 797,423	\$ -	\$ 797,423

3.3 Sub Catchment 3

Description and Location of Works

The sub catchment area and associated precincts are shown in Figure 11 and the works are indicated in Figure 12.

This sub catchment consists of a contributing area of one industrial precinct, three residential precincts and one commercial precinct.

The non contributing areas comprise a high school site at Narellan Vale and land zoned for arterial roads along Camden Valley Way, the Camden By-Pass and Narellan Road.

Stormwater runoff from this sub catchment is conveyed to sub catchment 5.

Precinct 3A

This is an industrial precinct at Smeaton Grange.

Trunk drainage works proposed are an upgrading of the creek to convey stormwater to precinct 5A.

Trunk drainage works for this precinct are also provided downstream in precinct 5A.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 3B

This is a residential precinct at Narellan Vale being developed by Bricklane Estates Pty Limited, Landcom and others.

Trunk drainage works completed as at June, 1997 were three dry detention basins and four grass lined channels with low flow pipes to convey stormwater to precinct 3A and downstream. Some were undertaken by Bricklane Estates and Landcom as works in kind contributions.

Trunk drainage works proposed are a dry detention basin with an outlet structure and a culvert under Tobruk Road.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 3C

This is a residential precinct at Narellan which is fully developed.

Trunk drainage works are provided in precinct 3B.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 3D

This is a residential precinct at Narellan which is fully developed.

There are no trunk drainage or water quality facilities proposed for this precinct.

The precinct is not required to contribute towards trunk drainage in this Plan as it was developed prior to commencement of development of the Narellan Release Area and the Harrington Park Release Area.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 3E

This is an industrial precinct at Narellan which is fully developed.

There are no trunk drainage or water quality facilities proposed for this precinct.

The precinct is not required to contribute towards trunk drainage in this Plan as it was developed prior to commencement of development of the Narellan Release Area and the Harrington Park Release Area.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Apportionment of Costs

Trunk Drainage

Precincts 3A and 3B contribute all of the cost of trunk drainage works within their own precinct.

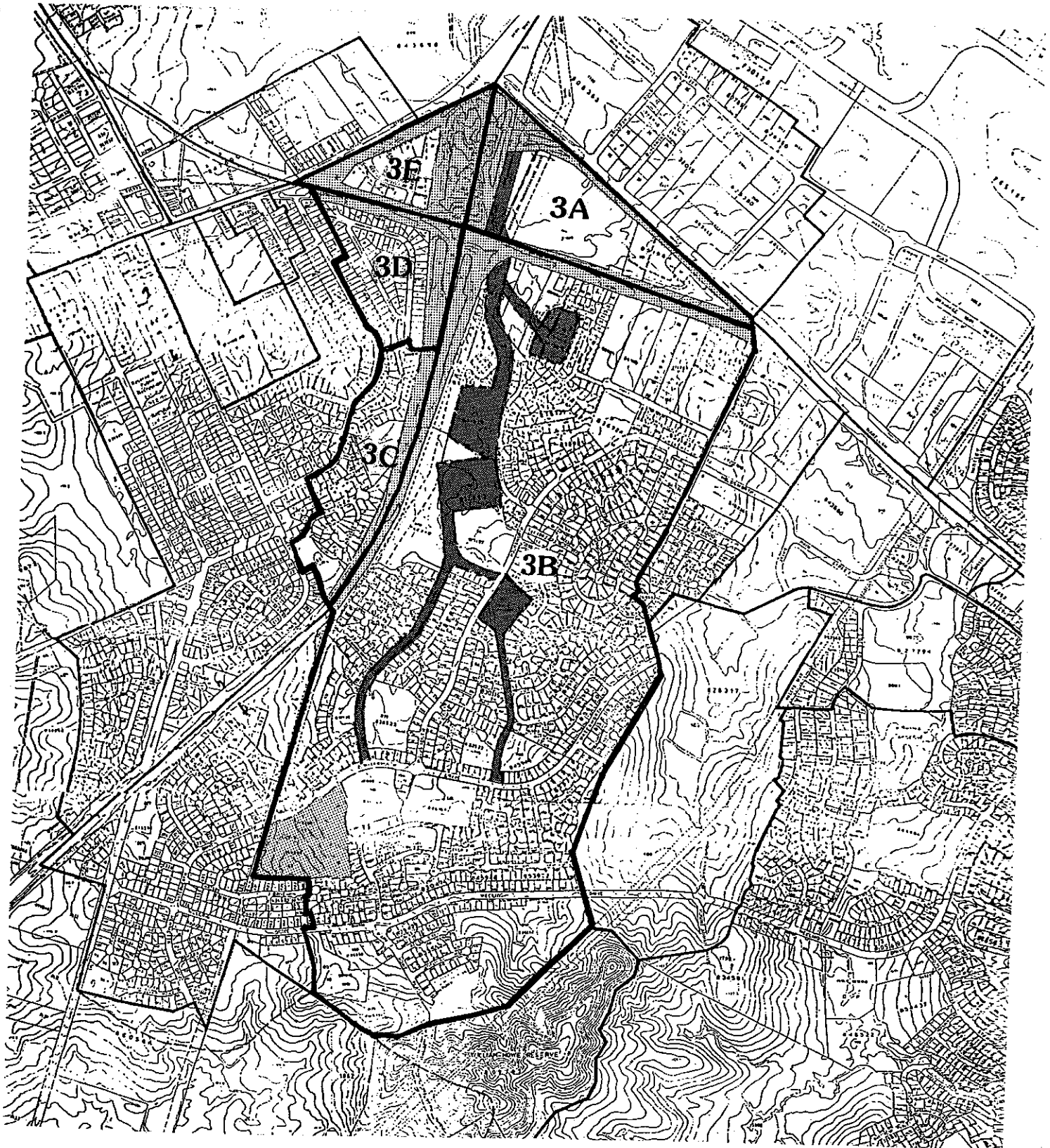
Precinct 3A also contributes proportionally with precincts 2A, 5A and 5B to the developed flow cost of Narellan Creek within precinct 5A. The apportionment of cost is based on the factored precinct area and derived from the formula given for Narellan Creek in precinct 5A.

Precincts 3C, 3D and 3E do not have any trunk drainage works proposed within their own precinct as part of this Plan. These precincts were developed prior to the commencement of development of the Narellan Release Area and the Harrington Park Release Area and are not required to contribute towards trunk drainage in this Plan.

Water Quality

None of the precincts in sub catchment 3 have water quality facilities and therefore contribute proportionally to the cost of such facilities downstream in Precinct 5A. The apportionment of cost is based on the factored precinct areas and derived from the formula given for sub catchment 1.

FIGURE 11:PRECINCTS 3A - 3E





-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY

FIGURE 12 : WORKS SCHEDULE : SUB CATCHMENT 3

PRECINCT	ITEM OF WORKS	STAGE 1 COMPLETED JUN 97	STAGE 2 JUL 1997-JUN 2000	STAGE 3 JUL 2001-JUN 2004	TOTAL
3A (COMMERCIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR CREEK	Non s.94			\$ -
	UPGRADING OF CREEK	\$ -	\$ 44,000		\$ 44,000
	SUB TOTAL	\$ -	\$ 44,000	\$ -	\$ 44,000
	WATER QUALITY	\$ -	\$ -	\$ -	\$ -
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ -	\$ 44,000	\$ -	\$ 44,000
3B (RESIDENTIAL)	TRUNK DRAINAGE				
	STUDY, DESIGN AND SUPERVISION	\$ 44,838	\$ 24,856	\$ -	\$ 69,696
	LAND ACQUISITION FOR DRY DETENTION BASINS A,B, & D	\$ 899,887			\$ 899,887
	LAND ACQUISITION FOR DRY DETENTION BASIN C		\$ 235,313		\$ 235,313
	LAND ACQUISITION FOR CHANNELS A,B,C & D	Non s.94			\$ -
	DETENTION BASINS A,B & D	\$ 1,682,323	\$ 326,502	\$ -	\$ 1,990,825
	STORMWATER CHANNEL A				
	STORMWATER CHANNEL B				
	STORMWATER CHANNEL C				
	STORMWATER CHANNEL D				
	DETENTION BASIN C	\$ 915	\$ 133,190		\$ 134,108
	DETENTION BASIN C OUTLET STRUCTURE		\$ 221,003		\$ 221,003
	CULVERT UNDER TOBRUK ROAD			\$ 50,230	\$ 50,230
	TEMPORARY WORKS		\$ 7,000		\$ 7,000
SUB TOTAL	\$ 2,807,764	\$ 849,866	\$ 60,230	\$ 3,697,860	
	WATER QUALITY	\$ -	\$ -	\$ -	\$ -
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ 2,807,764	\$ 849,866	\$ 60,230	\$ 3,697,860
3C (RESIDENTIAL)	TRUNK DRAINAGE				
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	WATER QUALITY	\$ -	\$ -	\$ -	\$ -
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ -	\$ -	\$ -	\$ -
3D (RESIDENTIAL)	TRUNK DRAINAGE				
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	WATER QUALITY	\$ -	\$ -	\$ -	\$ -
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ -	\$ -	\$ -	\$ -
3E (INDUSTRIAL)	TRUNK DRAINAGE				
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	WATER QUALITY	\$ -	\$ -	\$ -	\$ -
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ -	\$ -	\$ -	\$ -
TOTAL SUBCATCHMENT WORKS		\$ 2,807,764	\$ 849,866	\$ 60,230	\$ 3,697,860

3.4 Sub Catchment 4

Description of Works

The sub catchment area and associated precincts are shown in Figure 13 and the works are indicated in Figure 14.

This sub catchment consists of a contributing area of one industrial precinct, three commercial precincts and two residential precincts.

The non contributing areas comprise land zoned for schools and open space, land forming part of the Studley Park golf course and land zoned for arterial roads along the Camden By-Pass, Camden Valley Way and the extension of Narellan Road to The Northern Road.

Trunk drainage works proposed for sub catchment 4 include outlet works to the detention basin at Glenlee Reserve, a diversion channel and a detention basin within Studley Park. As a consequence, stormwater is conveyed to precinct 5A at pre-developed flow rates and any excess is conveyed to Studley Park

Therefore precincts 4B, 4C, 4E and 4F, due to incidental benefit received from these works, do not contribute to trunk drainage within precinct 5A.

Precinct 4A

This is a residential precinct at Narellan which is fully developed.

Trunk drainage and water quality works completed as at June 1997 were a dry detention basin, a wet basin, gross pollutant trap and grass lined channel with low flow pipe.

Precinct 4B

This is a residential precinct at Narellan which is fully developed.

Trunk drainage works completed as at June 1997 were a concrete lined channel. These were non-S.94 works.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 4C

This is a commercial precinct which consists of Stages 2 and 3 of the Narellan Shopping Centre and others. It is expected to be redeveloped in conjunction with the Narellan Town Centre.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 4D

This is a commercial precinct which forms Stage 1 of the Narellan Shopping Centre. The precinct has been redeveloped in conjunction with the Narellan Town Centre.

There are no trunk drainage works proposed for this precinct under this Plan however, on-site detention is provided by the developer.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 4E

This is a commercial precinct which is partly developed and is expected to be further developed in conjunction with the Narellan Town Centre.

Trunk drainage works proposed are a pipe under Camden Valley Way and drainage augmentation to convey stormwater to precinct 4F and downstream.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Precinct 4F

This is an industrial precinct (with some service trades) partly developed. It is expected to be redeveloped in conjunction with the Narellan Town Centre.

Trunk drainage works proposed are a concrete lined channel and piped drains to convey stormwater to precinct 5A.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Apportionment of Costs

Trunk Drainage

Precincts 4A and 4D contribute all of the cost of the trunk drainage works within their own precinct.

Precinct 4B does not contribute to any trunk drainage.

Precinct 4C has no trunk drainage works within its precinct but contributes proportionally with precincts 4E and 4F for the following works.

- outlet works to the detention basin at Glenlee Reserve;
- diversion channel;
- detention basin at Studley Park.

Precincts 4E and 4F contribute proportionally to the pipe from Somerset Avenue to Tributary No. 1 located within precinct 4F.

The apportionment of trunk drainage cost is derived from the following formula:

$$A_{TD4} = x \times \frac{a_f}{\Sigma a_f}$$

Where:

A_{TD4} is the apportioned cost of the above TD works;

x is the trunk TD cost in precinct 4F for the above works;

a_f is the factored precinct area;

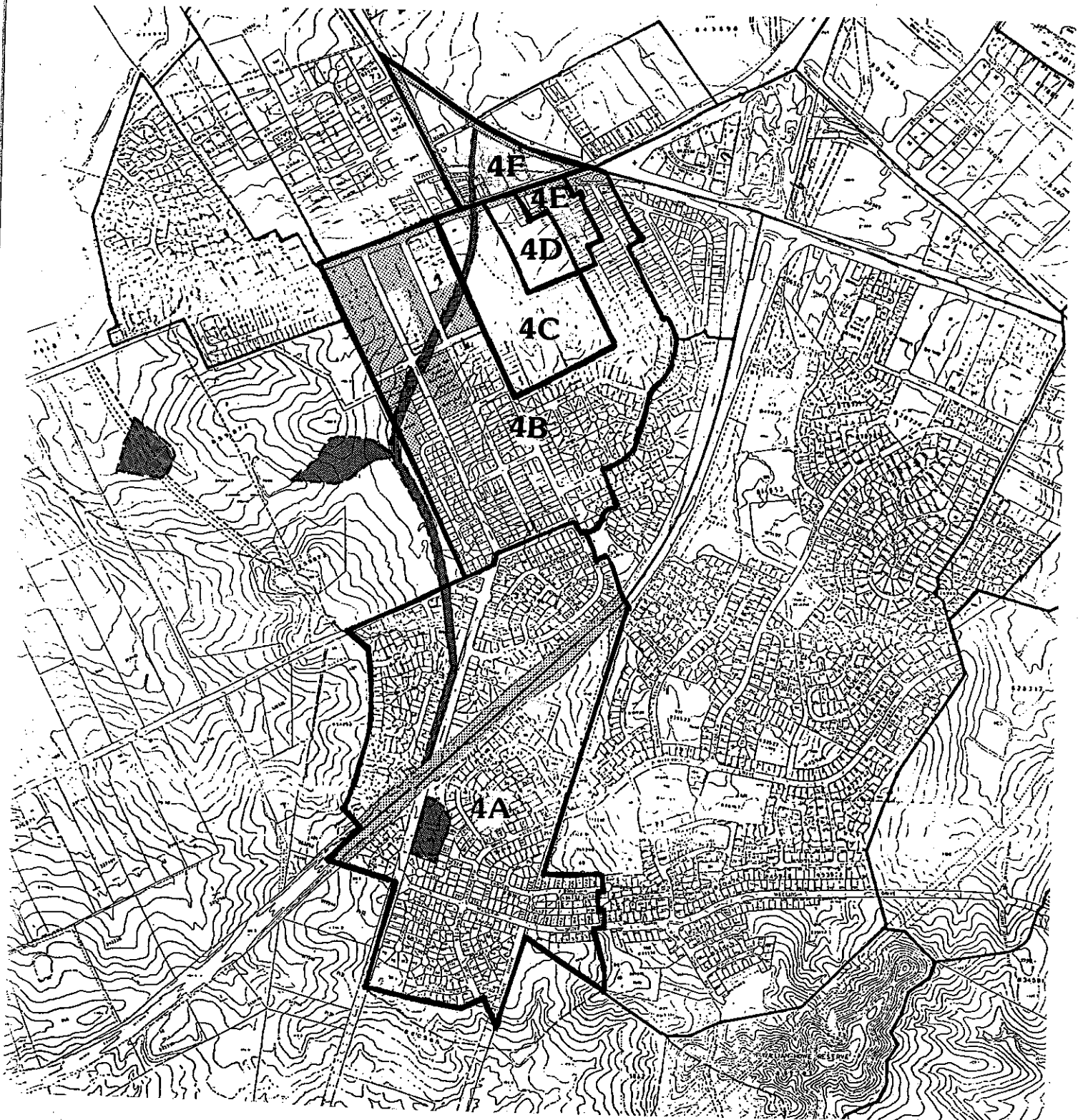
Σa_f is the sum of the factored precinct area of precinct 4E and 4F.

Water Quality

Precinct 4A contributes all of the cost of water quality facilities within its own precinct.

All the other precincts in sub catchment 4 do not have water quality facilities and therefore contribute proportionally to the cost of such facilities downstream in precinct 5A. The apportionment of cost is based on the factored precinct areas and derived from the formula given for sub catchment 1.

FIGURE 13:PRECINCTS 4A - 4F



NON CONTRIBUTING AREAS WITHIN PRECINCTS



TRUNK DRAINAGE AND WATER QUALITY WORKS

FIGURE 14 : WORKS SCHEDULE : SUB CATCHMENT 4

PRECINCT	ITEM OF WORKS	STAGE 1 COMPLETED JUN 97	STAGE 2 JUL 1997-JUN 2000	STAGE 3 JUL 2001-JUN 2004	TOTAL
4A (RESIDENTIAL)	TRUNK DRAINAGE				
	OPEN CHANNEL & DRY DETENTION BASIN				
	WET DETENTION BASIN	Non s.94			
	SUB TOTAL	\$ 99,918	\$ -	\$ -	\$ 99,918
	WATER QUALITY	\$ 99,918	\$ -	\$ -	\$ 99,918
	TRASHRACK AND WQCP IN STUDLEY PARK				\$ 99,918
	TOTAL PRECINCT WORKS	\$ 150,000	\$ -	\$ -	\$ 150,000
		\$ 249,918	\$ -	\$ -	\$ 249,918
4B (RESIDENTIAL)	TRUNK DRAINAGE				
	NO FUTURE WORKS WITHIN THIS PRECINCT				
	EXISTING CONCRETE LINED CHANNEL	Non s.94			
	WATER QUALITY				
	NO WORKS WITHIN THIS PRECINCT				
	TOTAL PRECINCT WORKS	\$ -	\$ -	\$ -	\$ -
4C (COMMERCIAL)	TRUNK DRAINAGE				
	OUTLET WORKS TO DETENTION BASIN AT GLENLEE RESERVE, STUDLEY PARK DIVERSION CHANNEL & DET BASIN	\$ 18,791	\$ 295,083	\$ -	\$ 313,874
	SUB TOTAL	\$ 18,791	\$ 295,083	\$ -	\$ 313,874
	WATER QUALITY	\$ 18,791	\$ 295,083	\$ -	\$ 313,874
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ 18,791	\$ 295,083	\$ -	\$ 313,874
4D (COMMERCIAL)	TRUNK DRAINAGE				
	ON-SITE DETENTION BASINS				
	WATER QUALITY	\$ -	\$ 200,000	\$ -	\$ 200,000
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ -	\$ 200,000	\$ -	\$ 200,000
4E (COMMERCIAL)	TRUNK DRAINAGE				
	PIPE UNDER CAMDEN VALLEY WAY & DRAINAGE				
	OUTLET WORKS TO DETENTION BASIN AT GLENLEE RESERVE, STUDLEY PARK DIVERSION CHANNEL & DET BASIN	\$ -	\$ 269,000	\$ -	\$ 269,000
	SUB TOTAL	\$ -	\$ 77,280	\$ -	\$ 77,280
	WATER QUALITY	\$ -	\$ 346,280	\$ -	\$ 346,280
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ -	\$ 346,280	\$ -	\$ 346,280
4F (INDUSTRIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR CHANNEL	Non s.94			
	OUTLET WORKS TO DETENTION BASIN AT GLENLEE RESERVE, STUDLEY PARK DIVERSION CHANNEL & DET BASIN		\$ 243,312	\$ -	\$ 243,312
	CONCRETE LINED OPEN CHANNEL			\$ 307,500	\$ 307,500
	PIPE FROM SOMERSET AV. TO TRIBUTARY No. 1		\$ 200,128	\$ -	\$ 200,128
	SUB TOTAL	\$ -	\$ 443,440	\$ 307,500	\$ 750,940
	WATER QUALITY	\$ -	\$ -	\$ -	\$ -
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	TOTAL PRECINCT WORKS	\$ -	\$ 443,440	\$ 307,500	\$ 750,940
TOTAL SUBCATCHMENT WORKS		\$ 268,799	\$ 1,284,803	\$ 307,500	\$ 1,861,012

3.5 Sub Catchment 5

Description and Location of Works

The sub catchment area and associated precincts are shown in Figure 15 and the works are indicated in Figure 17.

This sub catchment consists of a contributing area of two residential precincts.

The non contributing area consists of rural land to the north of the sub catchment and land agreed for arterial roads along Camden Valley Way and The Northern Road.

Stormwater runoff from this sub catchment is contained within the sub catchment itself.

Precinct 5A

This is a residential precinct at Harrington Park being developed by Taylor Woodrow (Australia) Pty Ltd.

The components of the trunk drainage and water quality facilities provided within precinct 5A are:

- two offstream lakes (Lakes 1 and 2) which will incorporate macrophyte zones and provide sedimentation and biological treatment of low and moderate flows;
- an existing multi purpose lake (Lake 3A) located on Narellan Creek incorporating macrophyte and open water zones to provide sedimentation and biological treatment of all flows and flood mitigation. Associated works include a bund wall across the creek at the upstream end and spillways;
- two smaller offstream lakes (Lakes 3B and 3C) upstream of Lake 3A, also with macrophyte and open water zones. Associated works include a culvert and a sediment management zone;
- a pumping station to allow water to be re-circulated through the lake system a number of times in periods of low flow. During re-circulation, water will be forced to pass through the large macrophyte zones in lakes 3C, 3B and 3A and then through the open water zone in Lake 3A;
- tributary 1 constructed to replicate a natural creek system with variable shape, a sequence of pools and riffles, and planting with native vegetation;
- gross pollutant traps on the three main tributaries where they enter precinct 5A;

- a natural floodway along Narellan Creek from Camden Valley Way downstream to Lake 3A. The floodway will carry all catchment flows ranging from low flows to large flood flows.

As at June 1997, some of the above works had been carried out on behalf of Taylor Woodrow. However, they had not yet been agreed to as works in kind contributions. Further negotiation will be necessary.

Precinct 5B

This is a residential precinct at Harrington Park partly developed and known locally as "Struggletown".

Trunk drainage works for this precinct are provided downstream in precinct 5A.

Water quality facilities for this precinct are provided downstream in precinct 5A.

Apportionment of Costs

Trunk Drainage

For precinct 5A, the total cost of trunk drainage works is apportioned between:

- pre-developed stormwater flow; and
- developed stormwater flow.

This apportionment is shown in Figure 16. It is based on the relative flow rates measured at the precinct boundaries and is expressed as a percentage.

Pre-developed Flow

Pre-developed stormwater flow refers to the flow existing prior to the start of development within the Harrington Park and Narellan Release Areas.

Precinct 5A contributes all of the pre-developed flow cost component of the trunk drainage works within its precinct. The pre-developed flow cost is derived from the following formula:

$$A_{TD1} = \left[\frac{Q_1}{Q_2} \right] \times x_1 + x_2$$

Where:

A_{TD1} is the apportioned pre-developed flow cost of trunk drainage works within precinct 5A;

- Q_1 is the pre-developed flow determined at the precinct 5A boundary for Narellan Creek;
- Q_2 is the developed flow determined at the precinct boundary for Narellan Creek ;
- x_1 is the trunk drainage cost for Narellan Creek; and
- x_2 is the total trunk drainage cost for Tributary No.1. This is due to the critical peak flow in Tributary No. 1 occurring in the pre-developed state.

Developed Flow

Developed stormwater flow refers to the flow that results from all urban development within the catchment including that occurring within the Harrington Park and Narellan Release Areas.

The developed flow cost component of the trunk drainage works for Narellan Creek within precinct 5A is determined by subtracting the pre-developed flow cost from the total cost for Narellan Creek.

Precinct 5A contributes proportionally with precincts 2A, 3A and 5B towards this developed flow cost of Narellan Creek.

The apportioned costs are shown in Figure 16 and are derived from the following formula:

$$A_{TD2} = F_{TD} \times W_1$$

Where:

A_{TD2} is the apportioned developed flow cost of trunk drainage works for Narellan Creek within precinct 5A; .

F_{TD} is the fraction derived from the following formula:

$$F_{TD} = \left[\frac{a_f}{(\sum a_f)} \right]$$

$$a_f = k a_p$$

Where:

- k is the weighting factor (1.55) used for industrial, commercial and high density residential precincts as compared to residential precincts (1.0). The factor of 1.55 is because of increased runoff from increased impervious areas. The factor is derived by dividing the runoff coefficient for industrial/commercial precincts (1.0 for 95% imperviousness at 1% AEP) by the runoff coefficient for residential precincts (0.645 for 33% imperviousness at 1% AEP), refer Figure 3;

- a_p is the precinct area.
- a_f is the factored precinct area;
- $\sum a_f$ is the sum of the factored precinct areas for Narellan Creek (precincts 2A, 3A, 5A and 5B);
- W_1 is the developed trunk drainage cost payable for works within precinct 5A derived from the following formula:

$$W_1 = \sum \left[x - \left(\frac{Q_1}{Q_2} \times x \right) \right]$$

Where:

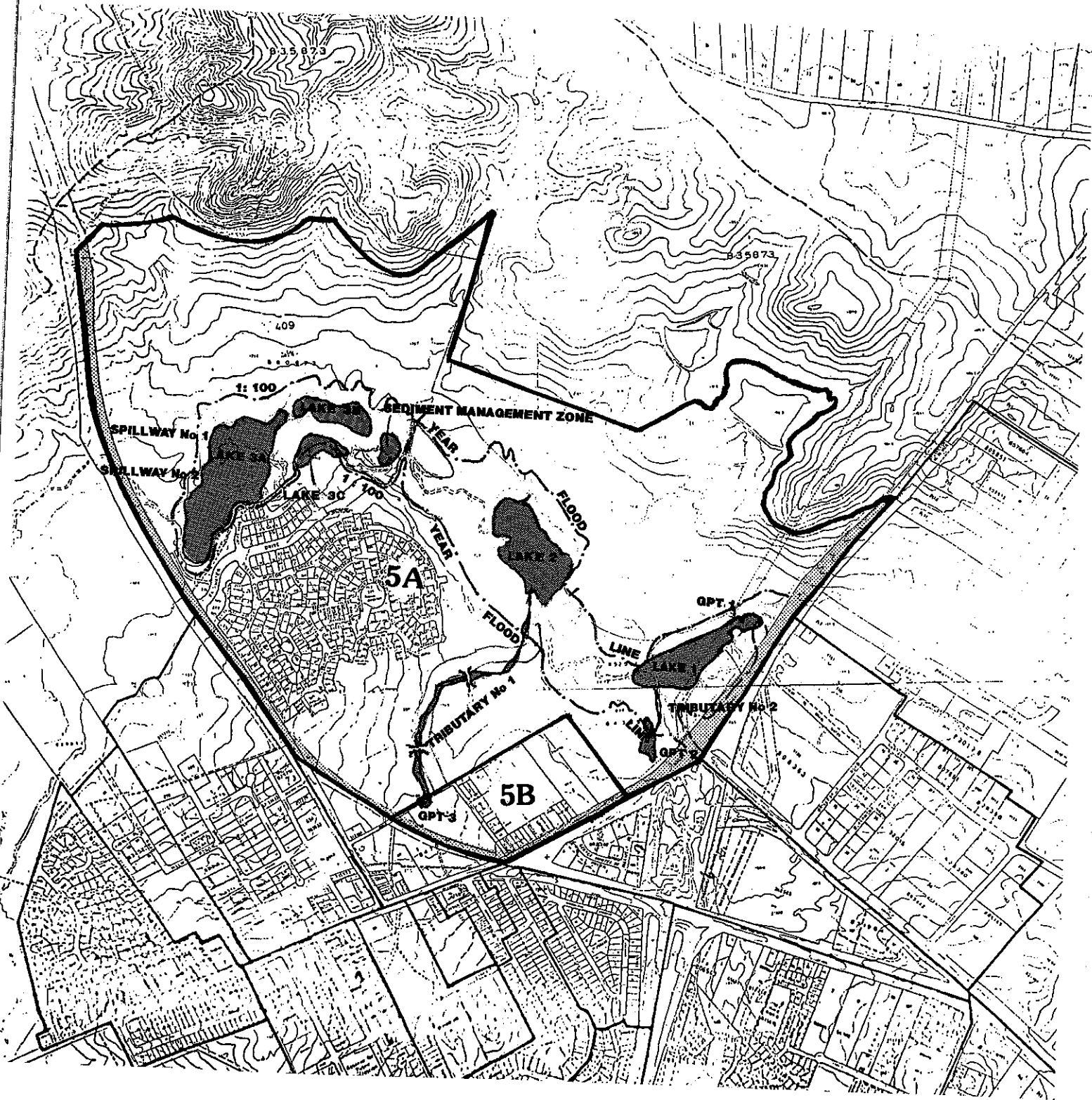
- x is the total developed trunk drainage cost for works within precinct 5A for Narellan Creek;
- Q_1 is the pre-developed flow determined at the precinct 5A boundary for Narellan Creek; and
- Q_2 is the developed flow determined at the precinct 5A boundary for Narellan Creek.



Water Quality

Precinct 5A contributes proportionally towards the cost of water quality facilities provided in precinct 5A based on the factored precinct areas and derived from the formula given for sub catchment 1.

Precinct 5B does not have water quality facilities and therefore contributes proportionally to the cost of such facilities provided downstream in precinct 5A. The apportionment of cost is based on the factored precinct areas and is derived from the formula given for sub catchment 1.

FIGURE 15:PRECINCTS 5A & 5B



-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS

**FIGURE 16 : APPORTIONMENT OF PRECINCT 5A
TRUNK DRAINAGE COSTS**

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ITEM OF WORKS	COST OF PRECINCT WORKS 100%	APPORTIONMENT OF COST		
		NARELLAN CREEK		TRIBUTARY No.1
		PRE-DEVELOPED 78.4%	DEVELOPED 21.6%	PRECINCT COST 100%
LAND ACQUISITION FOR DETENTION LAKE 3	\$ 51,930	\$ 40,687	\$ 11,243	
LAND ACQUISITION FOR FLOODWAY	\$ -	\$ -	\$ -	
LAND ACQUISITION FOR TRIBUTARY No1	\$ 59,063			\$ 59,063
DETENTION FOR LAKE 3	\$ 3,085,436	\$ 2,417,442	\$ 667,994	
FLOODWAY 1 (UPSTREAM OF BRIDGE 1)	\$ 304,031	\$ 238,209	\$ 65,822	
FLOODWAY 2 (UPSTREAM OF BRIDGE 2)	\$ 387,263	\$ 303,421	\$ 83,842	
TRIBUTARY No1	\$ 470,925			\$ 470,925
SUB TOTAL	\$ 4,358,647	\$ 2,999,758	\$ 828,901	\$ 529,988
STUDY & DESIGN COST	\$ 694,186	\$ 495,769	\$ 136,992	\$ 61,425
TOTAL	\$ 5,052,833	\$ 3,495,527	\$ 965,893	\$ 591,413

- (1) is the description of works
- (2) is the total cost of trunk drainage works from Figure 17
- (3) is the predeveloped cost of trunk drainage for Narellan Creek = (2) x (Q₁/Q₂)
Where;
Q₁ = 194.7 m³/s, is the developed flow with 5A basin determined at The Northern Rd.
Q₂ = 248.5 m³/s, is the developed flow without 5A basin determined at The Northern Rd
- (4) is the developed cost of trunk drainage for Narellan Creek = (2)-(3)
- (5) is the precinct cost of trunk drainage for Tributary No.1.

FIGURE 17 : WORKS SCHEDULE : SUB CATCHMENT 6

554CF3-11

PRECINCT	ITEM OF WORKS	STAGE 1 COMPLETED JUN 97	STAGE 2 JUL 1997-JUN 2000	STAGE 3 JUL 2001-JUN 2004	TOTAL
5A (RESIDENTIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR DETENTION LAKE 3			\$ 51,930	\$ 51,930
	LAND ACQUISITION FOR FLOODWAY			\$ -	\$ -
	LAND ACQUISITION FOR TRIBUTARY No1			\$ 59,063	\$ 59,063
	DETENTION FOR LAKE 3		\$ 3,085,436		\$ 3,085,436
	FLOODWAY 1 (100m Upstream of Bridge 1)		\$ 304,031		\$ 304,031
	FLOODWAY 2 (200m Upstream of Bridge 2)		\$ 387,263		\$ 387,263
	TRIBUTARY No 1		\$ 470,925		\$ 470,925
	STUDY & DESIGN	\$ 129,062	\$ 195,763		\$ 324,824
	CONTRACT ADMINISTRATION AND SUPERVISION		\$ 369,361		\$ 369,361
	SUB TOTAL	\$ 129,062	\$ 4,812,776	\$ 110,993	\$ 5,052,833
	WATER QUALITY				
	LAND ACQUISITION FOR LAKE 1			\$ 44,400	\$ 44,400
	LAND ACQUISITION FOR LAKE 2			\$ 63,360	\$ 63,360
	LAND ACQUISITION FOR LAKE 3			\$ 173,070	\$ 173,070
	LAND ACQUISITION FOR GROSS POLLUTANT TRAP 1			\$ 4,500	\$ 4,500
	LAND ACQUISITION FOR GROSS POLLUTANT TRAP 2			\$ 4,500	\$ 4,500
	LAND ACQUISITION FOR GROSS POLLUTANT TRAP 3			\$ 4,500	\$ 4,500
	POLLUTANT CONTROL FOR LAKE 1		\$ 1,083,912		\$ 1,083,912
	POLLUTANT CONTROL FOR LAKE 2		\$ 1,418,289		\$ 1,418,289
	POLLUTANT CONTROL FOR LAKE 3		\$ 1,318,512		\$ 1,318,512
	FLOODWAY 1 (100m Upstream of Bridge 1)		\$ -		\$ -
	FLOODWAY 2 (200m Upstream of Bridge 2)		\$ -		\$ -
	TRIBUTARY No 1		\$ -		\$ -
	GROSS POLLUTION TRAP 1		\$ 913,445		\$ 913,445
GROSS POLLUTION TRAP 2		\$ 449,535		\$ 449,535	
GROSS POLLUTION TRAP 3		\$ 356,350		\$ 356,350	
EMBANKMENTS		\$ 471,500		\$ 471,500	
STUDY & DESIGN	\$ 129,062	\$ 272,453		\$ 401,515	
CONTRACT ADMINISTRATION AND SUPERVISION		\$ 522,743		\$ 522,743	
MONITORING		\$ 250,000		\$ 250,000	
SUB TOTAL	\$ 129,062	\$ 7,056,739	\$ 284,330	\$ 7,480,131	
TOTAL PRECINCT WORKS	\$ 258,124	\$ 11,869,517	\$ 405,323	\$ 12,532,963	
5B (RESIDENTIAL)	TRUNK DRAINAGE				
	NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -
	WATER QUALITY				
NO WORKS WITHIN THIS PRECINCT	\$ -	\$ -	\$ -	\$ -	
TOTAL PRECINCT WORKS	\$ -	\$ -	\$ -	\$ -	
TOTAL SUBCATCHMENT WORKS	\$ 258,124	\$ 11,869,517	\$ 405,323	\$ 12,532,963	

3.6 Sub Catchment 6

Description & Location of Works

The sub catchment area and associated precincts are shown in Figure 18 and the works are indicated in Figure 19.

The sub catchment area and associated precincts are shown on Map J and the works are indicated in Table G.

This sub catchment consist of a contributing area of two industrial precincts and one residential precinct.

There is a large non contributing area of rural land at Kirkham, land zoned for arterial roads along Camden Valley Way and The Northern Road, and land forming part of the Studley Park golf course.

Stormwater runoff from this sub catchment is conveyed downstream.

Precinct 6A

This is an industrial precinct substantially developed over many years as the Narellan Industrial Estate. Expansion of the estate will occur on undeveloped land in the north of the precinct.

Trunk drainage works proposed are a wet detention basin.

Water quality facilities proposed are a wet detention basin and a gross pollutant trap.

Precinct 6B

This is an industrial precinct at Narellan which is partly developed.

Trunk drainage works proposed are a rock lined channel, piped drains and wet basins.

Water quality facilities proposed are a gross pollutant trap, linear wetland and a wet basin located outside the precinct but adjacent to it.

Precinct 6C

This is a residential precinct at Narellan which is fully developed.

Trunk drainage works proposed are a piped drainage extension to the rock lined channel and wet basin provided for precinct 6B.

Water quality facilities proposed are gross pollutant traps, wetland and a wet basin located outside the precinct but adjacent to it.

Apportionment of Costs

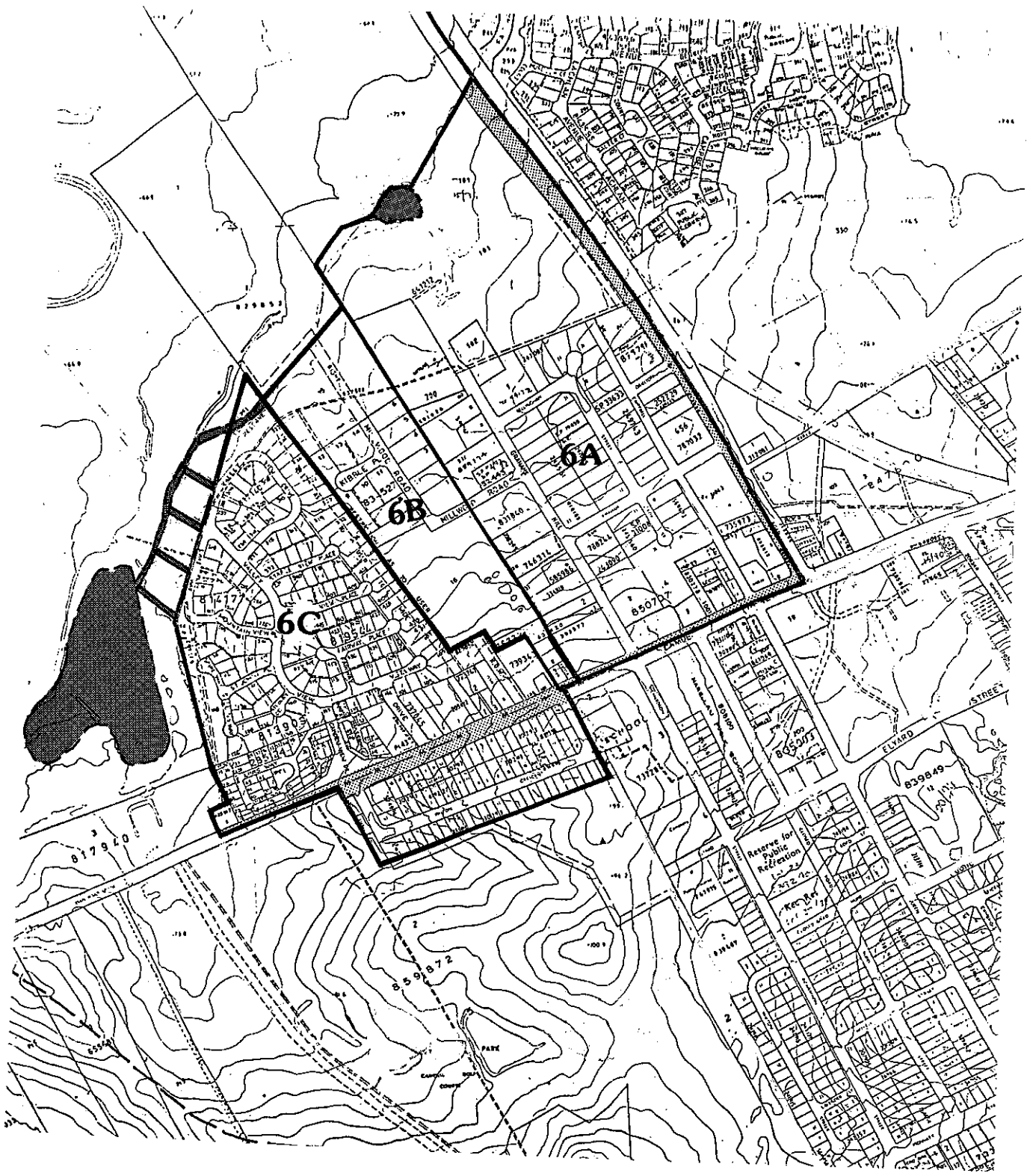
Trunk Drainage

All precincts in sub catchment 6 contribute all of the cost of trunk drainage works for their own precincts.

Water Quality

Precincts 6A, 6B and 6C contribute to the total cost of water quality facilities located downstream of sub catchment 6. There are no apportioned costs for works in precinct 5A.

FIGURE 18:PRECINCTS 6A - 6C





-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS

FIGURE 19 : WORKS SCHEDULE : SUB CATCHMENT 6

PRECINCT	ITEM OF WORKS	STAGE 1	STAGE 2	STAGE 3	TOTAL
		COMPLETED JUN 97	JUL 1997-JUN 2000	JUL 2001-JUN 2004	
6A (INDUSTRIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR WET BASIN	\$ -	\$ 4,500	\$ -	\$ 4,500
	WET DETENTION BASIN	\$ -	\$ 30,000	\$ -	\$ 30,000
	SUB TOTAL	\$ -	\$ 34,500	\$ -	\$ 34,500
	WATER QUALITY	\$ -	\$ 43,000	\$ -	\$ 43,000
	WATER QUALITY WORKS IN DETENTION BASIN	\$ -	\$ 20,000	\$ -	\$ 20,000
	GROSS POLLUTANT TRAP	\$ -	\$ -	\$ -	\$ -
SUB TOTAL	\$ -	\$ 63,000	\$ -	\$ 63,000	
TOTAL PRECINCT WORKS		\$ -	\$ 97,500	\$ -	\$ 97,500
6B (INDUSTRIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR WET DETENTION BASIN AND CHANNEL	\$ -	\$ 129,800	\$ -	\$ 129,800
	WET DETENTION BASIN	\$ -	\$ 55,281	\$ -	\$ 55,281
	ROCK LINED OPEN CHANNEL AND LFP	\$ -	\$ 70,356	\$ -	\$ 70,356
	SUB TOTAL	\$ -	\$ 255,437	\$ -	\$ 255,437
	WATER QUALITY	\$ -	\$ 20,000	\$ -	\$ 20,000
	GROSS POLLUTANT TRAP	\$ -	\$ 63,978	\$ -	\$ 63,978
CONSTRUCTED WETLAND IN LOT 5 DP 829852	\$ -	\$ 48,133	\$ -	\$ 48,133	
WET BASIN IN LOT 5 DP 829852	\$ -	\$ 132,108	\$ -	\$ 132,108	
SUB TOTAL	\$ -	\$ 487,646	\$ -	\$ 487,646	
TOTAL PRECINCT WORKS		\$ -	\$ 971,083	\$ -	\$ 971,083
6C (RESIDENTIAL)	TRUNK DRAINAGE				
	LAND ACQUISITION FOR WET DETENTION BASIN AND CHANNEL	\$ -	\$ 218,550	\$ -	\$ 218,550
	ROCK LINED OPEN CHANNEL AND WET DETENTION BASIN	\$ -	\$ 110,597	\$ -	\$ 110,597
	SUB TOTAL	\$ -	\$ 329,147	\$ -	\$ 329,147
	WATER QUALITY	\$ -	\$ 51,625	\$ -	\$ 51,625
	GROSS POLLUTANT TRAPS & WETLAND	\$ -	\$ 65,348	\$ -	\$ 65,348
	WET BASIN IN LOT 5 DP 829852	\$ -	\$ -	\$ -	\$ -
SUB TOTAL	\$ -	\$ 116,971	\$ -	\$ 116,971	
TOTAL PRECINCT WORKS		\$ -	\$ 446,118	\$ -	\$ 446,118
TOTAL SUBCATCHMENT WORKS		\$ -	\$ 931,264	\$ -	\$ 931,264

3.7 Professional Services

The provision and costs for professional services are shown in Figure 20.

Review of the Plan

In Stages 2 and 3 of the works schedules, it will be necessary to review this Plan with an assessment of the rate of subdivision and development, the works completed and a re-assessment of proposed works.

An amount of \$90,000 has been estimated for a consultant to undertake this review under the supervision of Council's staff.

Trunk Drainage Modelling

Trunk drainage modelling is necessary as part of the review of Stages 2 and 3 as development progresses.

An amount of \$105,000 has been estimated for this modelling.

Land Valuations

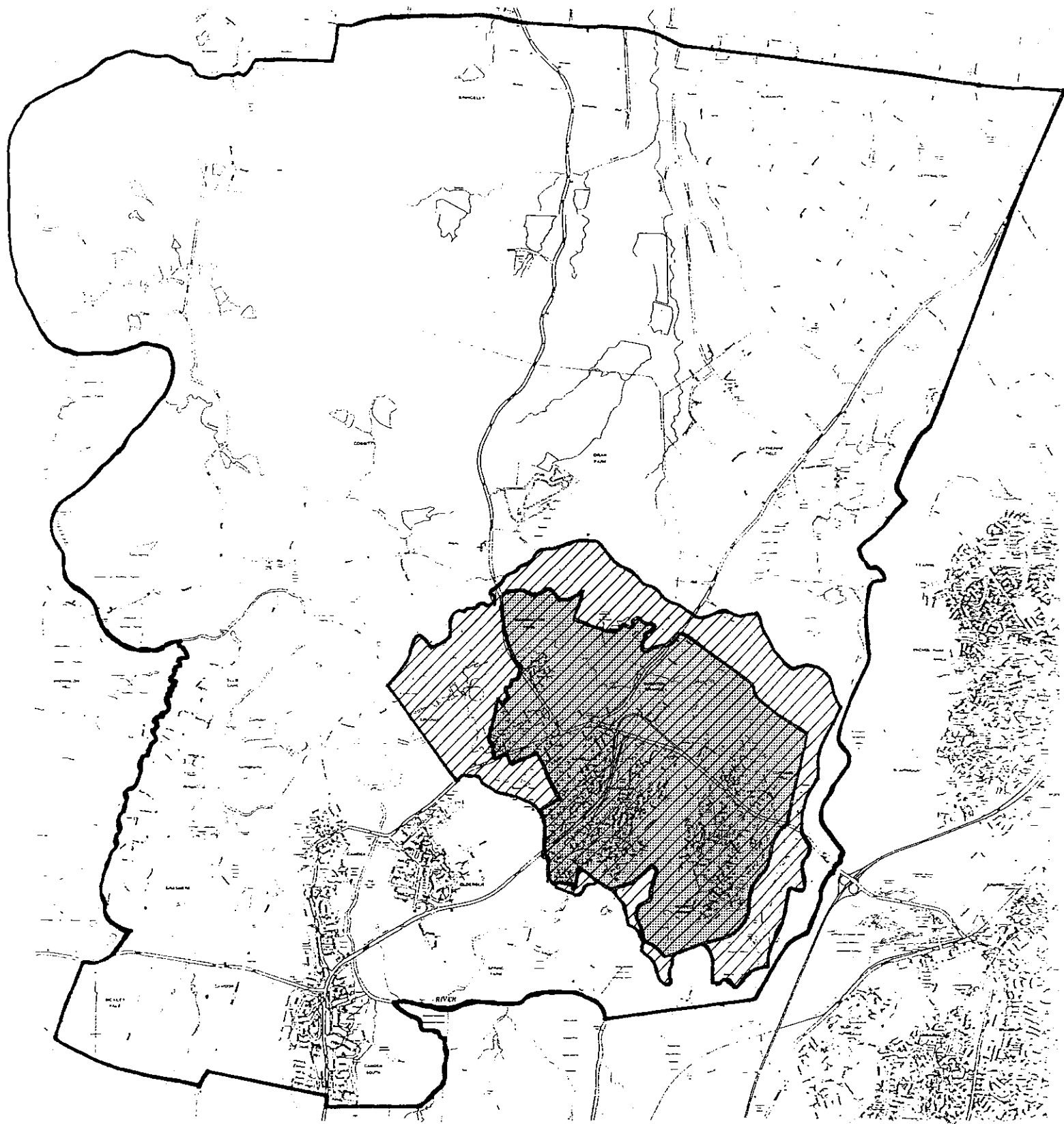
Independent valuations will be required as land contributions are acknowledged from developers. It is difficult to estimate these fees, but an amount of \$4,000 is estimated in Stages 2 and 3 for land valuations.

Legal Advice

Council will need to occasionally seek legal advice on implementation of the Plan. As with land valuations, legal fees are difficult to estimate, but an amount of \$4,000 is estimated in Stages 2 and 3 for legal advice.

FIGURE 20 : WORKS SCHEDULE : PROFESSIONAL SERVICES

ITEM OF SERVICES	STAGE 1	STAGE 2	STAGE 3	TOTAL
	COMPLETED JUN 97	JUL 1997-JUN 2000	JUL 2001-JUN 2004	
Review of the Plan	\$ 1,616	\$ 70,000	\$ 20,000	\$ 91,616
Trunk Drainage Modelling	\$ -	\$ 65,000	\$ 40,000	\$ 105,000
Land Valuations	\$ -	\$ 4,000	\$ 4,000	\$ 8,000
Legal Advice	\$ 745	\$ 4,000	\$ 4,000	\$ 8,745
TOTAL	\$ 2,361	\$ 143,000	\$ 68,000	\$ 213,361



MAP A: UPPER NARELLAN CREEK CATCHMENT



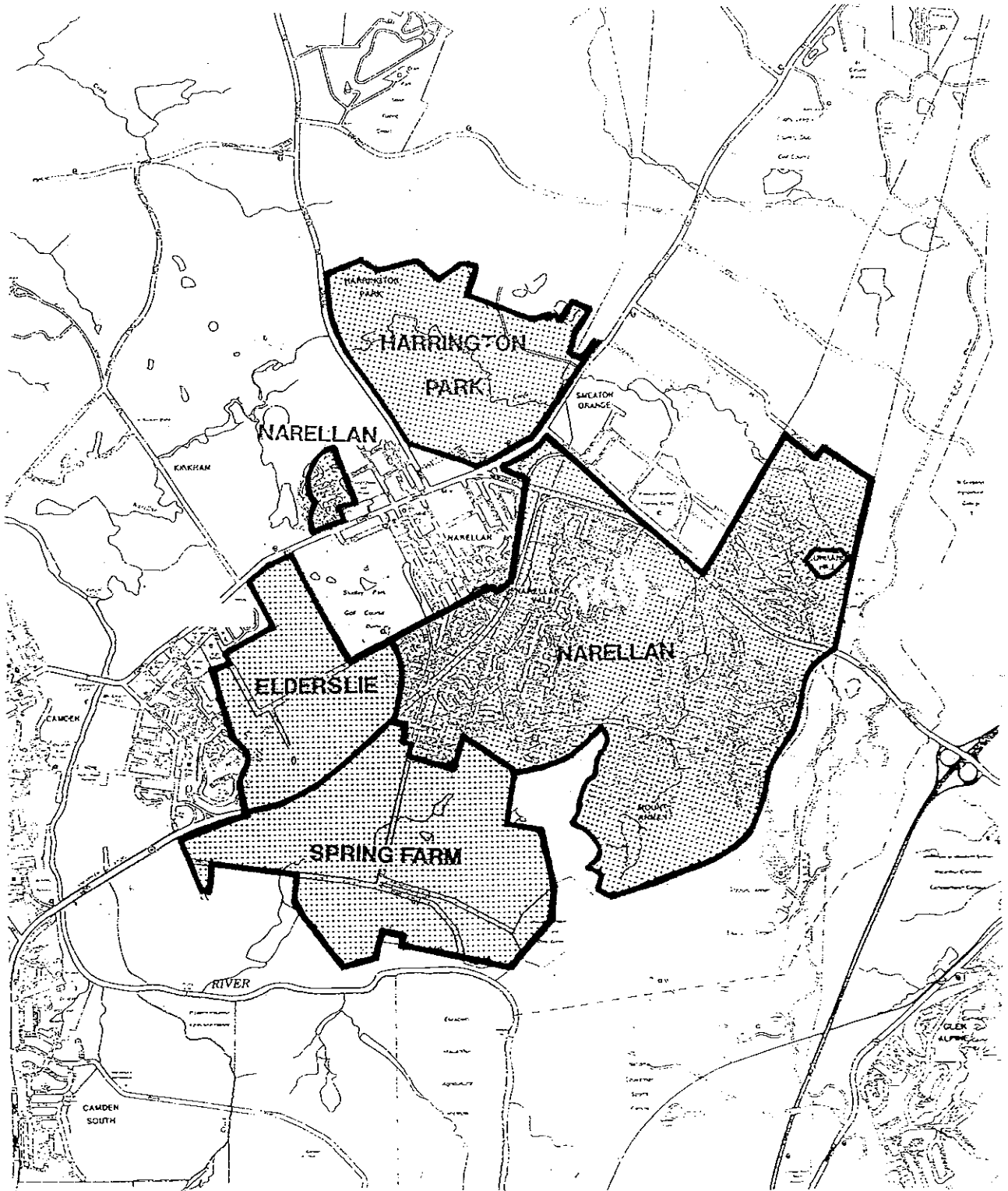
AREA OF UPPER NARELLAN CREEK CATCHMENT



**AREA TO WHICH THIS PLAN APPLIES
(NON CONTRIBUTING AREAS EXCLUDED)**



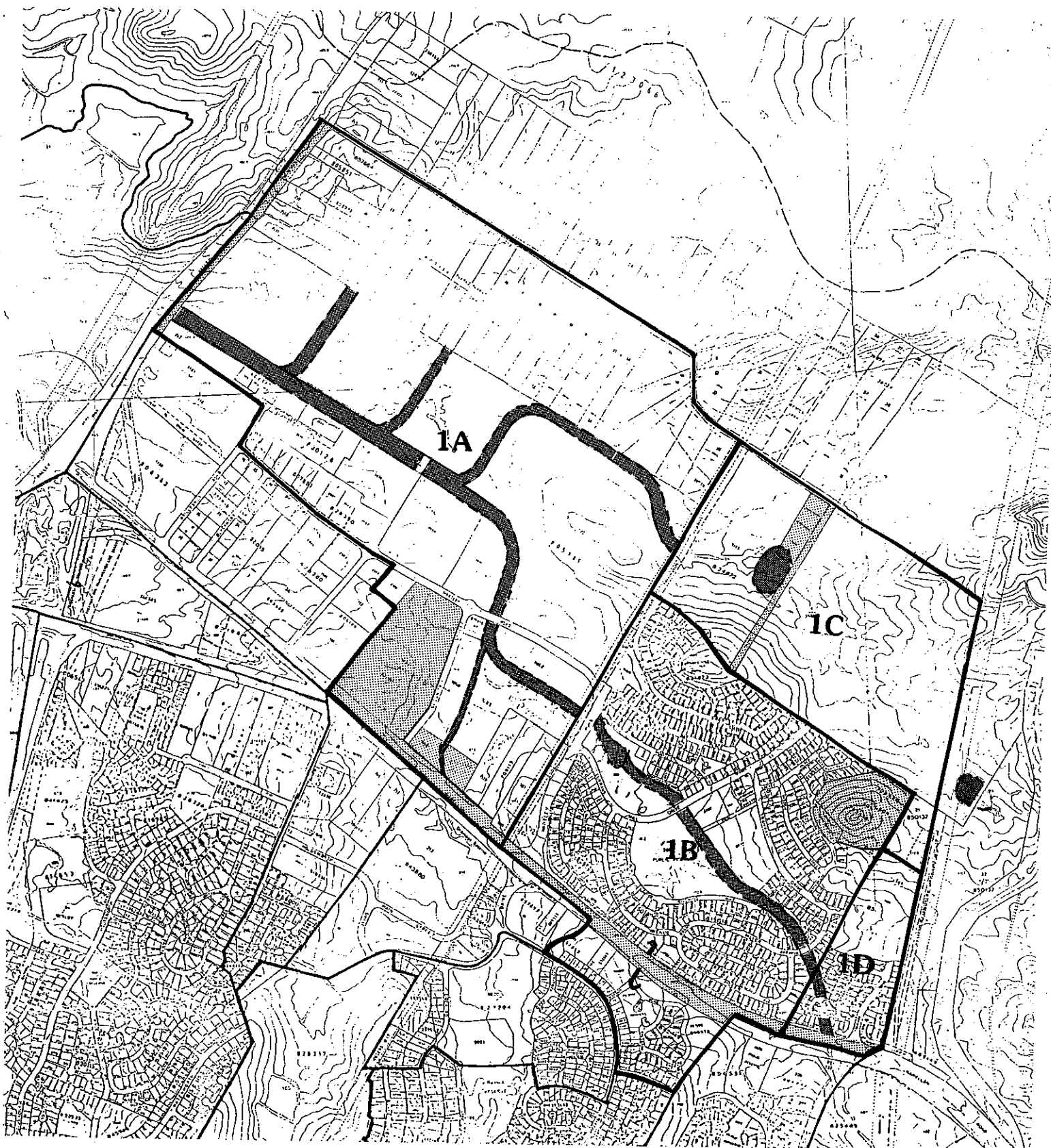
COUNCIL BOUNDARY





MAP C: URBAN RELEASE AREAS

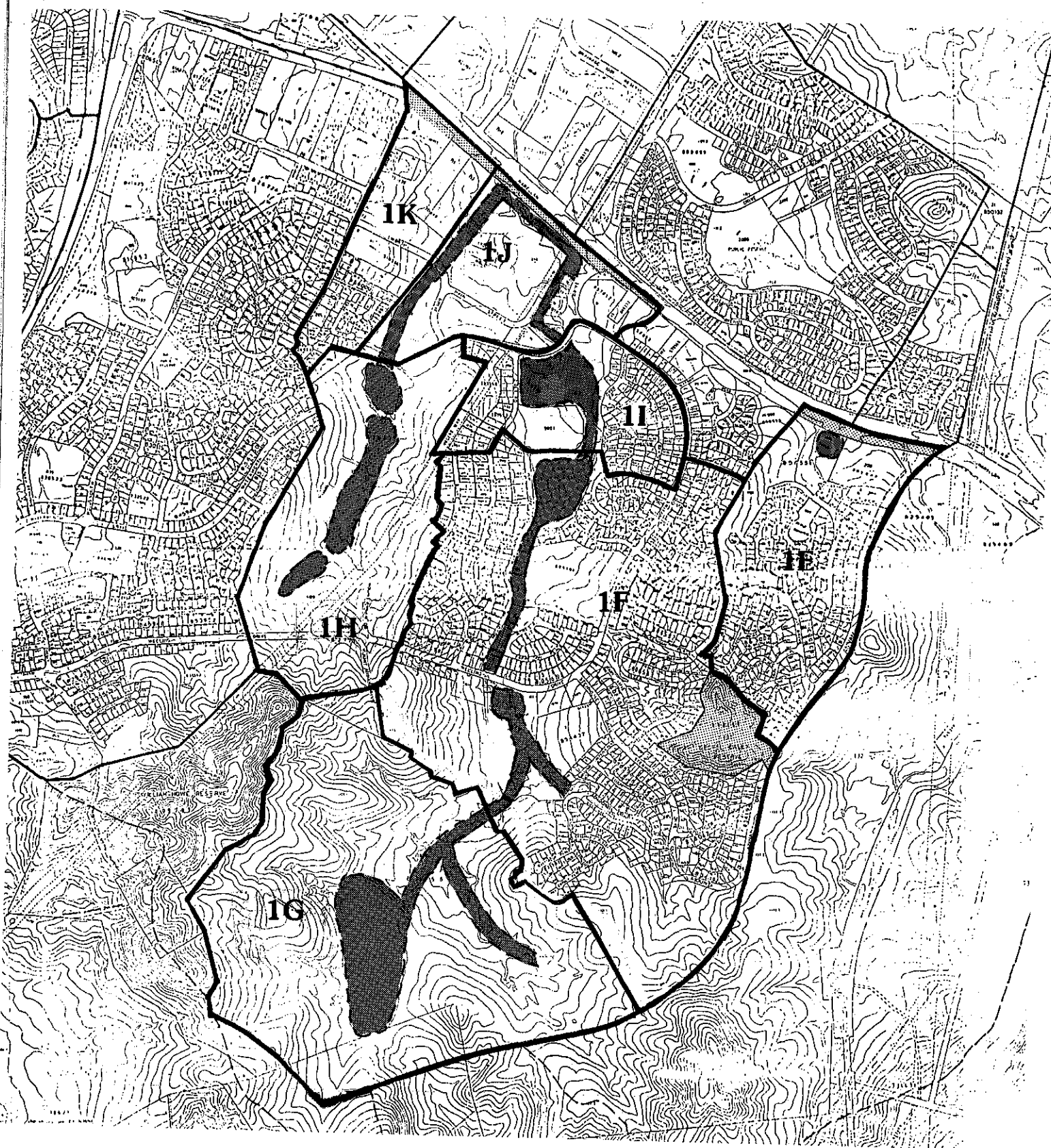


MAP B: DRAINAGE SUB CATCHMENTS





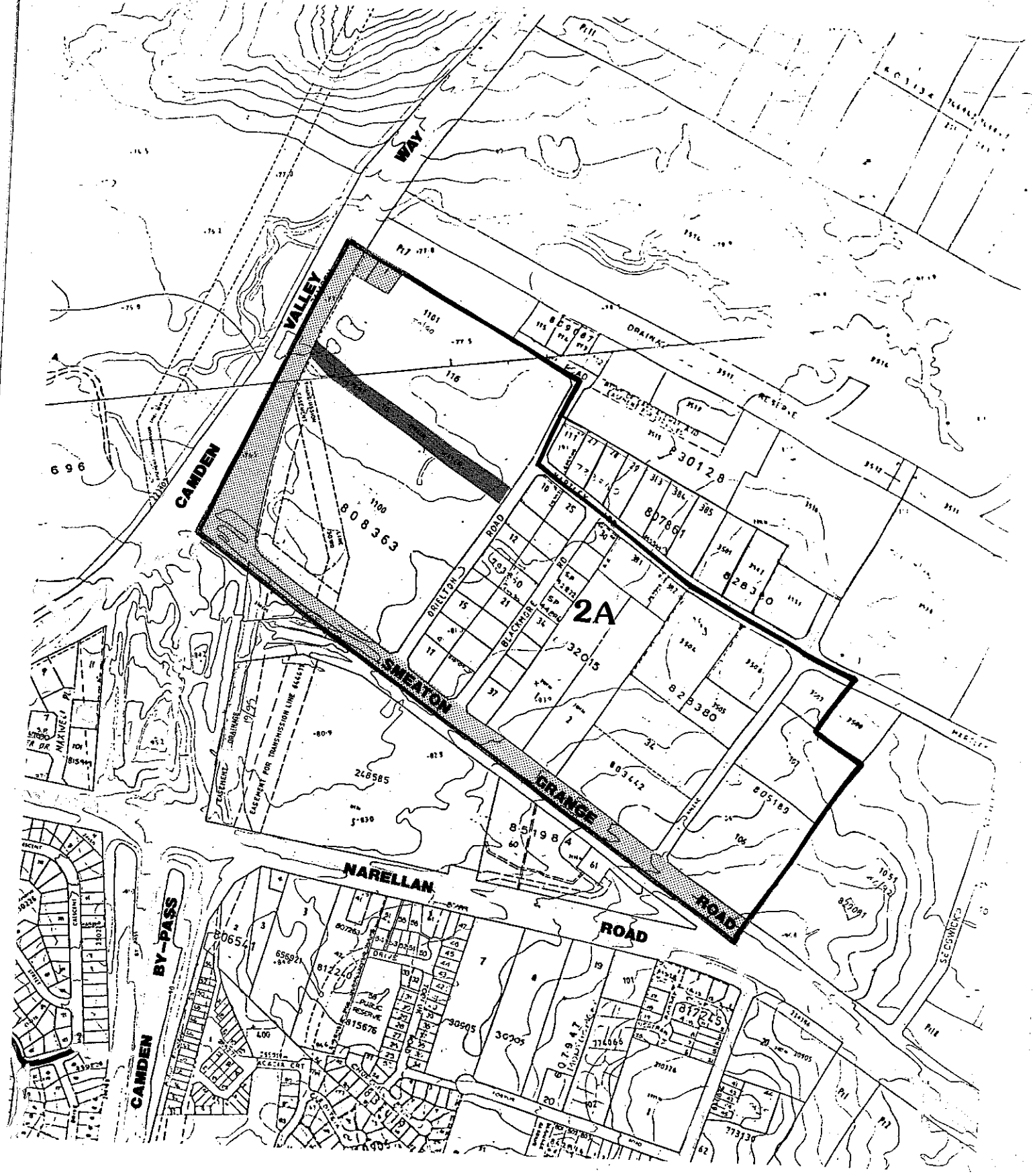
MAP D : PRECINCTS 1A -1D

-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS





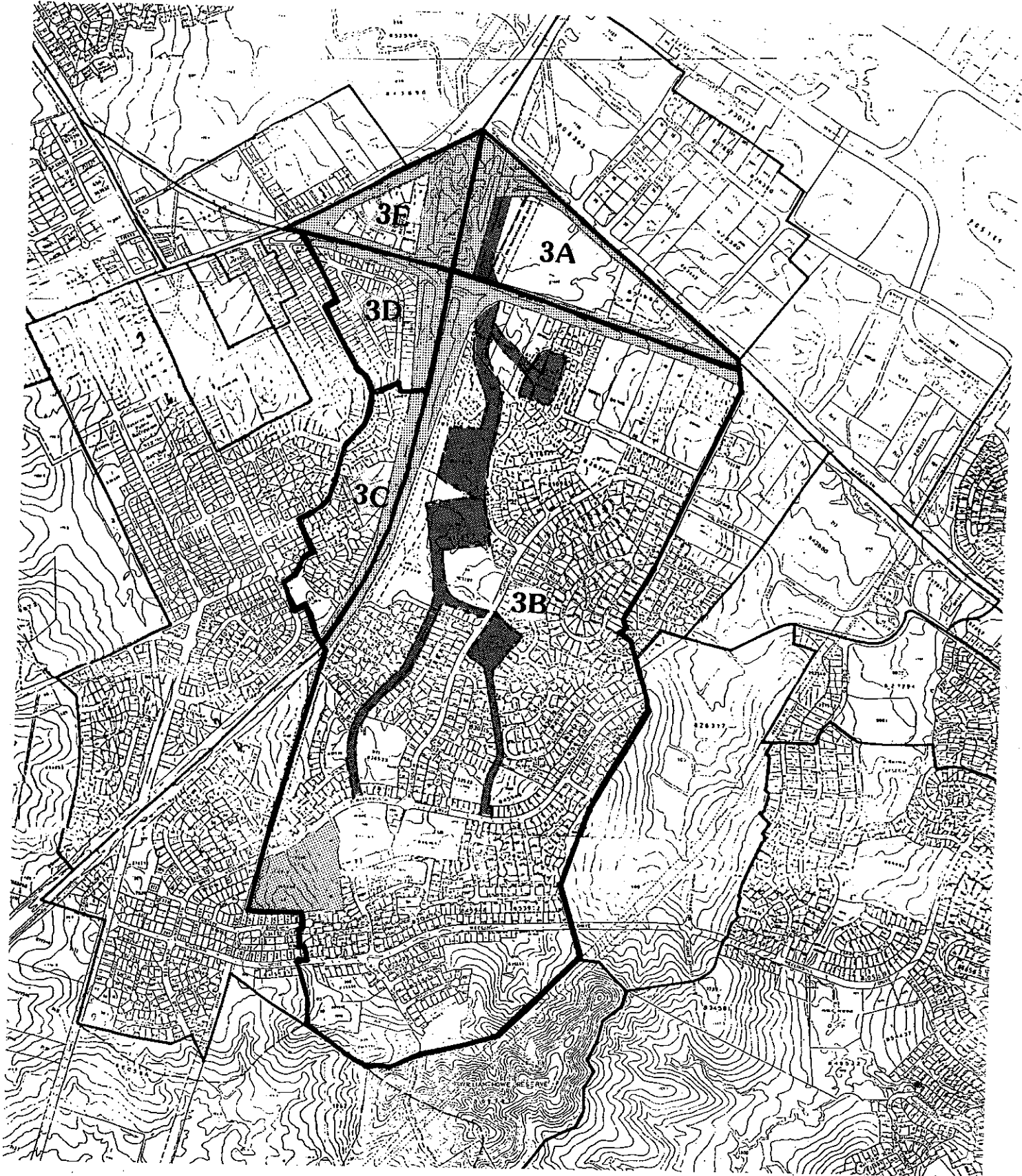
MAP E: PRECINCTS 1E- 1K

-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS





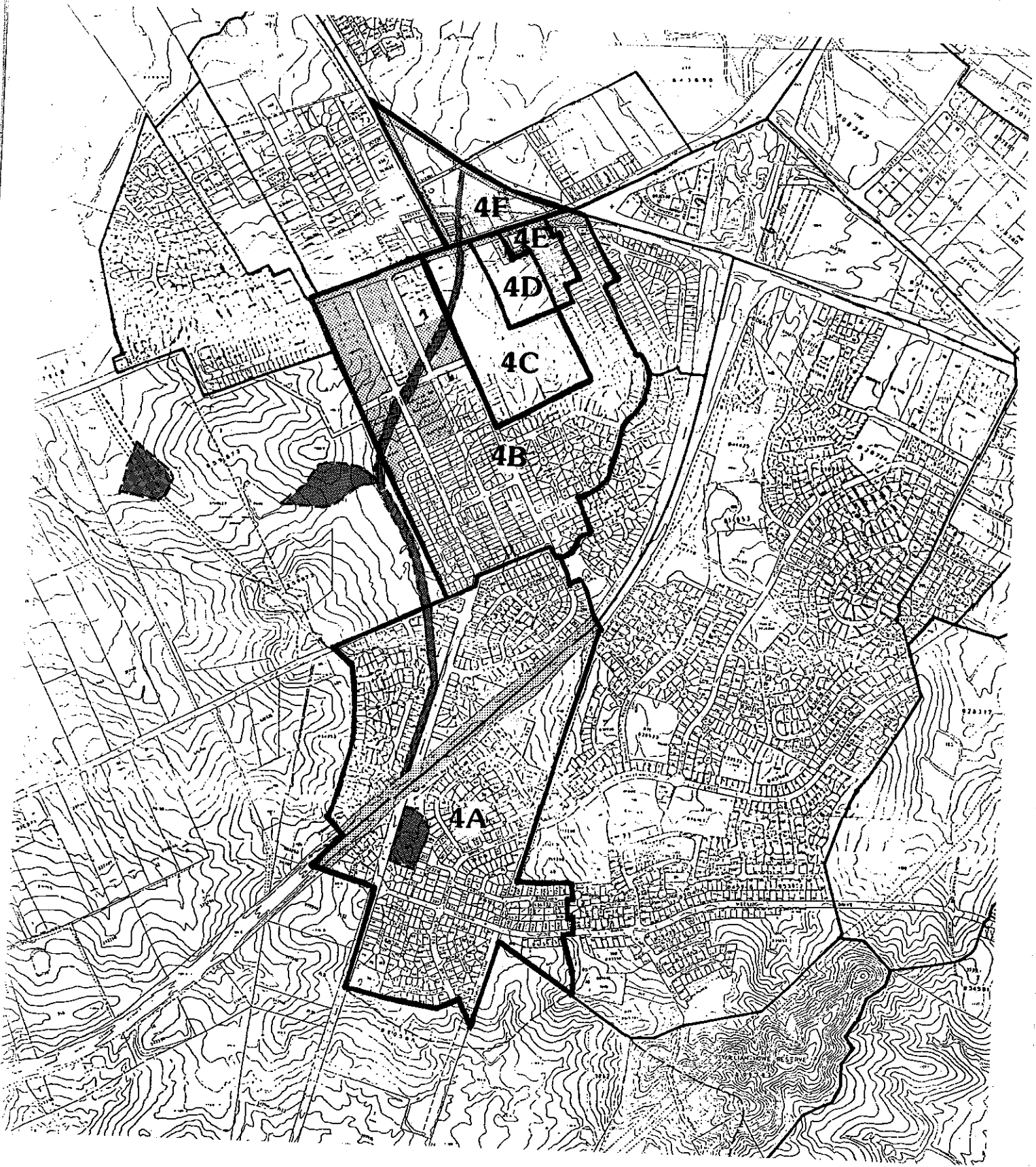
MAP F: PRECINCT 2A

-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS

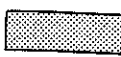



MAP G: PRECINCTS 3A - 3E

-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY

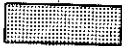



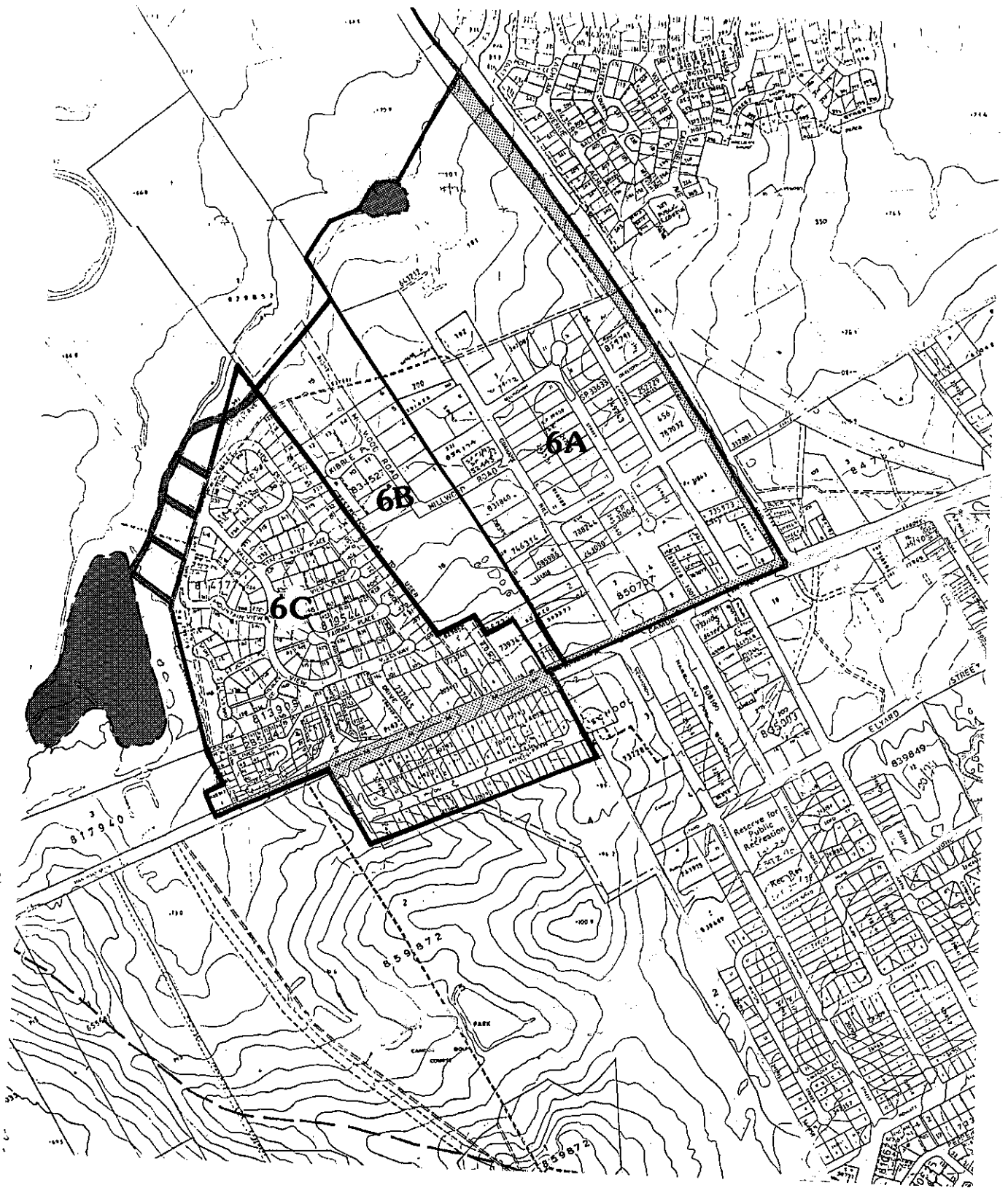
MAP H: PRECINCTS 4A - 4F

-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS


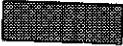


MAP I: PRECINCTS 5A & 5B

-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS



MAP J: PRECINCTS 6A - 6C

-  NON CONTRIBUTING AREAS WITHIN PRECINCTS
-  TRUNK DRAINAGE AND WATER QUALITY WORKS