

THE UNIVERSITY OF CALGARY

GUIDELINES

FOR

DEVELOPING THE PHYSICAL

INFRASTRUCTURE OF

SMALL NORTHERN COMMUNITIES

by

Ronald M. McCaw

A MASTERS DEGREE PROJECT

SUBMITTED TO THE FACULTY OF ENVIRONMENTAL DESIGN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ENVIRONMENTAL DESIGN

(PLANNING)

FACULTY OF ENVIRONMENTAL DESIGN

CALGARY, ALBERTA

MARCH, 1994

c Ronald M. McCaw 1994



National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-315-93945-1

Canada

Name

Ronald M. McLean

Dissertation Abstracts International is arranged by broad, general subject categories. Please select the one subject which most nearly describes the content of your dissertation. Enter the corresponding four-digit code in the spaces provided.

Urban and Regional Planning

SUBJECT TERM

0999

SUBJECT CODE

U·M·I

Subject Categories

THE HUMANITIES AND SOCIAL SCIENCES

COMMUNICATIONS AND THE ARTS

Architecture0729
Art History0377
Cinema0900
Dance0378
Fine Arts0357
Information Science0723
Journalism0391
Library Science0399
Mass Communications0708
Music0413
Speech Communication0459
Theater0465

EDUCATION

General0515
Administration0514
Adult and Continuing0516
Agricultural0517
Art0273
Bilingual and Multicultural0282
Business0688
Community College0275
Curriculum and Instruction0727
Early Childhood0518
Elementary0524
Finance0277
Guidance and Counseling0519
Health0680
Higher0745
History of0520
Home Economics0278
Industrial0521
Language and Literature0279
Mathematics0280
Music0522
Philosophy of0998
Physical0523

Psychology0525
Reading0535
Religious0527
Sciences0714
Secondary0533
Social Sciences0534
Sociology of0340
Special0529
Teacher Training0530
Technology0710
Tests and Measurements0288
Vocational0747

LANGUAGE, LITERATURE AND LINGUISTICS

Language
General0679
Ancient0289
Linguistics0290
Modern0291
Literature
General0401
Classical0294
Comparative0295
Medieval0297
Modern0298
African0316
American0591
Asian0305
Canadian (English)0352
Canadian (French)0355
English0593
Germanic0311
Latin American0312
Middle Eastern0315
Romance0313
Slavic and East European0314

PHILOSOPHY, RELIGION AND THEOLOGY

Philosophy0422
Religion
General0318
Biblical Studies0321
Clergy0319
History of0320
Philosophy of0322
Theology0469

SOCIAL SCIENCES

American Studies0323
Anthropology
Archaeology0324
Cultural0326
Physical0327
Business Administration
General0310
Accounting0272
Banking0770
Management0454
Marketing0338
Canadian Studies0385
Economics
General0501
Agricultural0503
Commerce-Business0505
Finance0508
History0509
Labor0510
Theory0511
Folklore0358
Geography0366
Gerontology0351
History
General0578

Ancient0579
Medieval0581
Modern0582
Black0328
African0331
Asia, Australia and Oceania0332
Canadian0334
European0335
Latin American0336
Middle Eastern0333
United States0337
History of Science0585
Law0398
Political Science
General0615
International Law and
Relations0616
Public Administration0617
Recreation0814
Social Work0452
Sociology
General0626
Criminology and Penology0627
Demography0938
Ethnic and Racial Studies0631
Individual and Family
Studies0628
Industrial and Labor
Relations0629
Public and Social Welfare0630
Social Structure and
Development0700
Theory and Methods0344
Transportation0709
Urban and Regional Planning0999
Women's Studies0453

THE SCIENCES AND ENGINEERING

BIOLOGICAL SCIENCES

Agriculture
General0473
Agronomy0285
Animal Culture and
Nutrition0475
Animal Pathology0476
Food Science and
Technology0359
Forestry and Wildlife0478
Plant Culture0479
Plant Pathology0480
Plant Physiology0817
Range Management0777
Wood Technology0746
Biology
General0306
Anatomy0287
Biostatistics0308
Botany0309
Cell0379
Ecology0329
Entomology0353
Genetics0369
Limnology0793
Microbiology0410
Molecular0307
Neuroscience0317
Oceanography0416
Physiology0433
Radiation0821
Veterinary Science0778
Zoology0472
Biophysics
General0786
Medical0760

EARTH SCIENCES

Biogeochemistry0425
Geochemistry0996

Geodesy0370
Geology0372
Geophysics0373
Hydrology0388
Mineralogy0411
Paleobotany0345
Paleoecology0426
Paleontology0418
Paleozoology0985
Palynology0427
Physical Geography0368
Physical Oceanography0415

HEALTH AND ENVIRONMENTAL SCIENCES

Environmental Sciences0768
Health Sciences
General0566
Audiology0300
Chemotherapy0992
Dentistry0567
Education0350
Hospital Management0769
Human Development0758
Immunology0982
Medicine and Surgery0564
Mental Health0347
Nursing0569
Nutrition0570
Obstetrics and Gynecology0380
Occupational Health and
Therapy0354
Ophthalmology0381
Pathology0571
Pharmacology0419
Pharmacy0572
Physical Therapy0382
Public Health0573
Radiology0574
Recreation0575

Speech Pathology0460
Toxicology0383
Home Economics0386

PHYSICAL SCIENCES

Pure Sciences
Chemistry
General0485
Agricultural0749
Analytical0486
Biochemistry0487
Inorganic0488
Nuclear0738
Organic0490
Pharmaceutical0491
Physical0494
Polymer0495
Radiation0754
Mathematics0405
Physics
General0605
Acoustics0986
Astronomy and
Astrophysics0606
Atmospheric Science0608
Atomic0748
Electronics and Electricity0607
Elementary Particles and
High Energy0798
Fluid and Plasma0759
Molecular0609
Nuclear0610
Optics0752
Radiation0756
Solid State0611
Statistics0463

Applied Sciences

Applied Mechanics0346
Computer Science0984

Engineering
General0537
Aerospace0538
Agricultural0539
Automotive0540
Biomedical0541
Chemical0542
Civil0543
Electronics and Electrical0544
Heat and Thermodynamics0348
Hydraulic0545
Industrial0546
Marine0547
Materials Science0794
Mechanical0548
Metallurgy0743
Mining0551
Nuclear0552
Packaging0549
Petroleum0765
Sanitary and Municipal0554
System Science0790
Geotechnology0428
Operations Research0796
Plastics Technology0795
Textile Technology0994

PSYCHOLOGY

General0621
Behavioral0384
Clinical0622
Developmental0620
Experimental0623
Industrial0624
Personality0625
Physiological0989
Psychobiology0349
Psychometrics0632
Social0451



Nom _____

Dissertation Abstracts International est organisé en catégories de sujets. Veuillez s.v.p. choisir le sujet qui décrit le mieux votre thèse et inscrire le code numérique approprié dans l'espace réservé ci-dessous.



SUJET

CODE DE SUJET

Catégories par sujets

HUMANITÉS ET SCIENCES SOCIALES

COMMUNICATIONS ET LES ARTS

Architecture	0729
Beaux-arts	0357
Bibliothéconomie	0399
Cinéma	0900
Communication verbale	0459
Communications	0708
Danse	0378
Histoire de l'art	0377
Journalisme	0391
Musique	0413
Sciences de l'information	0723
Théâtre	0465

ÉDUCATION

Généralités	515
Administration	0514
Art	0273
Collèges communautaires	0275
Commerce	0688
Économie domestique	0278
Éducation permanente	0516
Éducation préscolaire	0518
Éducation sanitaire	0680
Enseignement agricole	0517
Enseignement bilingue et multiculturel	0282
Enseignement industriel	0521
Enseignement primaire	0524
Enseignement professionnel	0747
Enseignement religieux	0527
Enseignement secondaire	0533
Enseignement spécial	0529
Enseignement supérieur	0745
Évaluation	0288
Finances	0277
Formation des enseignants	0530
Histoire de l'éducation	0520
Langues et littérature	0279

Lecture	0535
Mathématiques	0280
Musique	0522
Orientation et consultation	0519
Philosophie de l'éducation	0998
Physique	0523
Programmes d'études et enseignement	0727
Psychologie	0525
Sciences	0714
Sciences sociales	0534
Sociologie de l'éducation	0340
Technologie	0710

LANGUE, LITTÉRATURE ET LINGUISTIQUE

Langues	
Généralités	0679
Anciennes	0289
Linguistique	0290
Modernes	0291
Littérature	
Généralités	0401
Anciennes	0294
Comparée	0295
Médiévale	0297
Moderne	0298
Africaine	0316
Américaine	0591
Anglaise	0593
Asiatique	0305
Canadienne (Anglaise)	0352
Canadienne (Française)	0355
Germanique	0311
Latino-américaine	0312
Moyen-orientale	0315
Romane	0313
Slave et est-européenne	0314

PHILOSOPHIE, RELIGION ET

THEOLOGIE	
Philosophie	0422
Religion	
Généralités	0318
Clergé	0319
Études bibliques	0321
Histoire des religions	0320
Philosophie de la religion	0322
Théologie	0469

SCIENCES SOCIALES

Anthropologie	
Archéologie	0324
Cultuelle	0326
Physique	0327
Droit	0398
Économie	
Généralités	0501
Commerce-Affaires	0505
Économie agricole	0503
Économie du travail	0510
Finances	0508
Histoire	0509
Théorie	0511
Études américaines	0323
Études canadiennes	0385
Études féministes	0453
Folklore	0358
Géographie	0366
Gérontologie	0351
Gestion des affaires	
Généralités	0310
Administration	0454
Banques	0770
Comptabilité	0272
Marketing	0338
Histoire	
Histoire générale	0578

Ancienne	0579
Médiévale	0581
Moderne	0582
Histoire des noirs	0328
Africaine	0331
Canadienne	0334
États-Unis	0337
Européenne	0335
Moyen-orientale	0333
Latino-américaine	0336
Asie, Australie et Océanie	0332
Histoire des sciences	0585
Loisirs	0814
Planification urbaine et régionale	0999
Science politique	
Généralités	0615
Administration publique	0617
Droit et relations internationales	0616
Sociologie	
Généralités	0626
Aide et bien-être social	0630
Criminologie et établissements pénitentiaires	0627
Démographie	0938
Études de l'individu et de la famille	0628
Études des relations interethniques et des relations raciales	0631
Structure et développement social	0700
Théorie et méthodes	0344
Travail et relations industrielles	0629
Transports	0709
Travail social	0452

SCIENCES ET INGÉNIERIE

SCIENCES BIOLOGIQUES

Agriculture	
Généralités	0473
Agronomie	0285
Alimentation et technologie alimentaire	0359
Culture	0479
Élevage et alimentation	0475
Exploitation des pâturages	0777
Pathologie animale	0476
Pathologie végétale	0480
Physiologie végétale	0817
Sylviculture et taune	0478
Technologie du bois	0746
Biologie	
Généralités	0306
Anatomie	0287
Biologie (Statistiques)	0308
Biologie moléculaire	0307
Botanique	0309
Cellule	0379
Écologie	0329
Entomologie	0353
Génétique	0369
Limnologie	0793
Microbiologie	0410
Neurologie	0317
Océanographie	0416
Physiologie	0433
Radiation	0821
Science vétérinaire	0778
Zoologie	0472
Biophysique	
Généralités	0786
Médicale	0760

SCIENCES DE LA TERRE

Biogéochimie	0425
Géochimie	0996
Géodésie	0370
Géographie physique	0368

Géologie	0372
Géophysique	0373
Hydrologie	0388
Minéralogie	0411
Océanographie physique	0415
Paléobotanique	0345
Paléocéologie	0426
Paléontologie	0418
Paléozoologie	0985
Palynologie	0427

SCIENCES DE LA SANTÉ ET DE L'ENVIRONNEMENT

Économie domestique	0386
Sciences de l'environnement	0768
Sciences de la santé	
Généralités	0566
Administration des hôpitaux	0769
Alimentation et nutrition	0570
Audiologie	0300
Chimiothérapie	0992
Dentisterie	0567
Développement humain	0758
Enseignement	0350
Immunologie	0982
Loisirs	0575
Médecine du travail et thérapie	0354
Médecine et chirurgie	0564
Obstétrique et gynécologie	0380
Ophtalmologie	0381
Orthophonie	0460
Pathologie	0571
Pharmacie	0572
Pharmacologie	0419
Physiothérapie	0382
Radiologie	0574
Santé mentale	0347
Santé publique	0573
Soins infirmiers	0569
Toxicologie	0383

SCIENCES PHYSIQUES

Sciences Pures	
Chimie	
Généralités	0485
Biochimie	0487
Chimie agricole	0749
Chimie analytique	0486
Chimie minérale	0488
Chimie nucléaire	0738
Chimie organique	0490
Chimie pharmaceutique	0491
Physique	0494
Polymères	0495
Radiation	0754
Mathématiques	0405
Physique	
Généralités	0605
Acoustique	0986
Astronomie et astrophysique	0606
Électronique et électricité	0607
Fluides et plasma	0759
Météorologie	0608
Optique	0752
Particules (Physique nucléaire)	0798
Physique atomique	0748
Physique de l'état solide	0611
Physique moléculaire	0609
Physique nucléaire	0610
Radiation	0756
Statistiques	0463

Sciences Appliquées Et Technologie	
Informatique	0984
Ingénierie	
Généralités	0537
Agricole	0539
Automobile	0540

Biomédicale	0541
Chaleur et thermodynamique	0348
Conditionnement (Emballage)	0549
Génie aérospatial	0538
Génie chimique	0542
Génie civil	0543
Génie électronique et électrique	0544
Génie industriel	0546
Génie mécanique	0548
Génie nucléaire	0552
Ingénierie des systèmes	0790
Mécanique navale	0547
Métallurgie	0743
Science des matériaux	0794
Technique du pétrole	0765
Technique minière	0551
Techniques sanitaires et municipales	0554
Technologie hydraulique	0545
Mécanique appliquée	0346
Géotechnologie	0428
Matériaux plastiques (Technologie)	0795
Recherche opérationnelle	0796
Textiles et tissus (Technologie)	0794

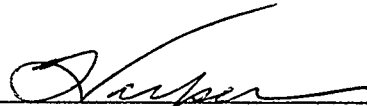
PSYCHOLOGIE

Généralités	0621
Personnalité	0625
Psychobiologie	0349
Psychologie clinique	0622
Psychologie du comportement	0384
Psychologie du développement	0620
Psychologie expérimentale	0623
Psychologie industrielle	0624
Psychologie physiologique	0989
Psychologie sociale	0451
Psychométrie	0632

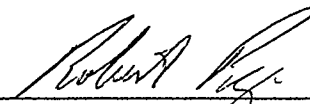


THE UNIVERSITY OF CALGARY
FACULTY OF ENVIRONMENTAL DESIGN

The undersigned certify that they have read, and recommend to the Faculty of Environmental Design for acceptance, a Master's Degree Report entitled "GUIDELINES FOR DEVELOPING THE PHYSICAL INFRASTRUCTURE OF SMALL NORTHERN COMMUNITIES", submitted by Ronald M. McCaw in partial fulfillment of the requirements for the degree of Master of Environmental Design.



Professor Thomas Harper
Faculty of Environmental Design



Dr. Robert Page
Dean, Faculty of Environmental Design



Robert Kitchen, P.Eng., M. Eng., MBA
External Advisor



Bernard Amell, Adjunct Professor
Dean's Examiner

APRIL 21, 1994
Date

TABLE OF CONTENTS

PAGE

ABSTRACT	i
PREFACE	iii
LIST OF APPENDICES	ix
GLOSSARY	x
PART I PLANNING FOR NATIVE NORTHERN SETTLEMENTS	
<u>Chapter I</u>	
INTRODUCTION	1
1.1 Planning Prospectives for Small Communities	4
<u>Chapter II</u>	
CONTEXT	6
2.1 Social Manifestations	7
2.2 Economic Manifestations	8
2.3 Cultural Manifestations	9
2.4 Institutional Manifestations	10
2.5 Form of Local Government and Relative Community Size	11
2.5.1 Band Councils	12
2.5.2 Hamlet or Settlement Council	12
2.5.3 Outpost Camps	13
2.5.4 Settlements	13
2.5.5 Hamlets	13
2.5.6 Villages	14

<u>Chapter III</u>	PAGE
PLANNING PROCESS	15
3.1 Assessing Community Needs	15
3.2 Research	16
3.2.1 Research Problems and Suggested Solutions	16
3.3 Research Methods	18
3.3.1 Telephone Interviews.	19
3.3.2 Mailed Questionnaires	19
3.3.3 Personal Interviews.	20
3.4 Resident Input to Planning Process	20
PART II LAND USE PLANNING AND HOUSING	

<u>Chapter IV</u>	
4.0 Community Land Use Planning	24
4.1 Factors for Consideration	25
4.2 Residential Land Use Areas	26
4.2.1 Health Concerns	27
4.2.2 Access/Convenience	27
4.2.3 Economic Restrictions	28
4.3 Commercial Land Use Areas	28
4.4 Industrial Land Use Areas	29
4.5 Recreational Land Use Areas	31
4.6 Special Use Land Areas	31

	PAGE
4.6.1 Churches	31
4.6.2 Schools	32
4.6.3 Graveyards	32
4.6.4 Gravel Pits	33
4.6.5 Access	33
4.6.6 Geographical Features and Natural Resources	34
4.6.7 Geographical Orientation	35
4.7 Inventory of Existing Resources	35
4.7.1 Data Sources	36
4.7.2 Air Photos	37
4.7.3 Boundary and Contour Survey	39
4.7.4 Geo-Technical Investigations	39
4.7.5 Technical Data on Physical Assets	40
 <u>Chapter V</u>	
HOUSING	43
5.1 Housing Requirements	43
5.1.1 Single Parent Families	45
5.1.2 Single Parent Families - Suggested Program	45
5.1.3 Community Elders	45
5.1.4 Housing for Elders - Suggested Program.	45
5.1.5 Low Income Families	47
5.1.6 Low Income Families - Suggested Program	48

	PAGE
5.1.7 Families with Income for Conventional Mortgage	48
5.1.8 Families with Income for a Conventional Mortgage - Program . .	49
5.2 Owner Assisted Programs	49
5.2.1 Owner Build Program	49
5.2.2 Lease to Purchase Program	50
5.2.3 Lease/Purchase Financial Guidelines	51
5.3 Funding Alternatives	52
5.3.1 Direct Lending Program	52
5.3.2 Forgiveable Loans to First Time Home Owners	53
5.3.3 Alternate Housing Program	54
5.3.4 Direct Sale of Housing Packages	54
5.3.5 Profit Sharing on the Sale of a Home Prior to Loan Payout . . .	55
PART III PUBLIC WORKS REQUIREMENTS	
INTRODUCTION	56
<u>Chapter VI</u>	
MANAGERIAL REQUIREMENTS AND RESPONSIBILITIES	57
6.1 Economic Capability	57
6.1 Desire for Independence	58
6.1 Interest and Motivation	58
6.4 Financial Alternatives Available	59
6.5 Economic and Employment Opportunities	60
6.6 Buildings	61

	PAGE
6.7 Storage	61
6.8 Supervision of Community Activities	62
6.9 Administration Duties	63
6.10 Public Works Department	64
6.11 Employee Training	65
6.12 Contracted Obligations	66
6.13 Maintenance of Parks and Recreational Facilities	66
6.14 Collection of Accounts	67

Chapter VII

PUBLIC WORKS - PHYSICAL INFRASTRUCTURE	68
7.1 Water Treatment and Distribution	68
7.2 Recommendations for Water Treatment Plan	69
7.3 Considerations for Fire Suppression	70
7.4 Waste Water Treatment and Collection	71
7.5 Buildings Maintenance	73
7.6 Equipment Maintenance	74
7.7 Supervision of Community Assets	75
7.8 Delivery of Essential Services	76
7.9 Fire Protection	76

Chapter VIII

SOLID WASTE DISPOSAL	78
8.1 Burdens on Land Fill Sites	79

	PAGE
8.2 Problems Related to Improper Handling of Solid Waste	80
8.3 Wind Blown Debris	80
8.4 Construction Considerations	81
8.5 Waste Reduction	83
8.6 Calculation of Land Fill Requirements	83
8.7 Solid Waste Collection	84
8.7.1 Frequency of Collection	84
8.7.2 Individual or Area Pick-Up	84
8.7.3 Hamlet Personnel or Private Contractor	85
8.7.4 Recycling	86
 <u>Chapter IX</u>	
CONCLUSION AND SUMMARY	87
REFERENCES	101
PERSONAL INTERVIEWS	103

LIST OF APPENDICES

PAGE

APPENDIX

A	Form of Local Government and Relative Community Size	91
B	Summary of Problems and Probable Causes	92
C	Water Treatment	93
D	Waste Water Treatment	94
E	Summary of Recreational Activities	95
F	Summary of Maintenance Equipment	96
G	Owner Build Sweat Equity	97
H	Owner Build and Lease to Purchase	98
I	Planning Process - Time/Cost Estimate	99
J	Implementation of Guidelines - Time/Cost Estimate	100

ABSTRACT

GUIDELINES FOR DEVELOPING THE PHYSICAL INFRASTRUCTURE OF SMALL NORTHERN COMMUNITIES

by Ronald M. McCaw

Completed in partial fulfillment of the requirements for the Degree of

Master of Environmental Design (Planning)
Faculty of Environmental Design
University of Calgary
March 1994

Project Supervisor: Professor Thomas Harper

This Master's Degree Project (MDP) establishes guidelines by which the Band Councils of small northern communities may facilitate expansion or improvements to the physical infrastructure of their community. Further, this MDP offers options for the decision-makers to consider when they choose to develop a community plan or expand services within their community.

Small northern communities evolved either from popular meeting places or from areas where natural resources were plentiful. These communities grew in the direction of easiest development. When the communities were small and relatively undeveloped, there was little need for long-range community planning. However, many of these settlements have grown larger with time and residents now wish to enjoy some of the amenities and services found in larger urban centres.

Band Council members who are responsible for planning the direction of growth for their community will have choices to make, and this MDP offers some of the information base required to make those choices. Development options include considerations which are based on the physical constraints of the settlement site, oral history, and the needs of the residents. These guidelines emphasize the importance of human resources, and the need for interaction between residents and the administration in the community. This MDP also recognizes the requirement for training. The instinct for sustainable living, combined with the current levels of technology will help to focus the direction of the Band Council when choosing their priorities.

KEY WORDS:

Northern Community Development Guidelines, Northern Community Physical Development, Northern Community Infrastructure, Northern Community Water and Waste Water Treatment, Northern Community Public Works, Northern Community Land Use Planning, Northern Community Housing

GLOSSARY OF TERMS

Oral History

A record of past events as recalled and detailed by elders to acquaint people with cultural history, a window on the past.

Northwest Territorial Housing Corporation

A territorial crown corporation organized to promote, facilitate and construct public and private housing within the Northwest Territories.

Hereditary Chief

In some native bands, the position of band chief is hereditary, meaning it is passed on from father to son or daughter.

Leakage

The term used, when wages and profit generated by projects within a community, leave the community because the money is being spent outside community.

Contour Survey

Records topographical information - differences in heights of features.

Geo-technical Survey

Records the different soil types, water table levels, rock types and sub-surface conditions.

Water Treatment

The process by which raw, untreated water becomes safe for human or animal consumption, ie; it becomes "potable".

Waste Water

The term used to describe water which has been used or contaminated by use. Waste water discharged into a stream, from a process is called "effluent".

Truck Fill Point	<i>The point of access to a water treatment plant (filling spout) where purchasers of water may fill their containers with a pre-determined volume of water for a pre-determined price.</i>
"Fire Only"	<i>An emergency water pressure system to be used in the event of fire, not to be used for human consumption.</i>
P.S.I.	<i>Pounds per square inch is a measure of pressure within a pipe, and is associated with the volume of water from the pipe.</i>
Package Treatment Plant	<i>A self-contained arrangement of mechanical equipment designed to treat water or waste water, as the case may be. Generally transported completely assembled to a site.</i>
Photo Mosaic	<i>A number of smaller photographs joined together to illustrate features not found on any one of the smaller photographs, similar to the process used in a patch work quilt.</i>
Buffer	<i>A device used to minimize the negative effects of noise, wind, snow drifting, ie; Buffers may be natural (trees) or man made, (fences).</i>
Scraper Ditch	<i>A wide flat bottomed ditch with shallow sloping sides; used to contain above average amounts of snow or precipitation; a combination of ditch and storage area.</i>
Raw Water	<i>Untreated water, not potable.</i>
Area Fill	<i>Refers to a method of handling solid waste disposal at a landfill sitewhich involves. Working the entire "face" of the waste trench one section at one time. This method results in a more efficient operation due to: increased compaction, less bulk, better drainage and less material required to cover the waste.</i>

PREFACE

It is my sincere wish that this MDP will provide residents of small northern communities with an understanding of the importance of the issues discussed and will aid them in building a better community, one which is more in-line with their cultural needs.

I wish to acknowledge the contribution of my supervisor, Professor Tom Harper who has provided invaluable advice and encouragement. I would also like to thank my other committee members, Dr. Robert Page, Dean of the Environmental Design Faculty and Mr. Robert Kitchen P. Eng., City of Calgary, who was also my employer during the term of my studies and who gave advice and support. A special thanks also to Professors Val Geist, Bill Perks, Richard Revel, and Grant Ross who gave me the encouragement to enroll in the program and provided ongoing support during the course of my studies.

My experience in northern community development has extended over a period of eighteen years and I would like to thank my friend and co-worker, who was a source of much needed research materials, Mr. Milton Pittman. Without his help this project would have been considerably more difficult and demanding.

Finally, I would like to thank my wife Joan for her many hours of typing, and my two sons, William and Brennan for their encouragement and their support.

PART I PLANNING FOR NATIVE NORTHERN SETTLEMENTS

Chapter I

INTRODUCTION

With the growing movement for independence and self government, Native bands are maintaining a constant pressure on the Federal Government and its Provincial counterparts to settle Aboriginal Land Claims. Senior levels of government are now conforming to the wishes of the bands and are recognizing some complaints as being valid. When agreements are reached, funds are then advanced to begin local improvements. Unfortunately, in practice, smaller bands do not have an orderly approach to using these funds for the development of their communities. Without a comprehensive community development plan, development funding is often used ineffectively.

Aboriginal cultures are primarily "present" oriented.¹ Traditionally, they were hunters and gatherers, and the future was not foreseeable. Their experience relative to the future included elements beyond their control, such as the movement of animals, storms, early winter or late spring. Therefore, planning was deemed unnecessary²

The small native community's ideas of long range planning were based on events in the past. A good year or a poor year was remembered by a change in the migration path of the caribou, or a winter of deep snow when food was scarce, or disease rampant. This type of planning is evident in the shape of the villages that are stretched along the shores of a lake or river.

¹ Gerein, H.J.F., *Towards an Urban Land Policy for the Northwest Territories*, 1979

² Salway-Black, Sherry, *Understanding the Tribal Context for Development*, Oregon, U.S.A 1992

This manner of planning was suitable for the present population when there was little appreciable increase in band members. When band populations increased, the new members simply settled on the nearest available property.

These small villages are often found at the confluence of a river and lake or on a river where a major change in direction takes place, thus giving the village both a front and rear exit or entrance. These rivers and lakes provided not only a food source, but a reliable means of all weather transportation as well. Lakes and rivers were readily identifiable landmarks, their locations referenced to other land marks and easily described to other hunters. The kinship and traditional values natives placed on bodies of water as a food source may account for the low density of the villages.

The idea of planning for future changes is a relatively new concept and not totally understood by many aboriginal people. Planning has always been a family matter, rather than, as an adjunct to the family's duties as a member of the community. While historic trends are no longer valid, any attempts to change cultural behavior should be based on community acceptance or "buy-in".

Single family homes and traditional lifestyles require open spaces and separation from neighbours. These open spaces are not some subconscious need for "elbow room" but are necessary to the native life style: room is needed for dogs, fish drying racks and boat or recreational vehicle storage. Space may also be required for piles of heating wood, smoke tents and out buildings. Most of the communities (50 - 300 population) are of a size whereby the common conveniences associated with efficient subdivision designs do not apply. Common conveniences may be defined as; block landscaping, water distribution and waste pickup.

Review of current literature and discussions with experts who are involved in housing delivery programs in both the Northwest Territories Housing Corporation³ and Alberta Housing⁴ have prioritized housing as the most pressing problem at this time. Lack of housing remains the single biggest deterrent to community spirit and public health in the small settlements today.⁵ Most native communities are experiencing a high rate of population growth (approximately 3 - 4%) attributable to the increasing number of younger residents, as opposed to the norm of approximately 1.5 to 2% for other northern residents.⁶ In accordance with the native history of close family ties, all single children normally remain at home with their parents. When children marry and wish to leave their parents' home, housing for rent or purchase is often non-existent, nor is prepared or suitable land on which to build new housing stock. The high rate of population growth will have a considerable impact on the communities in terms of planning, on the need for prepared building lots, recreation facilities, and an increased need for employment.

The concept of individual land ownership remains alien to the native northerner⁷, however, territoriality is widely understood amongst the various native bands and a communal tenure is widely accepted, as opposed to individual land ownership as we know it. Yet it should also be noted that a "southern-type" local government structure accompanies lot ownership by necessity. Some means of paying for services must be devised that recognizes the "user pay" principle, for example; land taxes, frontage fees, and the distribution and collection of individual services.

³ Pittman, Milton, Lands Manager, Yellowknife, N.W.T., Personal Interview, 1994.

⁴ Matthews, Mr. M., Accommodation Officer, High Prairie, Alberta

⁵ Central Mortgage and Housing Corporation, *Study of Core Housing Needs* 1992

⁶ Northwest Territories Housing Corporation, *Study on Housing Requirements* 1992

⁷ Gerein, H.J.F., *Towards an Urban Lands Policy for the Northwest Territories* 1979

1.1 Planning Perspectives For Small Communities

It is not the intent of this MDP to rewrite the Canadian Planning Act as it affects native northerners nor to point out deficiencies of the Northwest Territorial, Alberta Provincial, or Federal Government relative to the administration of small northern communities. The Band Council for a small northern communities sees the complex paper trail of applications and approvals as confusing and unnecessary. Why would approval from some bureaucrat in Yellowknife, Whitehorse or Peace River who will never live there be required to build a house in the community? This MDP will offer guidelines and options for the development of the physical infrastructure of the small northern community.

Most northern communities with a population between 50 to 300 people are predominately northern natives. It is to these **Band Councils**, and their **Planner**, that these development guidelines are addressed. This MDP will assume the Band Councils of these small communities will accept the responsibility for future planning. To that end, this Master's Degree Project will provide guidelines for that planning. These development guidelines address many of the common problems associated with the changing lifestyles in these small communities. Rather than offer a top down solution, this MDP will suggest options for Band Councils to consider, and allow them the freedom of choice in the direction they choose, according to their knowledge, of their own community.

Outside influences are greatly affecting traditional life styles within these small communities. Influences such as instant communication, the current and ever changing level of technology as well as modern efficient modes of transportation are placing severe strains on cultural values.

In turn, these values are being questioned by the younger generation and in many cases, rejected. Outside influences and their effect on traditional values are manifested as a life skills problem. A brief discussion of these problems may facilitate a deeper understanding of the planning issues.

For a summary of these problems and their probable causes see Appendix A.

Chapter II

CONTEXT

A rapidly changing lifestyle and the erosion of cultural values has magnified many of the common problems associated with the development of small northern communities. The native population finds itself unable to support the traditional way of life by the usual means. With the current attitude towards technology, hunting skills no longer have value, and the skills involved in the tanning of hides for clothing is redundant, when store bought clothes are available immediately, with little effort. Money, however, is required to purchase these goods and there are few opportunities for earning money in the small communities.

Employment opportunities in the small communities are very scarce and often temporary. Traditional skills are viewed as being no longer useful. Unemployment, substance abuse, lack of education and a growing dependence on social assistance payments is becoming common place. Young residents of the community see an apathetic older generation, and non-natives directing the daily affairs of their community. These problems and the conditions associated with them can be identified more accurately as symptoms of deeper problems beneath the surface. These problems must be identified and some means of solving them realized, before total community improvement can begin.

This chapter will describe the manifestations of these problems and suggest probable causes. Solutions for these problems must come from within the community itself, in the form of employment, adult education, self sufficiency and an awareness of the unique value of the heritage they share.

The most pressing of these problems is obvious in the condition of housing, the state of disrepair of community roads and infrastructure, as well as the general lack of community grooming. Inappropriate technology (due to a lack of community input) and a lack of community acceptance has contributed to the current condition. Infrastructure systems which have been planned by outside agencies unfamiliar with cultural standards or community needs has often led to technologies or policies which have been inappropriate and unacceptable. Institutional solutions to cultural aspirations have resulted in complete failures, initiated distrust, and furthered intolerance and misunderstanding.

"Inhabitants of the small northern settlements have a sense of recognition of who and what they are, a hard won wisdom based on a history of survival."⁸ For the purposes of these development guidelines, the social, economic, cultural and institutional aspects will be summarized, symptoms discussed and probable causes noted.⁹ This MDP assumes that many of the problems can be eliminated if the residents of the small communities are responsible for the administration, planning and decision making involved with the governing of their own settlement. Autonomy, employment, and education are seen as vital steps to establish a sense of pride, and a sense of place.

2.1 Social Manifestations

Occurrences of family abuse and neglect are indicative of changing and conflicting social and moral values. A loss of cultural standards and ever increasing instances of drug and alcohol abuse, result in depression and low self-esteem, often to the extremes of a mounting suicide rate.

⁸ *Winter Cities Volume VIII, No. 3, Page 11*

⁹ See Appendix B for details

The lack of employment contributes in a major way to low self-esteem, as does unrealistic and artificial expectations of an unattainable standard of living gained from watching television programs. In many of the small settlements, an outlet for social expression for youth such as a recreation center or hockey rink, does not exist. The lack of opportunity for Elders and the younger population to associate with each other in a social atmosphere is an important "opportunity lost" for the passing on of traditional and cultural values.

2.2 **Economic Manifestations**

The lack of a local economy or local enterprise results in the inevitable lack of employment in the villages. A lack of enterprise and employment at the local level encourages a further dependency on government assistance programs. With no economic opportunities or incentives for self-sufficiency there are no opportunities for self-improvement and no way to eliminate depression or self-doubt. Institutional policies and directives are often formulated in a centralized government bureaucracy, which is unaware of local or cultural expectations or requirements. Government policies are based on budgetary considerations and take the form of a "Project" (which is a one time occurrence) where instead, a "Program" with continuing local input would be much more appropriate.

When projects in the community are carried out by external contractors, higher leakages than normal occur: wages and profit immediately migrate from the community rather than further contributing directly to the local economy (ie. there is little or no multiplier effect). Local labour may be hired to appease hiring policies, but often menial labour and non-skilled, short term jobs are offered.

Skilled labour or jobs which require on-the-job training are not open at this level, unless some government hiring incentive is offered, such as a wage subsidy. For these reasons, resident workers are becoming increasingly more frustrated and resentful to outside instigated improvements, and see some benefits in continuing the welfare state. Residents react to the situation by showing little interest in these projects and refuse to become involved. This show of disinterest furthers outside involvement, because the absence of a local labour pool necessitates importing labourers from outside the community, and compounds the problem further.

2.3 **Cultural Manifestations**

A lack of interest in community activities, or participation in traditional events by community Elders or traditional offices of power such as hereditary chiefs, are obvious indicators of a lack of communication. The lack of interest and apathy shown by the Elders is reflected in the community. When disinterest and apathy prevail, inappropriate technology, and inconsistent standards, restrain any progress, thereby alienating local initiative or involvement.

This apathy and alienation in turn undermines cultural values and establishes distrust. Traditional native values encourage trust and openness by way of agreement by consensus. Non-native government dictates policies by top-down directive giving the impression of efficiency, but essentially providing another competing cultural value. Traditional native values become confused by their exposure to unrealistic and artificial expectations, such as unnaturally high, short-term wages or free benefits, clothing and transportation provided by a high-profile employer. When the employment ceases, the hopes of the native worker are extinguished by reality, and lack of meaningful employment.

As the Band Councils become responsible for the administration of community affairs, and the provision of community services, employment opportunities will increase, and wages will be in proportion to other community labour, and relative to the community lifestyle.

2.4 Institutional Manifestations

Very often, a government project will install or set into motion a low technology service to benefit the community, such as a water treatment plant, sewage lagoon or solid waste pick-up and disposal system. These systems are the result of "Development by Budget Control" (ie. another government project) and are Band-Aid solutions to an on-going problem. The installations are commissioned into service and often left to untrained, unskilled operators to operate and maintain. With little or no operator training, and less inclination to maintain an inappropriately designed service, the system slowly slides into disrepair.

White business interests can not understand why the northern native would sooner hunt or fish rather than operate a noisy, smelly mechanical treatment plant enclosed in an artificially lighted building, by himself, isolated on the edge of his or her village. Planners must be aware of the native operator's distaste for this situation. Housing the treatment plant in an attractive building with an exterior appearance similar to adjacent buildings, and situated on the perimeter of the community will contribute to a sense of belonging to the community. The building should be suitably landscaped and maintained. The operators should be enrolled in a formal training program and the value of his contribution (ie. safe water) for the community emphasized.

Government has partially conformed to popular public opinion, and allowed the villages to manage their own local improvement projects. In some cases, this independence and autonomy has been surprisingly successful, where local expertise has been induced into managing the enterprise. Other cases, however, have failed miserably due to a lack of experienced management. Where cases of local management failed to adequately manage project funding, (to non-native government standards) the failure has re-enforced an inaccurate, stereotyped opinion, based on ignorance, bias or lack of knowledge.

Any conscientious evaluation of community needs must, by necessity address the sociological, cultural and economic problems existing in these small northern communities. In order to advance community development objectives, economic needs must be realized, cultural aspirations satisfied, and social problems addressed. These problems require a stable local economy with accommodation for training and education. An appropriate level of community services, suitable and sufficient housing will improve self esteem, re-establish traditional beliefs, independence and values.

2.5 Form of Local Government and Relative Community Size

In order to encourage participation by the Elders in decisions affecting their communities, the senior level of government has decreed that a recognizable form of local government (Band Councils) deal with them on issues that affect future plans for the community. This local government may take slightly different forms according to the size of the community population. To fully understand these "local" governments, a brief explanation will be offered under the following categories: outpost camps, settlements, hamlets and villages.

2.5.1 **Band Council**

Community planning can only be successful if the planner has an understanding of human behavior within a culture. The planner must also have a clear understanding of the two principle, political powers in these small native communities, and their relationship with each other. The Band Council is the traditional governing body for the band and can be considered as the guardian of their culture. Most Band Chiefs are elected and act as the official representative of the band on ceremonial and official occasions. Band Chiefs also convey the wishes of the band to the operational “arm” of the band: the hamlet or settlement council.

2.5.2 **Hamlet or Settlement Council**

The settlement council is considered as the operational arm, “the heart” of the settlement and ensures that details and tasks necessary for the successful day to day operation of the settlements are carried out. The settlement council oversees the nuts and bolts” details, of the band’s direction. The settlement council is elected and in return elects its own chairman. While the settlement council can be considered as the “heart” of the settlement the band council can be looked on as the “spirit”. The population of a community, and subsequent local government structure dictates the manner in which senior levels of government will deal with the administration.

For a summary of local government responsibility and its relationship with senior government, see Appendix A

2.5.3 Outpost Camps

Outpost camps are small groups of people, usually families or groups of families, up to a maximum of 16 persons, who have decided to settle in a location on a semi-permanent basis. These groups have a common interest, (fishing or hunting) and help each other accomplish this, in a joint effort. The Government of the Northwest Territories contributes to this traditional lifestyle with small grants, ie; for 2-way radios, fuel for fishing and ammunition.

2.5.4 Settlements

Communities that have grown to include a population of 50 to 299 residents are said to have achieved settlement status. A settlement of this size generally elects a council of between six to eight members, who in turn elect their chairman. This council has an advisor role only, regarding the "running" of settlement affairs. However, it is the recognized body which provides input on the needs and desires of the community. This local government body is also allowed to make decisions on local services that affect the day to day life of the community.

2.5.5 Hamlets

Hamlet status is the first level of incorporated local government in the smaller communities with a population of between 300 to 499 residents. Both the council and council members are a legal entity. This legal entity (the incorporated hamlet and council) is allowed by government statute to enter into contracts with private business for services, and assume responsibility for the administration and delivery of essential municipal services within the community.

This level of recognition, (hamlet status) is also more than an advisory position to senior government. The hamlet council has direct input into the planning of the community. The community also prepares an annual budget for operation and subsequently is responsible for the accountability of expenditures and any revenues derived from the delivery of services or special projects.

2.5.6 Villages

In order to qualify for village status, a community must have a population of 500 or more and be able to raise revenue. Because there are very few communities with a native population of 500 or more, this MDP will not attempt to address the problems associated with them.

For a brief summary of the various sized settlements, population and form of local government , see Appendix A.

Chapter III

PLANNING PROCESS

3.1. Assessing Community Needs

An accurate assessment of community needs and desires can only be obtained by accurately probing community opinions. To accomplish this "needs assessment", a great deal of patience and all the time necessary, will be required to honestly earn the respect of the community residents. Without gaining this respect and/or trust, the community's planner cannot hope to obtain an accurate reflection of community thought in the needs assessment study. With a history of government ineptitude, it may be impossible to totally earn the necessary trust. The trust earned by the planner will always be on a personal basis and very rarely associated with a business, government department or corporate affiliation.

There are substantial problems associated with the translation between English and the native languages: slang, ethnic terms and futuristic concepts often have no equivalent in the native language. Concepts familiar in European cultures are unfamiliar to native culture. Differences in cognitive patterns between the two cultures are strongly related to differences in the languages.¹⁰ English tends to have an either/or quality, unfamiliar to native people. When confronted by a question demanding a yes or no reply, the usual native response is "maybe".¹¹

¹⁰ Callee, 1967:30 Persson, 1975:18

¹¹ Redbird, 1973:70

Questions of the form "what if you were....." or, "would you rather....." are found too confusing by natives, who are used to thinking in concrete, but not abstract or hypothetical terms.¹²

3.2. Research Problems and Suggested Solutions

The researcher may expect to confront one of several different reactions to his/her request for research data.

(a) Some native bands have been the subject of many research projects. This gathering of information has used different research techniques, some of which have been more complete than others. Many of these research projects have been carried out with little tact or concern, for personal embarrassment, and cultural understanding. As a result, the native bands concerned have grown resentful to what they see as invasions of their privacy and the theft of their cultural property.

In such circumstances, a great deal of understanding must be exercised, time taken, tact used, and the need for privacy respected. The researcher should also approach the community administrator and request them to recommend local assistants for hire, and the appropriate rate of pay for their services. The contract for service may best be handled by hiring the assistants through the community office. Payment for these assistants would be through a contract with the community.

¹² Honigmann and Honigmann, 1965:238

In this way the community administration is involved in the project from the start; allowing their input will encourage acceptance, and allow a buy-in. Their participation in this way should be considered as the community contribution to the project.

(b) Most native bands have traditionally governed themselves and their affairs by a democratic, consensus-driven style of local decision-making. This type of decision making has encouraged an open minded approach, and responds to discussions affecting them and their lives. When confronted with questions on concepts which are unfamiliar to them, they become very adept at anticipating the desired response and respond to it accordingly.

The researcher must be aware of this tendency, and become suspicious of his data when research results overwhelmingly reflect his/her own opinion.

(c) Residents may simply refuse to participate in interviews.

The researcher must carry out all interviews under the auspices of the Chief and Band Council. Before beginning the research project, sufficient time is necessary for the Chief and Band Council to discuss the purpose of the study with the residents of the community.

3.3. Research Methods

Most research projects would best be served, by hiring local research assistants through the Band administration office, under a labour service contract. A contract of this nature will accomplish two things;

- (a) provide an initial limited "buy-in" by the research assistants, who will certainly discuss their contribution to the research at other times, in a more social setting with family and friends.
- (b) keep the community council informed on the project progress.

A thorough research component is necessary to determine the physical needs and relate them to the social needs of the community. A lack of cultural understanding may promote serious errors, resulting in irrelevant data collected, and expose the village population to artificial or unrealistic expectations. The researcher must make an effort to become familiar with the participants of the survey and acquaint himself, or herself, with their history and culture. In this way, the researcher will be better prepared to recognize erroneous data. The importance of obtaining accurate information and "reporting back" to the community, with a draft report must be emphasized.

Once the research project has been approved by the Band Council and explained to the research assistants, the next question is one of determining the proper research approach and its suitability for the situation. Possible methods include the following techniques: telephone interviews, mailed questionnaires, personal interviews, and a combination of interview and questionnaire.

3.3.1. Telephone Interviews

Studies by the Northwest Territories Housing Corporation,¹³ demonstrate that the telephone interview approach would be an unacceptable approach for the following reasons:

- (a) Very few homes have telephones.
- (b) The interviewer would have no way of knowing whom he or she was speaking to in the household.
- (c) Many residents of the far northern communities have a less than perfect grasp of the English language.
- (d) Many native elders do not have a good enough grasp of the English vocabulary to comfortably discuss subjects such as adult education, substance abuse, etc., and would probably just hang up the phone.

3.3.2. Mailed Questionnaires

Mailed questionnaires would undoubtedly face similar problems as telephone interviews, and for similar reasons:

- (a) The male elder in the home may not speak or write English, or both, and would not wish to expose his lack of these skills before his children.
- (b) Many small communities have only a central Post Office, often located in another business' premises, and an elder would certainly not reveal his lack of reading or writing skills in such a public place.
- (c) Unaccustomed to mailed questionnaires, the native householder may fail to understand the purpose of it and would be reluctant to ask; simply disposing of the paper would be the most probable reaction.

¹³ Northwest Territories Housing Corporation, *Study on Core Housing Needs* 1992

3.3.3 Personal Interviews

Personal interviews (and filling out a prepared questionnaire) remain as the only viable alternative means of completing a community needs study. When the researcher gains the confidence of the community, he/she should be able to explain the needs of the study and overcome any problems inherent in the two previous research approaches.

It is important that the researcher or his assistants are capable of communicating in the local dialect.

3.4. Resident Input to Planning Process

I recommend carrying out the research data collection in five separate stages, community input can be obtained by the following visioning procedures:

STAGE #1

Organize a town hall meeting and explain the concept of development planning, the benefits of a pre-prepared development guideline, and a strategy for the implementation of a community development blueprint. A preliminary needs assessment questionnaire would be explained in a congenial, social setting. Local research assistants would be free to circulate, explain, interpret and provide assistance where necessary. Any questions addressed to the researcher would provide answers for every person attending the meeting. The researcher should be patient, open, and offer as much detail on the objectives of the study as requested. Results of the survey, however, are confidential and must not be disclosed until the survey has been completed. Premature disclosure of survey results will certainly compromise the integrity of the final results.

STAGE #2

Details gathered in the Stage #1 meeting would be analyzed and community priorities identified. From these priorities a detailed questionnaire can be prepared that seeks out further in-depth details of the identified concerns.

The detailed questionnaire would then be used to record data obtained in the personal interviews. This MDP is concerned with communities that have a population of between 50 to 300 residents. Circulating the detailed questionnaire amongst 300 residents should not be a formidable task, and would result in a very accurate sample. If the researcher and his/her assistants have gained the trust of the community residents, they may expect to have residents approach them and volunteer to become involved. These volunteers (key informants) will be an important part of the community support group, who can be counted on to offer help, on most community projects.

STAGE #3

A third stage will serve to confirm the results of the first and second stage questionnaires. This is the opportunity to correct unusable, or incoherent data, and will serve as a vehicle to redress any errors or omissions and therefore act as a pilot probe in reverse. At this stage the researcher should interview each available member of the Band Council and Tribal Elders (key informants) on a one-to-one basis. By this time, any irregularities, discrepancies, or erratic trends in the data should have surfaced. Interviewing the Chief, Council and Elders in the final stages of research, will confirm their positions of respect and facilitate further efforts.

STAGE #4

When the complete data is analyzed, a second town hall meeting would be in order. At this meeting the Chief and Council would assume positions on the panel which would explain the survey results. This final town hall meeting would complete the commitment on the part of the researcher to report back to the residents. With the community needs and desires articulated by the community residents, assurance of a "buy-in" to the development program should be virtually assured. The implementation of a strategic guideline will communicate a direction, approved by most, and known by all. This common direction should consolidate efforts for the elimination of cultural, sociological and economic problems.

STAGE #5

When the community has discussed and submitted its needs to the initial stages of the planning process, the needs assessment will then reflect the direction in which the community wishes to see improvements proceed. Community improvements will be guided by priorities which were identified in the needs assessment. These priorities should be examined in detail and incorporated into a Community Land Use Plan.

The Community land use plan is a summation of community feelings. The land use plan will communicate priority of use, where commercial and industrial areas should be located within the community, the lot sizes, and access roads. The areas chosen for residential use will reflect the community's preference in location, lot sizes, level of service, type of service (trucked or piped) and utility services. Lot sizes of course, will also impact on the number of lots in a sub-division, as will, "back of lot" servicing, (back alley access to utility service points). These design features reduce the number of available lots and increase the per-lot cost.

Features that impact on the land use design (ie. lot size, access roads, rear of lot servicing) also have a direct effect on the operational requirements of the public works department. The community planner must take into account these design features, when formulating his land use plan. The cost of operating the public works department, has a direct linkage to subdivision design. The responsibilities, and operational requirements of the public works department is also directly related to the level of service expected by the community residents. (For public works duties and responsibilities see Chapter VII, Section 7.1 - 7.9.)

The residents identified their wishes for the amount and type of recreational facilities for each age group. Each age group will have needs specific to them, and these needs have various requirements and constraints which require a different planning perspective. (For a summary of the age groups and their general recreational requirements see Appendix E.)

When the Community Council and its Planners have examined the results of the needs assessment, and related the results to sustainable planning principles, a further step in the development of a community land use plan can begin. The Community planner has to integrate the wishes of community residents with sound planning process, while at the same time incorporating existing physical features into a comprehensive land use document. (For physical constraints, assets, and other land use design considerations which may affect community improvements see Chapter IV, Section 4.1-4.2.3, 4.3-4.4, 4.6.5.)

PART II LAND USE PLANNING AND HOUSING

Chapter 1V

COMMUNITY LAND USE PLANNING

A Community development plan will serve to focus the community's needs and opinions in a common direction. A complete land use plan for the community will act as a catalyst in determining the needs of the public works department. It will determine the equipment required to maintain the settlement streets, waste management program, water delivery and sewage pump outs, and the personnel required to supervise, administrate and operate this equipment. Training will be required for public works operators and administration staff. The land use plan will also identify the need for comprehensive community planning, and help shape the direction of development, in a manner that helps fulfill the residents' needs for cultural satisfaction.

Traditionally, planners have gained their experience from urban planning, and non-native communities. Thus they often lack the diversity of planning experience, such as, the empathetic understanding, and knowledge of native culture to effectively plan for small northern communities. Communities which are planned by southern experts just do not fit the native lifestyle; for example, a 50' X 100' housing lot will not accommodate the storage requirements for smoke tents, boats and recreational vehicles. Community Elders have tried to communicate their needs regarding community planning requirements, and after years of being ignored, have responded by an obvious show of disinterest and apathy. Community planning, with input from residents, will indicate the direction in which the settlement will expand, and the degree of change which is acceptable, while the younger members of the band will gain recognition, as the mechanism by which the change or development takes place.

Non-traditional conveniences (water delivery, waste water pump out) will usually be accepted by community residents as a means of improving health standards, improving the standard of living and easing the daily labours of the elder citizens. Many of the needs of the community will have been prioritized by the "needs survey" previously carried out. The needs survey will have given the community and its planner a detailed account of the needs, which the residents feel is most important to them. The planning team must now determine the type of services, establish the level of service anticipated, and locate service corridors with respect to the physical, technological and economic restraints imposed by reality.

At this step in the process, the design team must begin to consider the following questions:

- a) In which direction should the community grow?

The direction in which the community will expand will depend on the results of the geo-technical survey, the highest and best use of the land, type of housing, number of residents, and the desired level of service, as well as, the capabilities of the public works department.

- b) What will the land will be used for in the future?

The future use of the land will be determined by the rate of population growth, economic opportunities, employment opportunities, and cost of development.

4.1 Factors for Consideration

- a) Previous land use - the photo mosaic will indicate previous land uses and may reveal potential development problems such as poor soil conditions. This mosaic will serve as an invaluable working tool when planning settlement land use.

b) 'Geo-technical considerations - close examination of the geo-technical report will expose potential problems or may confirm decisions to locate differing land uses in a particular area. For example, an area unsuitable for residential use may be acceptable for light industrial (water treatment plant) or commercial use. In the same concept, an area with a high water table which is unsuitable for commercial or residential use, may be adequate for a storage area or for recreational use.

c) Designated future use - decisions must be made to designate areas for certain types of future use, and these designated areas would allow for projected future expansion, and include the following categories of use:

- 1) Residential
- 2) Commercial
- 3) Industrial
- 4) Recreational
- 5) Special use areas

4.2 Residential Land Use Areas

If the design team wishes to optimize land use within settlement boundaries, then the utilization of "prime land" for residential use is an important step in that direction. (Prime land is defined as land which has the highest and best use for the intended purpose)¹⁴ Residential land is separated from other land uses by four important considerations; health concerns, access/convenience, servicing, and economic restrictions.

¹⁴ Brook, Terry, Development Pro Forma, University of Calgary 1993

4.2.1 Health Concerns

Residential areas may have to be separated from other land uses by natural or constructed buffers. Space (distance), vegetation and fences are excellent noise and sight buffers, allowing residents to enjoy their homes without the intrusions of noise, air pollution or vehicular traffic.

4.2.2 Access/Convenience

Optimization of “residential” lands must recognize the various needs of the population using them. Families with young children or senior family members must have easy pedestrian access, to the necessities of every day life. Younger school age children must have a short walk to schools and playgrounds, while senior family members must live in close proximity to groceries, recreation and medical services. The community/planner design team must be aware of the effects that certain services, such as solid waste, sanitary sewage, or water delivery have on the design of subdivisions and on convenience to residents of the community.

Communities should consider a subdivision design which incorporates “back of lot servicing” into the design to facilitate delivery of municipal services. Communities which anticipate water delivery, solid waste collection and sewage pump-out services (above ground servicing should also consider a back alley design for their communities) to facilitate water delivery and sewage pump-out. A further consideration for sub-division design would be a wider building lot and subsequently a larger rear access (drive way) to accommodate service vehicles.

The delivery of heating oil, electrical service, telephone and satellite service would also be supplied from the rear of the building lots. The planner would recognize the efficiency of rear lot servicing by maximizing the front yard setback, and minimizing the distance between the rear alley and service points at the residence.

4.2.3 Economic Restrictions

Economic restrictions relevant to residential use may include the additional costs involved with wider building lots necessary for rear of lot service design. The higher cost involved with wider lots is simple economics, the fewer the lots, the higher the per lot cost. These additional costs will also reflect the cost of constructing a rear lane of sufficient standard to support service vehicles. Economic responsibilities are associated with the “finished” lot requirements demanded by potential home owners, such as level, graded lots, landscaping of roadways and a seasonal dust suppression program where residential streets are unpaved. Residential sub-divisions are normally constructed in areas where construction costs are less than in other areas as the cost of lot preparation is passed on directly to future lot owners. This may be attributed to a higher concentration of voters in a smaller area as opposed to very large industrial lots under the ownership of one individual or a company.

4.3 Commercial Land Use Areas

Areas designated for commercial use should be well thought out with future community development in mind. “Commercial use” covers a myriad of uses, from a small corner grocery store to a building supply operation and many varied uses in between. Each type of commercial use has specific design aspects which must be considered on an individual basis by the council/design team.

For example, the corner store may only require a small building lot in the midst of the residential area but a successful business on that lot may generate some undesirable activities such as high volume of traffic, brightly lighted signs, noise from late night patrons. On the other hand, a building supply store will most certainly be the centre for truck traffic and mechanically produced noise from saws and high speed planers.

A means of controlling these undesirable features exists in the issuing of building permits, or establish area's of "permitted"(zoning) use i.e.; a building supply warehouse on the perimeter of the settlement or at least, is remote from the residential area as possible business licenses are another means of mitigating some of the less desirable effects of commercial uses i.e.: limited hours of operation, minimum parking areas, restricting of outdoor lights and signs.

4.4 Industrial Land Use Areas

Industrial areas in small communities are often looked upon as a necessary evil and relegated to the most undesirable piece of land on the community outskirts. In most cases, "this necessary evil" is an unfair designation and only reflects, poor or incomplete planning by the community planner. Users of any industrial area are very often employers, astute businessmen and are, very often a real asset to any community social infrastructure.

The community planner for small northern communities is urged, to thoroughly research probable industrial uses in their community, and anticipate possible conflicts with other land uses by its residents. If conflicts are visualized, then an industrial area located remote from the community by 1/2 to 1 kilometer, would serve to buffer these conflicts.

A remote industrial area would surely mitigate many of the conflicting “sore spots” such as excess traffic, noise or negative aesthetic values. If remoting industrial areas is not feasible for any reason, then other approaches to lessen the negative impacts should be considered, such as;

- a) Locate the industrial area on the exit side of the village rather than on the entrance road where first impressions should be on a more positive level.
- b) The industrial area should be located on the down wind side of the settlement, or on the other side of a hill, where neither sight or sound advertises its presence.
- c) Buffers, such as trees, should be left in place, as much as possible around the perimeter of each lot, again through the use of building permits.
- d) Trees could be replanted or man made buffers constructed, i.e.: fences, earth berms, where natural buffers, such as trees, do not exist or where the cost of salvaging them is prohibitive,
- e) Architectural guidelines placed on the exterior finish of industrial buildings, limited hours of operation, mandatory housekeeping for lot users should also be consideration as a means of making industrial lot occupancy more palatable for its neighbours.
- f) As a last resort, perhaps a low key campaign extolling the virtues of the employment and services provided by lot owners, may identify the obvious benefits to their presence. Industrial lots are generally located on land not suitable for most other purposes, and are generally undeveloped. The cost of individual lot development is born by the lot owner at no cost to the average rate payer, except for very basic services in some instances.

4.5 Recreational Land Use Areas

Most northern communities are remote from each other and other larger urban centres. Residents are left to entertain themselves and recreation becomes an important part of their every day lives. Because of the isolation and long northern winters, recreation (or the lack of it) becomes not only a social function, but a community physical and mental health necessity. Planning for recreational activities must encompass every age group, and the needs of each age group must be recognized and accommodated.¹⁵

4.6 Special Land Use Areas

This category of land use covers many different and varied land uses. Churches, schools, graveyards and gravel pits are some of the activities which are contained in this land use category.

4.6.1 Churches

Churches and religion are an important and integral part of every day life in the small northern communities. Most northern communities support only two major faiths, Roman Catholic and Protestant, therefore room for only two church buildings is normally all that is required, and normal lot sizing is sufficient. Because church attendance is an “off hours” activity (nights and weekends) and the number of vehicles in the settlements is minimal, the need for parking space is a minor concern. Parking space can be shared with another facility, such as a school or other business concern.

¹⁵ See Appendix E for Summation

4.6.2 Schools

Residents of the smaller northern communities recognize the potential crisis from a rapidly changing lifestyle, and are concerned the younger generation may be unable to cope without an adequate education. Education, and educational facilities are a very important consideration, when developing a community land use plan.

Sufficient room to train and educate residents must be allowed for in the central community core. Community buildings, schools, offices, administration buildings, garages, etc. should be designed for multi-purpose use, and placed on lots which are sized for maximum use of the building. Education should include many different aspects of community life, from the accepted norms of a structured class room to adult education, apprenticeship training and the re-learning of traditional lifestyle skills.

4.6.3 Graveyards

When the normal mortality rate is compared to the availability of burial plots in the existing settlement cemetery, a brief but simple calculation will reveal what the need is for a new or expanded burial facility. The council/design team may feel the need to consult village elders on this matter as religious views and death are a sensitive subject. At any cost, dignity and patience are a necessary requisite when discussing this subject. Practical considerations must also be observed in this exercise, considerations such as locating the burial ground in an area where the water table is low and not subject to seasonal fluctuations. An area where the soil has a sandy or gravelly nature will assist in excavating, also a major consideration when choosing a suitable location.

4.6.4 Gravel Pits

Most small northern settlements which are accessible by road have virtually depleted all sand and gravel sources within a reasonable distance (5 - 10 km). Northern geology indicates a scarcity of usable gravel formations which are acceptable for use in manufactured structural materials such as concrete, stucco or asphalt. In the past, many northern projects have exploited and exhausted first class construction materials where a lower grade material would have adequately served instead. Care should be taken to preserve naturally occurring construction materials for appropriate use within the settlement itself. A system of building permits which limits the amount, and type of use to which sand and gravel are appropriately used, should suffice to prevent prematurely exhausting the local supply.

4.6.5 Access

The use to which areas have been designated will determine the:

- 1) Type of access - i.e. high speed, large radius corners and entrances.
- 2) Standard of access - i.e. width of road, weight bearing capacity (large trucks).
- 3) Number of access points - i.e. entrance and exit points for service vehicles, fire trucks.
- 4) Type of vehicle using the access - i.e. trucks, heavy equipment, over width, or overweight specialty vehicles such as fire trucks and over head cranes, etc.
- 5) Access roads to industrial areas would have ample overhead clearance from electrical or telephone wires¹⁶

¹⁶ Government of the Northwest Territories, Municipal Branch, Councillor's Handbook To Municipal Land Development

- 6) High voltage electrical supply lines should be restricted to the perimeter of the settlement residential areas to minimize the dangers of electrocution and reduce interference with telephones, television reception and emergency radio systems.

When determining the type, and standard of access to a designated use area, the design team must remember that a prepared road bed includes an efficient drainage system. Ditches must be designed to carry not only seasonal precipitation, but spring melting and peak floods from several inclement weather conditions.

4.6.6 Geographical Features and Natural Resources

The use of natural resources, such as hills and low lying areas should be maximized to minimize the effects of wind and inclement weather. Slopes can contribute to the reduction of shadow casting and maximize the access to sunlight. Consideration should be given to locating various building designs to accommodate the differences in terrain elevation, for example two storey homes or apartment buildings could be sited in the lower terrain levels while single family bungalows would be situated on higher terrain, effectively guaranteeing site lines and eliminating shadow casting. Resident's homes can be designed into two types:

- 1) Single, semi-detached free standing buildings of 1 - 1 1/2 storeys and housing a single family grouping.
- 2) Multi-family homes can run the gamut from a single storey, semi-detached building to a 24 unit, 4 storey apartment building. By designating the placement of these buildings to maximize light and minimize shadows, the optimum benefit to occupants may be realized.

4.6.7 Geographical Orientation

If streets are oriented into the prevailing wind direction, then the winds may scour snow and keep the streets bare, snow drifting will be minimized, effectively reducing inconvenience and the labour of residents during winter months. If curves or bends are designed into subdivision roads and streets, then the effects of wind channeling are substantially reduced. For the same reasons, streets at intersections should be offset. When streets are designed, adequate room should be left for snow deposits by virtue of large flat bottomed "scraper ditches", in order that sunlight assist in snow melting and the resulting drainage is contained within the drainage network. Scraper ditches are wide flat bottomed ditches which also serve to reduce instances where clutter and debris, may plug the standard "V" shaped ditch resulting in overflow and ponding.

4.7 Inventory Of Existing Resources

To begin the process of generating development guidelines, and developing a Community land use plan for the improvement of these small northern communities, a certain, logical process is necessary. This process begins with a needs assessment, and is followed by a list of priorities determined from the need assessment. The Band Council and its planner then begins to assemble all available information in the form of land use guidelines. Before the community's planner is able to begin constructing a land use plan for the community, they must make an accurate determination of what resources exist, and the effect these resources may have on the proposed land use. Previous land use, should also be investigated for possible limiting conditions; a record of previous land use as depicted on the photo mosaic may prove invaluable in this regard. See Air Photo, Chapter IV, Section 4.7.2.

4.7.1 **"Data Sources"**

Many decision makers are unaware of the amount of information which exists already and is available free of charge to officials or administrators of a settlement council, from the Territorial or Provincial Governments, Crown Corporations and private companies. Some useful sources of information include the following:

- (a) Public works departments have information on surveys, soils reports, water tables, engineering studies and drainage patterns.
- (b) Federal transport departments have detailed records on travel, airports and weather. Atmospheric records have a multitude of details on annual rainfall, snowfall, wind, how much, and when it occurs.
- (c) Social Service agencies have important data on local employment rates, the history of illnesses, the rate of family and substance abuse, population increases and the population in each age group.
- (d) The Department of Indian and Northern Affairs is still responsible in some cases for the administration of remote northern communities, and will be an important source of virtually all data concerning these small northern settlements in the Yukon and Northwest Territories.
- (e) Northern communities within Alberta's provincial boundaries have had their affairs overseen (except in rare cases) by Alberta Municipal Affairs through the auspices of the closest improvement district, municipal district or county.
- (f) Stats Can and Canada Parks Services, the Federal Department of Natural Resources as well as the Canadian Coast Guard are an inexhaustible supply of information directly related to matters which may be important to settlement planners.
- (g) Universities and colleges are a little known, but very important sources of information on virtually every topic imaginable relative to these small northern communities.

(h) The Arctic Institute of North America and its members and directors are probably the leading authority on details of the small northern villages. The executive director, chairperson of the Board of Directors and members of the editorial advisory staff are world renowned experts on northern and native affairs and are routinely called on to offer their experience and knowledge to benefit northern residents.

This data should be collected, categorized and compiled on a computer data base for ease of search and retrieval.

4.7.2 Air Photos

Band Councils would be well advised to obtain the latest air photographs available, for the recording of local data in a visual format. Companies who produce air photographs, should be contacted for information on the latest flight, flight levels at which the photographs were taken and the required scale of the finished product. As a general rule, the end use to which the photographs are used, will determine the flight level, the altitude (flight level) at which the photos are taken determines the coverage area shown and the scale of the pictures. For example, a flight level of 10,000 feet will yield a photo of an area approximately 1 1/4 miles wide and produce a photo at a scale of 4000:1 (4000 feet on the ground is equal to 1 foot of detail in the air photo, or vice versa). This scale would be quite appropriate for general use, however, a more appropriate scale for the use suggested here would be 400:1. Air photos can be enlarged to a factor of ten times in scale, before accuracy begins to suffer, therefore expanding the scale from 4000:1 to a scale of 400:1 would be the maximum enlargement. Information from satellite images can also be considered as an important source of specialized information and are similar in application to air photos.

Colour photos are highly recommended, as the untrained eye can easily interpret the subtle differences in shades and colours, where a trained air photo interpreter may be required to interpret details on black and white photos.¹⁷ It is strongly recommended that a colour air photo at a scale of 400:1 be mounted on the administration office wall for visitors and community planners to refer to when discussing development plans. "A picture is worth a thousand words". With the air photo mounted on the administration office wall, village elders should be actively encouraged to locate details of historic interest directly on the map (on a transparent protective overlay). In this way former residences, burial plots, areas of prohibited use, are recorded and an inventory of previous land uses is available to influence development plans.

Each photo overlay can record details of a different category, for example, existing streets and proposed streets, areas which are low and wet, recorded with existing and proposed drainage plans. A visual presentation of the existing community overlaid with a proposed development, will elicit comments and many constructive options to those which were initially proposed. Low marshy areas, bedrock outcrops, potential gravel sources and numerous other geographical features noted on the map will also be advantageous to planners, with the cost of the photos recovered by savings in labour. Air photos are readily available from the National Air Photo Library in Ottawa, Ontario or possibly on loan from the map and Air Photo Library, 2nd floor, Library Block at the University of Calgary.¹⁸ Photograph sources and detailed information, may also be available from Territorial public works departments in both the Yukon and Northwest Territories.

¹⁷ Foto Flight, Dave Skelton, 250 Aviation Place, Calgary International Airport, Calgary, Alberta
403-275-9334

¹⁸ Contact Ms. Helen Clarke

4.7.3 Boundary and Contour Survey

A local survey company should be contracted to carry out a legal boundary survey. Boundaries should be based on an area capable of sustaining the community population and their living requirements for at least 25 years into the future. Leave lots of room! The boundary survey and subsequent limits should be negotiated with the Territorial or Provincial Governments easing the task of providing legal descriptions for potential sources of funding. This survey should provide a minimum of at least three cadastral points within the proposed settlement limits. A contour survey can be carried out under the same survey contract and provide a topographical record of contours and spot elevations, with a suitable contour interval of 1.0 metres, maximum. This contour interval will show sufficient detail to allow for planning of roads, streets, ditches and drainage patterns. All survey data would of course be plotted at the same scale as the Air Photo mosaic, and co-ordinates matched to it for maximum utilization of information.

4.7.4 Geo-Technical Investigations

Some effort and cost savings would be realized if a geo-technical investigation and a boundary/contour survey were combined, and carried out at the same time under the same contract. A geo-technical investigation will identify the physical features which encourage, or discourage, a particular type of improvement or limit a particular type of development. For example; soil conditions may dictate the use of wooden or steel piles instead of concrete strip footings or conventional pads and wedges.

In the event a commercial lender such as a bank, government program or Central Mortgage and Housing was approached for funding to support community growth, a geo-technical investigation of sub-soil conditions would be mandatory to determine the soil suitability for foundations, basements, and any vulnerability to frost action.

4.7.5 Technical Data on Physical Assets

Before making any decisions on community development, the Band Council must be in possession of, and understand the technical capacities, and capabilities of the existing physical plants, plants such as the water treatment plant, the waste water treatment facilities, boiler for hot water heating, electrical power generators as well as their limits for expansion. Will the existing water treatment plant have the capacity to double its output in two years when the initial distribution system is installed? Will the high pressure pumps supply adequate pressure to the extreme edge of the settlement, sufficient to extinguish a house fire? These are questions that must be answered before development forces a crisis, life threatening or economic, upon the settlement.

The Band Council should also have access to details which may prove vital, should one of the physical plants require modification or replacement. If technical details are readily available to hand over to the Design Engineer, who is in charge of the replacement or modification, this will save the time they would spend on researching and realize an economic benefit to the band. A water treatment plant, waste water treatment plant, pumping station, will have had, many administrative similarities during the design, tendering, construction and commissioning stages of their inception.

The administrative information will include the following details:

- (a) The name of the consulting firm who originally designed the facility, also the name of the individual Design Engineer or Architect who was personally responsible for design calculations and details. This information is necessary as a sources from which the design team may obtain additional information.
- (b) A full copy of the criterion used to determine plant design, population trends, limitations of the plant, quality of the final product expected, expected life span of mechanical components.
- (c) Sufficient detail on mechanical processes and design features to carry out trouble shooting, should it be required.
- (d) Name and address of the plant supplier, a full and complete set of operating manuals, operating manuals should include cross reference tables for little known or obscure parts, and their service schedule. Full details on warranty and replacement parts, should accompany any service schedule.
- (e) Name and address of who actually installed the physical plant.
- (f) Any design considerations which depart from the normal design or construction procedures, should be detailed in case of degenerating performance (gradual) or delayed failures.
- (g) "As-built" drawings are invaluable when the need for analyzing reasons for failure to perform, or to choose an alternate to the existing plant features. Design for expansion to existing facilities will be considerably easier, if details on the current facility are available. A cost saving will also be realized.
- (h) A copy of the original tender and contract documents will also be valuable when determining what procedures, prices, specifications, are required to expand, modify or construct, an addition to the facility.

(i) Council and the design team should be aware that the engagement of a professional consulting engineer, includes the right to his professional expertise and drawings. Should Council require copies to replace lost, or damaged documents, they should only be responsible for the copy cost, as the professional expertise has been previously paid for.

Chapter V

HOUSING

This chapter will examine the housing problem in greater detail and suggests several solutions and programs. Suggested solutions will include those necessary to shelter single parent families and provide accommodations for community Elders. Programs are based on experience with similar housing problems in the Northwest Territories and reflects an effort to increase home ownership, lower maintenance costs, encourage pride in self reliance and provide training in trades and the development of life skills.

5.1 Housing Requirements

In the Northwest Territories Housing Corporation, reduced federal funding from Canada Mortgage and Housing Corporation reduced the budget for social housing construction by 59% on January 1, 1994.¹⁹ At the present rate of construction, prior to any budget cuts, the buildings erected were approximately 9 to 11% of required housing. In addition, an increased housing need of 14% was determined over the past two years. The increase in housing requirements has been attributed to the younger population and a higher birth rate. These two factors combined, will ensure that housing needs will remain high in most communities. Assuming the present economic climate continues, and the need for housing remains constant, the housing shortage will be addressed at the rate of approximately 3.8% per annum, which means the housing requirement will be met in approximately 25 years. In the present economic climate an increase in funding by the federal government is a very remote possibility.

¹⁹ Northwest Territories Housing Corporation, *Consultation Framework Research* 1993

The Federal Government should be actively encouraged to divert funds from government departments in Whitehorse and Yellowknife and direct it towards community based housing programs. Communities should also be encouraged to invest funds from Land Claims settlements in housing programs and community development projects. Regardless of the source of funding, the need for housing must be addressed at a minimum rate of 10% per year.

Research methods necessary to determine community housing requirements, involves a straight forward procedure of counting families and the available housing, and calculating the requirements from the difference in the two figures.

The challenge presented in making suitable and sufficient housing available for residents presents a formidable exercise in efficiency and innovative economics.

Housing requirements for northern communities must meet the needs of four distinct community groups in the following categories:

- 1) Single parent families.
- 2) Community Elders.
- 3) Families with small annual incomes.
- 4) Families with an income sufficient to meet conventional mortgage payments, but unable to provide a down payment, a poor credit record, or a poor tenant history in public housing.

Each category of housing requirements is specific to the needs of the people in that group and housing must be tailored to address those specific needs.

5.1.1 Single Parent Families

As a general rule, 80% of people in this category are younger females with 1-3 children and partially supported by social assistance. The remaining 20% of this group are elder females supporting a teenage child, or single males, both of whom have sufficient incomes to afford suitable rental housing, or qualify for home ownership (if accommodation were available).

5.1.2 Single Parent Families - Suggested Program

Financing for these programs can be obtained from land claim settlements, CMHC or a Provincial or Territorial Housing program. Under this program, the Territorial or Provincial housing department would fund a design build contract for the construction of a housing complex. Upon completion of the buildings, the prospective owners, who have been counselled in Co-op living, would be expected to pay for their unit over a period of 15 years at 25% of their annual income.

5.1.3 Community Elders

Community residents in this category include senior citizens who are self sufficient and require minimal assistance as well as seniors who require the service and care associated with a nursing home.

5.1.4 Housing for Elders - Suggested Program

Under this program, the Territorial, or Provincial Housing department will, fund a Co-operative building complex, similar to the complex for single parents. The seniors wishing to access this program, would apply for residency to the local housing

authority, and would be counselled in co-op living when their application is approved. Residents would be expected to pay for their living units at a rate of 25% of their annual income. Community residents would not be acceptable as clients in this program until reaching the age of 55 years old, except in the case of those with disabilities or the infirm. In each case, an admittance board made up of directors from the Community Housing Authority would approve applications.

Elders enjoy the opportunity to socialize with those of their own age group. Seniors also enjoy the choice of participating in communal activities, or not, as their whim dictates. Any housing scheme for seniors must include these two very important concepts. Seniors are also susceptible to increasing fragility and inevitably must accept assistance from others. Many accommodations for seniors include a provision for semi-skilled and skilled (nurses or attendants) personnel to assist or supervise as required. Accommodations for this age group must include the following aspects:

- a) A single storey living, cooking, sleeping area of approximately 450 square feet per couple, grouped around an open court yard.*
- b) These units should be semi-detached sharing a common wall with three or four other units. Living units should have front and rear entrances opening on a common area court yard. The rear entrance would have a carport type area for storage. The common court yard could include such amenities as benches, flowers, shrubs, possibly a common garden area and certainly a roofed gazebo.*

Adjacent and convenient to the seniors' homes, would be the seniors centre where nursing help and volunteers could offer assistance. A large common meeting area where seniors could socialize or meet family and enjoy tea or coffee from the nearby kitchen. A small bake shop in the kitchen to sell goods at cost would add to the

appeal of this building. Central heat and water distribution would be included as an integral part of this central commonly owned co-op building.

5.1.5 Low Income Families

Residents in this needs category generally have a minimal income so as to eliminate them from qualification for a conventional mortgage.

5.1.6 Low Income Families - Suggested Program

The programs designed to assist families who fall in this group, have several self-help options, the options available are; The Alternative housing program, Owner build, Sweat equity Credits, Lease to Purchase. (For additional information See Sec.8.2.4)

The Alternative Housing Program, this program is designed for those who wish to live in a more traditional life style, it provides a very basic shelter for those who live in a community with no public housing. Basically, the shelter consists of a 2 or 3 bedroom home with no basement, bathroom or piped water.

Under this program, sanitary facilities consist of an outdoor privy with a cess pool for disposal of grey water. Potable water for drinking and cooking requirements is hand carried and stored in a container suitable to the occupants. Provisions in the housing design allows for later conversion to a conventional bathroom and a pressurized water system. Under this program, the prospective owner would rent it for a period of two years. If after two years they choose to formally purchase the home, then an agreement would be signed whereby they would pay up to 25% of their annual income as a mortgage payment.

5.1.7 Families with Income for a Conventional Mortgage

In this category, families, have sufficient resources to meet their obligations under a conventional mortgage scheme, but are unable to qualify for lack of a down payment, a poor credit record, or a poor tenant history in public housing. For these reasons, alternate financing programs are needed, programs which are efficient, innovative and meet the shelter requirements of community residents. In order for housing to meet the needs of people in this group of residents, several concerns must be considered. Low income, lack of day care facilities and the need for the parents to occasionally socialize within their own age group, are other considerations, and should be taken into account. Suitable shelters for this group of prospective home owners may include some, or all of the following suggestions as circumstance or geography dictates:

- a) A cluster of two and three bedroom units attached to a central service building. The requirements for the specific number of two or three bedroom units would be determined by a "needs study".
- b) Size of the units (and costs) could be kept to a minimum through the use of a central or shared heating system, common construction walls, common service utilities.
- c) These clustered shelters would not include a basement but would rely on a simple "spread footing", or a type of piling suitable for the soil conditions.
- d) A central service building could incorporate such necessities as an indoor play area for children (day care), a laundry room, a central heating system and a social area for adults. Parents would have the space and opportunity to co-op day care responsibilities.
- e) An extension to the co-op concept could include such innovations as group purchases of food, profit sharing of day care, or partnership in a small community based business.

5.1.8 Families with Income for a Conventional Mortgage - Suggested Program

In order that housing programs in the small northern communities meet the need of the residents, financing and housing programs must be matched to the residents skill and ability, time and expertise. These programs are also applicable to the group of residents with limited income. Housing requirements, and funding alternatives must be specific enough to address the individual capabilities of each client. There are flexible alternatives available in the following self help programs:

- 1) *Owner Build.*
- 2) *Sweat Equity Credits.*
- 3) *Lease to Purchase.*

5.2 Owner Assisted Programs

5.2.1 Owner Build Program

Under this program category, prospective home owners may be able to afford a conventional mortgage, but lack a down payment. If the prospective home owner is skilled enough to assist in the construction of his home, a contribution of sweat equity credits would serve to replace the money needed for the initial deposit on the home and reduce the monthly loan payments. For example, when the client clears his building site, erects his home and completes the exterior and interior framing, he would be eligible for 80 sweat credits.

Sweat equity credits are based on the principle that the cost of a home is 50% materials and 50% labour. If a home would sell for \$150K, and the land had a value of \$30K, then materials in the home would be valued at \$60K, and \$60K for labour.

The labour involved would be that, which was required to complete each task, for example, installing drywall is worth 6 credits @ \$600 ea. = \$3600 for this task.

Total building labour for the house, \$60K labour = 100 sweat equity credits

Therefore 1 credit would have a value of \$600.00²⁰, 30 credits @ \$600 = \$18,000

Therefore, a \$180 K house, would have \$90K labour (1/2 the house price),

\$90K = 100 credits, 1 credit = \$900.00

Note: The worth of each sweat equity credit will depend on the individual home value.

Designed for residents who have some house building skills and want to help build their own home, and reduce monthly payments through "sweat equity credits".

- Clients may do any number of construction tasks according to their ability, time or expertise. A minimum of 20 sweat equity credits must be earned.
- Loan is repayable according to clients income and sweat equity credits earned by client. The more sweat equity credits earned, the lower the monthly loan repayments. All clients benefit from a preventative maintenance program. Low income clients are eligible for an annual maintenance subsidy.

5.2.2 Lease to Purchase Program

Under a conventional mortgage arrangement, families with a minimal income or a history of poor credit would be excluded from consideration. Under a self help program these families would be included in a "Lease to Purchase" arrangement. This type of housing program, asks very little of the prospective home owner except reliability and a desire to own their own home. Utilizing a "Lease to Purchase"

²⁰ See Appendix G for a detailed example

agreement, the home owner would get a trial period during which they could experience first hand the cost and maintenance responsibilities associated with owning a home.

The client would have the advantage of starting with a clean slate, (if they had suffered a credit problem in the past) and begin to establish a record for reliability and dependability. If after the lease term of two years expired, the client may elect to complete the purchase of his home. In this case, a loan repayment schedule for the purchase of the house would be arranged based on a maximum of 25% of their gross income. Loans under this program would be interest free and repayable over a period of 15 years.

5.2.3 Lease/Purchase Financial Guidelines

Designed to accommodate residents who are unable to help build their own homes under one of the programs.

- Clients who are unable to help build their unit may still benefit from home ownership.
- Unit is leased for a minimum of two years to give the client a “home ownership trial period” during which the client can experience the costs and maintenance responsibilities of home ownership.
- Unit may be purchase after a minimum of two years with loan repayment according to client income.

All clients benefit from a preventative maintenance program. Low income clients are eligible for annual maintenance subsidy.

5.3 **Funding Alternatives**

Funding alternatives are needed to meet the requirements of the native people in the small northern communities. There must be a financing scheme that is specific to each age group, each social group and one to meet the needs of the people with a poor credit, or for those who have a less than desirable rental history in public housing. Occupants of public housing do not accept the unit which they live in as their own, no feeling of ownership exists (except in rare cases). They are reminded of their "renter" status at the end of each month.

This MDP will present seven different funding alternatives to a conventional mortgage. These alternatives are:

- 1) Direct Lending Program.
- 2) Forgivable loans to first time home owners.
- 3) Alternative Housing Program.
- 4) Lease to Purchase Program.
- 5) Owner Build Program.
- 6) Direct sale of housing packages.
- 7) Co-op housing for seniors and/or single parents.

5.3.1 **Direct Lending Program**

Designed for residents with sufficient income to afford a conventional mortgage loan, but who are unable to obtain one from Canada Mortgage and Housing Corporation or a bank. In the event funds are unavailable from C.M.H.C or a conventional lending institution, the Territorial or Provincial housing department provides the funds or guarantee's the applicants loan.

- Provides mortgage loans to households who live in communities where banks will not lend.
- Provides mortgage loans to households who are unable to obtain clear land title for a bank mortgage loan.
- Provides mortgage loans to households who cannot obtain mortgage financing for a unit already under construction.
- Loan is based on 25% of the residents annual income and is to be repaid in 15 years, interest free.

5.3.2 Forgivable Loans to First Time Home Owners

Designed to promote home ownership to families with sufficient income to obtain a conventional mortgage.

This loan provides a down payment, or can be used to improve the condition of a home to meet the requirements of the home owner (wheel chair ramp). It may also be applied directly to the mortgage to lower monthly payments. Maximum amount of the loan would be 10% of the purchase price of the building.

- Owner builder, Lease to Purchase, and alternative housing clients would not be eligible for this loan.
- The amount of loan varies with the amount of household income and location of the home.
- Client may apply loan amount to the mortgage or use to pay for other housing improvements.
- The loan is forgiven over 15 years, provided the client uses the home as their principle residence.

5.3.3 Alternate Housing Program

This program is designed for households who are not eligible for public housing and low income seniors who prefer a more traditional life style.

This program is a variation on the Lease to Purchase Program, in that the occupant would rent the home for two years then lease/purchase it for cost, based on 25% of his annual income. During the first two years, the resident would be eligible for a maintenance grant of \$1,800.00 per year. After signing a lease purchase agreement, a forgivable loan amounting to 10% of the purchase price would be applied to the purchase agreement to lower monthly payments. The total loan would be paid out over 15 years at zero interest.

- Provides a basic home for very low income seniors who will not live in public housing and prefer a traditional life style.
- Provides basic shelter for households who are not eligible to live in public housing because of arrears and/or damage problems.
- Provides basic shelter for very low income families in small communities where there is no public housing accommodation.

5.3.4 Direct Sale of Housing Packages

Intended to make available a complete housing package which has been designed for:

- a) northern climate,*
- b) native communities,*
- c) uncomplicated construction,*
- d) designed to be transported to remote communities.*

The resident opting to take this route is expected to have some income and resources. A forgivable loan is available to a maximum of 10% of the cost of the building package. The building package must be paid for, prior to delivery, the forgivable loan will be discharged when the building package is completely paid for.

5.3.5 Profit-Sharing on the Sale of a Home Prior to Loan Pay-Out

Housing clients may wish to sell their homes prior to the loan being paid out. Pre-arranged terms eliminate uncertainty and resentment towards the mortgage lender.

This arrangement applies to all financially assisted housing programs.

- The Housing Authority will have the right to purchase the unit from a client for the amount of any bona-fide offer from a third party.
- The profit-sharing mechanism will prevent clients from making a large profit. The amount of profit the client is allowed to retain is based on the number of years the client has been in the program and the amount of subsidy which has been provided. After 15 years, the client retains 100% of any profit on the sale of the unit.²¹

²¹ See Appendix H for a detailed example

PART 111 PUBLIC WORKS REQUIREMENTS

INTRODUCTION

This MDP presents both a planning process and some of the guidelines necessary to implement the objectives of the planning process. Chapters 1 to 5 present an overview of the planning process. Implementation of this planning process requires guidelines, options, alternatives, and solutions for the community council and its planner to consider, in order to achieve the goals which were identified in the community needs assessment. This section focuses on the practical aspects of the guidelines and, the more technical details which must be considered by council to implement the objectives of the planning process. In each case, an estimate for implementing the recommendations is included, to assist the council in making its decision. For example, the estimated time/cost of the planning process can be found in Appendix I, the estimated cost of implementing the guidelines can be found in Appendix J.

The opinions and recommendations that follow are based on the author's personal experience and do not include consideration of individual community conditions. Where the recommendations refer to a specific process, or piece of equipment, the recommendations are the author's opinion of the best, (or most effective) choice amongst the alternative methods of solving the problem, given the logistics of northern transportation and supply.

The planning process must begin immediately, in order to save resources and preserve cultural traditions. The detailed implementation can begin when the initial planning process is complete. When the implementation process begins, emphasis must be placed on the community residents and their contribution to the development. Before equipment is purchased, the administrator would be well advised to select the employees who will operate it, in order to achieve a buy-in commitment.

Chapter VI

MANAGERIAL REQUIREMENTS AND RESPONSIBILITIES

A small community wishing to have its own public works department must make a decision on the level of municipal service it will provide to that community. The level of service should be decided upon after consultation with residents.

When the desired level of services have been established, the required equipment to maintain these services can be determined. The equipment chosen should be appropriately sized for the intended use and capable of performing alternate duties (loader, backhoe). The amount and type of equipment required can then be based on the following factors:²²

- a) economic capability,
- b) the desire for autonomy,
- c) interest or motivation,
- d) financial resources possible,
- e) opportunities for employment and economic development.

6.1 Economic Capability

Can a small settlement afford its own public works department? Before a small northern community commits itself to a short term (5 years) financial obligation, it must formulate an operating budget and determine its viability. This operating budget must have some degree of financial flexibility in the event an emergency places undue strain on community coffers.

²² See Appendix F for Summary of Maintenance Equipment

6.2 Desire for Independence

Small communities should balance their desire for autonomy with fiscal responsibility, to assess the cost and benefits as compared to administrative and operational difficulties. Perhaps independence can be acquired incrementally. For example; maintenance of community roads, streets, drainage, etc., can be sub-contracted from the current operator. Sub-contracts from the provincial, territorial or federal authority are relatively easy to arrange, in view of the current climate and acceptance for native autonomy. Contracts can often include the equipment presently in use by current operators, and payment schedules negotiated to maximize the community's chances of success.

Communities can also acquire responsibility for separate public works services on the basis of their ability to operate them. The water treatment plant for instance can be operated by the community when their operator has been trained and his ability certified. A program of apprenticeship in conjunction with current operators would support the concept of incremental independence.

6.3 Interest And Motivation

In some northern communities, the percentage of younger population in the age group of 15 - 25 years is minimal. Many individuals in this age group have become disenchanted with lifestyles in a small community and have moved "outside" to a less traditional way of life. Educational opportunities in many small communities end with graduation from the 8th grade elementary school; ambitious students are forced to leave the community to further their education, and after exposure to the fast-paced "white" culture refuse to return.

If communities are developed with this in mind, the addition of improved amenities, innovative educational programs and increased employment opportunities may reverse this trend. Communities may choose to introduce trade related programs, such as heavy equipment operator's training, mechanics, construction surveying, as an outreach program from a community college. For example, Keyano College, Athabasca, Alberta, offers such a training program on actual projects for administration costs only.

When students have the opportunity to return to their home community to access this type of training, they will bring an increased awareness of the value of their culture and a knowledge of how it will meld with technology and provide opportunities similar to those available in the larger urban centres. Students trained in outreach programs, on real projects, are exposed to actual working conditions, and the problems associated (and solutions) with these projects, enjoy an enviable reputation for quality work and dependability.

6.4 Financial Alternatives Available

Maintenance and construction equipment is very expensive. With the current depressed economic climate, manufacturers of heavy duty equipment have introduced innovative financing plans for acquiring their products. Potential equipment owners, have virtually unlimited possibilities for arranging the purchase/rental/lease of the equipment they need. Small communities should investigate the benefits of leasing plans whereby the manufacturer will guarantee the trade-in value of equipment after a specified lease period. Rental/purchase agreements are also a popular way of acquiring equipment when a large "down payment" is impossible, under this arrangement, the purchaser deposits a small sum (generally a month's rental fee) with

the equipment vendor on delivery of the machine. The purchaser then agrees to pay a monthly rental fee, for a specified time (generally 2 years). Rental fees may also include some form of mechanical warranty. According to terms of the rental/purchase agreement, a previously agreed on portion /percentage of the rental payments will then be applied to the purchase of the equipment, thus eliminating the need for a large down payment and at the same time establishing a credit record for consideration.

6.5 Economic And Employment Opportunities

Community administrators may choose to improve the economic and employment opportunities for local residents by contracting maintenance or construction work from outside sources. If this is the case, administrators may be well advised to purchase different equipment options or heavier equipment models than those chosen for strictly settlement maintenance duties. For instance, a Caterpillar Model #120G is perfect for grading of roads and snow plowing, but would be underweight and undersized for the demanding requirements of contract work. Should the community administration decide to purchase equipment, train their own operators and perform their own maintenance, then employment opportunities within a community are improved.

In the northern communities cold weather will turn a new machine into a shiny piece of useless metal! In order that public works equipment be available for duties when required, it must be protected from the severe cold. This protection requires that a suitable shelter, such as a public works garage be available to properly house the equipment. In extremely cold weather, block heaters and electric circulating pumps are useless. If the unit is left outside unprotected, even with propane heaters and heat shielding it may take up to 12 hours to effect a start. Cold weather starts such as these

are very damaging to delicate bearings and may significantly reduce the useful life of the equipment.

6.6 Buildings

Public works departments acquire many different pieces of equipment, materials and supplies necessary to carry out their operational obligations as a department. This equipment and materials is a very costly investment for even the small communities and must be safeguarded against theft, loss or damage, by storage, or equipment repair buildings. These buildings in turn become an asset, and must be maintained to safeguard the community's investment in them.

6.7 Storage

Public works departments must have access to secure storage areas, for the storage of materials or supplies. Materials and supplies used by public works staff may be in use on a daily basis. In the case where daily use is the standard, convenient access to the storage area is important and should be maintainable on a year round basis. Materials used on a seasonal or periodic basis may not require year round access but must be in a secure location i.e.; lawn seed, mowers, brush cutters. Other supplies that are bulky, heavy and are movable only by mechanical means, will not require absolute security, simply a large fenced area capable of supporting the heavy equipment necessary to transport, load and unload the materials.

Administrators should also familiarize themselves with regulations regarding the posting of security signs and the penalties associated with not posting them. The storage of toxic or hazardous goods requires that special precautions be taken and

obliges handlers to have a minimum of training to protect themselves and the general public from harm. Oil, gas, solvents and other petroleum products are combustible if not properly handled or are allowed to leak and vapors accumulate in a confined area. When combustible vapors accumulate in a confined area, a small spark from a light switch or electric motor may ignite the vapors, and cause an explosion, so again, specialized knowledge is required in this area to avoid a dangerous incident.

6.8 Supervision of Community Activities

Most small northern communities are focused inward for recreation rather than outwardly, meaning the residents depend on their own resources to entertain themselves. This fact, coupled with the northerners love of outdoor activities may sometime strain community recreational facilities. It follows that the same public works employees whom are responsible for maintenance of facilities are often called upon to supervise activities in that same facility. Expensive equipment used to flood outdoor skating rinks or grade ball fields, must be returned to secure compounds when the games are finished to avoid damage or theft. Indoor winter activities are often centered in community recreational buildings where public works staff are enlisted for operational and security reasons.

6.9 Administrative Duties

The operation of any community infrastructure involves the gathering, compiling and sorting of thousands of important, and not so important, information. Without an efficient administrative system many important tasks would not be completed, such as pay day with no pay cheques! The settlement manager will have in place an administrative staff to administer the daily affairs of the settlement's business. The

settlement's administrative staff must however, rely on the public works staff to supply them with necessary details.

Essential details, on the operation of the water plant, waste water effluent quality, must be passed on to more senior levels of government, proving compliance by the community to its licensing agreement. Details on agreements to sub-contract may require weekly or monthly submissions to validate a legal agreement. Small community administrations, often work under sub-contractual agreements with private companies for a fee for services agreement such as reading power meters, distributing gas bills. These agreements, require the collection or distribution of details on a regular, scheduled basis requiring the services of settlement employees.

SETTLEMENT MAINTENANCE REQUIREMENTS

A small community with its own public works department, has a means of focusing its identity on a daily basis. The public works equipment going about its every day settlement chores, operated by local residents, affirms the community's ability to help itself. In small northern communities, a public works department means something different to each person, and each person has their own idea of what is the department's responsibility. Aside from the more obvious tasks, such as picking up the garbage and plowing the roads, the small public works department assumes the responsibility for other chores such as digging graves and flooding the outdoor rink. Regardless of individual conceptions, certain tasks and responsibilities are common to every community.

6.10 Public Works Department

In order that community life continue to be uninterrupted and peaceful, the “works people” have to carry out their daily routines thoroughly, systematically and in most cases unobtrusively. Life goes on! However, a thorough and systematic approach to settlement maintenance covers a broad list of duties such as:

- Operational activities.**
- a) building maintenance,
 - b) equipment maintenance,
 - c) supervision of settlement assets,
 - d) delivery of essential services,
 - e) maintenance of parks and recreational facilities,
- Managerial Activities.**
- f) employee training,
 - g) collection of accounts for services rendered,
 - h) supervision of community activities,
 - i) administrative duties.
 - j) contracted obligations

A brief explanation of these duties will offer some options for the community administrative team, and will provide insight into functions necessary for the successful operation of a small community.

6.11 Employee Training

The successful operation of any public works department should necessarily involve the education of each of its employees. The education of employees should extend from such things as the proper and careful handling of household waste, to the pitfalls of not doing so. Those employees who are responsible for the daily operation of complex mechanical facilities (i.e. water treatment plants, waste water treatment plants and artificial ice plants), must have their understanding and technical knowledge raised immediately to a minimum level of proficiency.

Training for these employees must be on a continual basis, relief operators should also be designated and encouraged to attain a minimum level of knowledge.²³ Relief operators will benefit from "hands on" experience within the operating plant environment! Senior operators should be encouraged to share their experience with novice employees. Levels of competence should be well defined and certificates issued for attaining a new level, with wage levels tied to the new level of accomplishment. Training for these operators can be arranged for, on site through the Alberta Government, Environment Protection Division (minimum number of attendees required). Advanced training may be taken on the Westerra Campus of the Northern Institute of Technology, Spruce Grove, Alberta, where teaching aids and specialized equipment are available for instruction. Environmental authorities require that operators of water treatment and waste water treatment plants demonstrate the required level of competency, as specified by national standards.²⁴

²³ Mistry, Cham, P. Eng., Zircon Projects Ltd., Edmonton, Alberta 403-461-3224 Personal Interview February 1994

²⁴ W.C.W. & W.W.O.A. (Western Canada Water & Waste Water Association)

Operators of equipment should also have the opportunity of enrolling in an apprenticeship training program and given the chance to acquire a provincially recognized, heavy equipment operators certificate. Both the Yukon, Northwest Territories and Province of Alberta have well established, well qualified instructors and examiners available, at minimum cost, to assist municipalities in this regard. The council/design team would be well advised to consider establishing an adult education program to address such issues as educational upgrading, computer literacy, engineering technology and other topics of interest to the community at large.

6.12 Contracted Obligations

Municipalities, settlements, and communities commonly enter into agreements to supply products (water) or service (road grading) to others. These supply agreements may be simplistic in nature such as the supply of treated water from a “truck fill” point to customers of convenience, when available. For a settlement to guarantee the supply of a product, of a certain quality, on a continuing basis however, bears serious responsibility; both the settlement and its employees should clearly understand their obligations, and the results of failing to honour their contractual obligations.

6.13 Maintenance of Parks and Recreational Facilities

Community parks and recreational opportunities provide important clues to a community's general state of health. Community parks that are well used, are sure indicators of a vibrant, healthy community spirit. Well attended events in the local arena, hockey, curling, volleyball are obvious clues to the interaction between the various age groups. Supervision of young athletes by an older age group provides an occasion for important social exercises. The maintenance of parks is often seasonal in

nature and provides an opportunity for part-time employment for students and other community residents.

6.14 Collection of Accounts

In any small community, employees of that community may carry out several different, unrelated duties during their work day. The works foreman for instance may become the dog catcher in the morning and deliver tax notices in the afternoon. The timely collection of accounts for services rendered is also a routine duty shared by civic employees. In the small northern communities, many "bills" for services provided are hand delivered. Because the Canadian postal service has chosen to move most postal services to a central location in a larger urban centre, it would be an unnecessary delay to mail invoices to local residents.

Invoices would be deposited in bulk in a postal bag and delivered to a major sorting centre. When the mail is sorted the envelopes would be returned to the settlement for delivery. In many cases, transportation of the envelopes both ways would be by air or private carrier. For these reasons, mail originating in the community is hand delivered (in most cases) through out the community. Because the public works department has the greatest number of civic employees, they are often called upon to hand deliver invoices for water, waste water pump out, solid waste collection. A labourer or operator may hand deliver the invoices, and is often sent to collect delinquent accounts.

Chapter V11

PUBLIC WORKS - PHYSICAL INFRASTRUCTURE

7.1 Water Treatment And Distribution

The proper design of a water treatment facility and distribution system is the responsibility of an experienced water processing specialist, and this paper will not presume to usurp this responsibility. However, in continuation of the concept of this paper, the provision and explanation of design options will continue to be a primary concern. Small northern villages may not elect to accept some design considerations such as underground supply or collection piping, or indeed, may reject them for less than obvious reasons. These less than obvious reasons may be based on a traditional life style, or a feeling that what they have now is good enough. Environmental or geographical conditions may exclude other design considerations, such as a predominance of severe physical constraints, for example large areas of exposed bed rock, many small deep lakes (thaw bulbs), high soil salinity, and above the tree line areas of continuous and discontinuous perma frost. These physical constraints may force the design team to consider more stringent economical limitations.

Virtually all water treatment plants can be constructed above ground, and maintained at acceptable operating temperatures, regardless of geographical locations or extreme weather conditions.²⁵ This is not true of underground distribution systems however, during periods of minimum demand (9:00 p.m. to 7:00 a.m.) insufficient flow of warmer water from the water treatment plant may allow underground lines to freeze, causing extensive damage. Thawing or repairing frozen lines during severe weather

²⁵ Mistry, Cham, Zircon Projects Ltd. 403-461-3224 Personal Interview, Edmonton 1994

conditions may not be possible with the limited equipment or expertise available in a small village. With the proper equipment, trained personnel and budgetary resources available, this option is still available. For a small settlement with limited resources, this MDP recommends the following:

7.2 **Recommendations for Water Treatment Plant**

Installation of a minimum sized water treatment plant of the packaged type, capable of expanding the output from one and a half cubic metres per hour to five cubic metres per hour by way of modular components. The plant should have provisions for two **coin operated truck fill** service points sized to provide service to:²⁶

- (a) Individual home owners (small service pipe supplying 50 gallons of water minimum) for a fee.
- (b) Commercially sized water trucks (delivers minimum of 1,000 gallons per filling).

A small package treatment plant with minimum capacity and a proven reputation is manufactured in Canada.²⁷ A small package plant also requires a minimum amount of supervision and a minimally trained operator. This plant ("Micro Floc Water Boy") is manufactured by Neptune Trident Industries. For a summary of operational features see Appendix C.

To avoid vandalism or theft related to the coin operated truck fill supply source, council should consider the use of metal tokens instead of coins, these tokens should be available (at cost) from the administrative office.

²⁶ Chomiak, Dan, Supervisor of Public Works, District of Tumbler Ridge Personal Interview February 1994

²⁷ See Appendix C for details

If Council wishes to support local employment they may choose to purchase a water delivery truck, a sewage pump out truck and hire and train their own operators. Alternately, they may choose to encourage private enterprise by licensing these services

7.3 **Considerations for Fire Suppression**

Council or the design team may also elect to increase fire fighting capabilities within certain areas of the settlement, such as the denser residential areas, schools, senior citizen lodges, nursing stations, or administration office. Fire fighting capability can be greatly increased by the provision of a piped water supply to fire hydrants strategically placed throughout the major concern areas. Piped water supply in this case would be for **Fire Only**, and pressure supplied by a separate fire pump and gasoline engine (located in the water treatment plant) dedicated to this function. Supply lines for fire only, would be minimum length, and could be either above or below ground insulated from adverse weather conditions.

This installation should be considered as surplus and complimentary to, the mobile fire suppression unit. In order that this service be an all weather function, "fire only" supply lines could be incorporated into a low pressure circulation loop originating at the water treatment plant. Fire supply lines from the plant, would be approximately four inches in diameter, circulation lines from the hydrants, and returning to the plant, would be one inch in diameter. Circulating pressure for this emergency system would be in the neighbourhood of thirty P.S.I. maximum but would ensure positive circulation and avoid freezing of the lines.

Technical, and design considerations can avoid the difficulties of water lines freezing by a combination of insulation and self draining hydrants. Remember! This is for **Fire Only**. Water supplied for fire suppression purposes would be untreated, and from the raw water holding tank. The contents of the supply lines would be continuously circulated through the water treatment plant at low pressure, when a fire occurs and a hydrant is opened in the system, a drop in pressure would signal the high pressure. **"Fire Only"** Pump and Engine to start, and supply the required output. Residents should be warned that this water is untreated and not fit for human consumption! In the treatment and supply system previously described individual home owners may haul their own water as they require it, in individually sized containers at their convenience. Alternately, home owners may choose to install a water holding tank in their homes and have water delivered in bulk quantities.

7.4 **Waste Water Treatment And Collection**

Mounting concern for our environment is forcing ever more stringent regulations governing the quality of waste water effluent. In many areas, local by-laws are discouraging sewage treatment lagoons as the sole source of final, waste water treatment. Sewage lagoons have always been associated with their well known, less favorable, characteristics such as;

- a) A land hungry facility, requiring a minimum of five acres.
- b) Offensive odors (seasonal turnover).
- c) A breeding ground for insects and diseases.
- d) The source of bad publicity (pollution), when seasonal draining into local streams is required.
- e) Safety hazard, requiring fencing against children and animals.

- f) Sewage lagoons have proven very ineffective in climates with cold temperatures, long winters, and short warm summer seasons. These conditions restrict, or prohibit, biological action.

For these reasons, this MDP recommends the installation of a small packaged waste water treatment plant, located in a small unobtrusive, well designed building on the perimeter of the settlement. Home owners would be expected to install a waste water holding tank in their homes, serviced by a commercial operator, with scheduled pump outs delivering the waste to the waste water treatment plant.²⁸

For a summary of waste water treatment plants and their relative features see Appendix D.

Experience by the Northwest Territories Housing Corporation has shown that, if water holding tank capacities are limited to a maximum of fifty percent capacity, of the waste water holding tank, virtually all spillage and over flow can be avoided. The installation of a water treatment plant, and delivery system, coupled with a waste water treatment plant and collection system, provides many benefits to small communities other than the obvious ones. Benefits include many tangible and intangible improvements to community life style, grooming and aesthetic quality, as well as employment opportunities.

The traditional native life style has always fostered a sustainable settlement and these mechanical improvements would only serve to complement it. When mechanical treatment plants are installed in these small settlements, one can not expect them to run flawlessly, without a competent operator to regularly fine tune the various components.

²⁸ See Appendix D for details

The water treatment plant, and waste water treatment plants recommended in this paper were chosen for simplicity, ease of operation, quality of the final product and most importantly, the fact that both are ninety percent free of moving parts (less maintenance and breakdowns). The only moving parts necessary in either plant are the electric pumps necessary to move raw materials to the plant, and another to remove or distribute the final product.²⁹ Council and/or the design team should make an effort to recruit a reliable plant operator during the final design stages, certainly while the plant is being installed, to allow their input and give them the opportunity to "learn the plant" components, and encourage a sense of ownership and pride.

Formal operator training should follow an on-the-job apprenticeship and be regularly scheduled.³⁰ This training requirement can be met by the Alberta Government, Department of Environment, Licensing and Training Division, whose responsibility is for water and waste water plants and operators. Courses are held on a regular basis throughout the province. Distance learning is also available from Alberta Environment and the Westerra Campus of Northern Alberta Institute of Technology, Spruce Grove, Alberta.

7.5 **Building Maintenance**

Community buildings represent a considerable portion of community assets, and a systematic approach to their maintenance is vital. Buildings such as the nursing station or senior citizens centre are an integral part of community life, and a failure to properly maintain them which resulted in a major component failure, would be catastrophic in severe weather conditions.

²⁹ Mistry, Cham, Zircon Projects Ltd., Edmonton Alberta 403-461-3224 Personal Interview February 1994

³⁰ Mistry, Cham, P. Eng., Zircon Projects Ltd., Edmonton, Alberta 403-461-3224 Personal Interview February 1994

In most cases, public works employees are responsible for furnace maintenance, chimney cleaning, yard and walk maintenance, painting and general building upkeep. Maintenance duties must be scheduled, regular and systematic. Maintenance employees should work from a check list when inspecting a building, and regular maintenance reports submitted to the supervisor responsible. A responsible, and regular approach to building maintenance will result in the lowering of repair costs, pride of ownership, high employee morale, and the safeguarding of a valuable asset.

7.6 Equipment Maintenance

The most expensive, sophisticated piece of equipment quickly becomes an expensive piece of scrap, without regular scheduled, "appropriate" maintenance. When regular equipment maintenance is discussed, most people visualize an operator with a grease gun stooped over the bucket of a rather large yellow loader or dozer. While this is true of course, the maintenance of equipment includes thousands of mundane chores performed on an endless variety of mechanical apparatus. It is beyond the scope of this paper to attempt to describe the proper maintenance of any one piece of equipment, we can only point out the various aspects of a regular maintenance schedule and its need. Above all, this MDP must emphasize the need for preventive maintenance, emphasize the direct linkage between regular and preventive with the cost of equipment upkeep and its reliability. There is also a direct linkage between properly maintained equipment, with safety and accidents.

Equipment manufactures have detailed maintenance requirements in order to guarantee equipment performance. Maintenance schedules must be strictly adhered to in order to validate new product warranties. No maintenance, no guarantee!

The importance of cleanliness cannot be over emphasized when determining reliability and longevity. For example, periodically vacuuming the accumulation of dust from the cooling fins of an electric motor in a water treatment plant will extend its useful life by as much as 200%, removing the accumulation of grease from around the end bearing on a gravel dump box may reveal stress cracks, in time to make repairs, as opposed to replacing the unit with a new part. The supervisor would be well advised to catalogue all maintenance information, establish maintenance schedules, and insist his employees strictly adhere to them.

7.7 Supervision of Community Assets

Safeguarding of community assets may involve regularly scheduled inspections of such things as the **raw water intake** for contamination, waste water dumps at the sewage treatment plant, inspections of the sanitary landfill site, by senior supervisors, for adherence to environmental guidelines, are a means of ensuring good community housekeeping. Petroleum farms (an area for bulk storage of fuel and heating oil) should also be monitored by public works staff for spills and possible contamination of ground water sources, spillage containment dikes must be maintained. The security fencing around sewage lagoons, water reservoirs, and material storage areas should also be regularly checked for integrity. Naturally, the most obvious assets of the community, buildings would also be included in regular checks and condition inspections. Secure entry to buildings, will prevent unauthorized access to restricted areas and materials, preventing loss or personal injury to children or the unaware.

7.8 **Delivery of Essential Services**

When the community accepts the responsibility for the delivery of essential services, it also assumes the liability for not providing them, or providing services below the acceptable standards. Specifically, **water** that is offered for sale by the community (and supplied to a private delivery service, or for resale) must meet minimum quality standards as spelled out in the Canadian Clean Water Act. Each water treatment facility, all equipment and apparatus must meet very stringent hygiene standards. Community employees, must acquaint themselves with these standards, meeting or exceeding them, to meet plant licensing requirements.

Employees operating these plants must meet personal health standards themselves, and pass an annual medical. The collection and treatment of **waste water** must also meet rigid handling and effluent discharge standards. In residential areas serviced by water delivery and waste water pump out, the council/design team are advised to limit the capacity of the potable water tank to 50% of the capacity of the sewage holding tank to avoid overflowing. In the same vein, mechanical fittings for the water fill pipes, should be a different size and type from that on the sewage holding tank to avoid confusion and contamination.³¹

7.9 **Fire Protection**

In reality, most small northern communities, handling a water delivery service, must look to a "first attack", fire suppression volunteer group, when disaster strikes. Water for fire suppression should be contained in at least a 1,000 gallon tank, and mobilized by a heavy duty flat bed truck.

³¹ Northwest Territories Housing Corporation - *Construction Specifications*

This vehicle should be dedicated to this purpose only, and regularly checked (weekly) for reliability. Public works staff should actively discourage any use of this vehicle for other than fire suppression. Maintenance of this vehicle should be the responsibility of public works staff, however, leadership and administration of the volunteer fire fighters should be separate from public works to avoid duplication of responsibility and internal friction.

Chapter VIII

SOLID WASTE DISPOSAL

Solid waste disposal in remote northern communities is a difficult and costly process; where perma frost conditions also exist the problem becomes increased by more costly and complex. A harsh northern climate suppresses any biological action allowing household and community waste to accumulate year after year. Any reduction in waste volume by this biological action is scarcely noticeable. Several other factors specific to these small northern communities also contributes to solid waste bulking and handling problems. These problems will be briefly discussed and solutions suggested for consideration by the community development/public works team:

- a) Burdens on land fill sites.
- b) Problems related to the proper handling of solid waste.
- c) Wind blown debris.
- d) Construction considerations.
- e) Reducing waste volume.

In the event the settlement is accessible by a reliable, cost efficient form of transportation on regular basis, the community should consider the use of an incinerator. The proper use of an incinerator will solve many of the irritating problems associated with a more conventional means of solid waste disposal.³² In order that an incinerator be considered as a reliable means of solid waste disposal, a regular supply of incinerating fuel such as furnace oil or propane must be available,

³² Henry, James, Robinson, Mike, Badashsan, Amir, *Consideration For Waste Management In Remote Arctic Regions* 1991, University of Calgary, Calgary, Alberta

8.1 Burdens on Land Fill Sites

Most northern communities (N.W.T.) are entirely without road access and must depend on non-scheduled airlines for their supply of fresh fruit and vegetables. The bulk of their daily requirements and food staples are delivered on an annual basis by barge in the western Territories and by sea-lift in the eastern Territories. Other northern communities may receive their supplies by an ice road; inclement weather, spring thaw and fall freeze-up all contribute to a unique problem. Because so much of the community's supplies arrive in bulk containers, with appropriate packaging to prevent breakage, an enormous burden is placed on the land fill site. Food stuff is purchased in oversize containers, rarely seen in southern Canada. These containers eventually wind up in the land fill site instead of being recycled or returned for refund. The harsh northern climates suppresses or minimizes any biological action and waste continues to build up. This condition is unacceptable, however, the inclement weather restricts the options available to correct it. Several techniques exist which will improve, but not eliminate the problems of current methods of disposal. These methods are noted under the sub-sections 6.2 and 6.5. An alternative to land fill operation and its inherent problems, can be found in incineration which has problems specific to its own operation but of a considerably less severe nature.

Temperatures in northern communities often drop below freezing levels at night during the short summers; the waste freezes, then a new layer of waste is dumped over it serving to insulate the previous layer. Compactive efforts are reduced and the volume continues to build. Because most northern land fill sites are located in "free dumps" such as gullies or natural low areas, they are subject to the collection of snow, melt run-off and moisture from exposed slopes.

This water collects and freezes in the dump sites. With the almost daily freeze-thaw cycles, the waste becomes very difficult to handle effectively and the potential capacity of the site is dramatically reduced.

8.2 Problems Related to Improper Handling of Solid Waste

- a) Because of the remoteness of most northern communities, the old axiom of "whatever comes in, stays in", is reality. The cost of returning unsatisfactory goods is prohibitive both in terms of freight cost and the time involved. The time involved before satisfactory replacement far outweighs the dissatisfaction with the goods and they may soon end up in the dump.
- b) Equipment purchased for settlement maintenance is often a multi-purpose machine, suitable for loading snow or digging a ditch, but not very effective for maintaining land fill sites. Most small communities have a limited number of public works staff to carry out regular settlement maintenance duties, therefore, supervising operators at the land fill becomes a low priority. Without supervision and regular maintenance the land fill site quickly degenerates into a garbage dump.
- c) Unrestricted access to the community land fill results in waste and litter being scattered by those who enjoy "scrounging". Scattered waste is then left to decompose and to be further strewn by the wind. Unrestricted access also leaves the site open to further danger by uncontrolled, indiscriminate burning.

8.3 Wind Blown Debris

Access to the land fill site should be restricted to authorized personnel, hours of operation should also be limited so operating personnel can push-in and cover the waste at the completion of their work shift.

The perimeter of the dump site should be cleared of brush and vegetation and proper fencing installed to a minimum height of 16 feet. A clear, graded perimeter will allow machine pick-up of wind blown debris and reduce the chances of brush fires from uncontrolled burning. If each days dumping is covered with a thin covering of soil at completion, the chance of wind blown debris is greatly reduced.

8.4 Construction Considerations

The first step in the construction of a land fill site is the selection process for a suitable site. This selection process should begin with the careful and thorough examination of aerial photographs for features or obstacles which would make this area a poor choice or prohibitive for the location of a land fill site. Topographical features or obstacles to the location of a public land fill site will include the following:

- 1) A high water table.
- 2) Surface drainage courses in the site area.
- 3) Delicate eco-systems.
- 4) Proposed site is in proximity to a residential or recreational area.
- 5) Area susceptible to land slides.
- 6) Area susceptible to catastrophic fire damage.

The next step should be the preparation of a base map showing contours (1.0 metre interval) and identify the following features:

- a) Proposed site location.
- b) Route access to the site.
- c) Surface drainage patterns.
- d) Direction of prevailing winds.
- e) Distance and direction to the airport.

- f) Location of seeps or springs.
- g) Underground services or utilities (if applicable).
- h) Identify direction and staging of development.

Normally site selection should include a comprehensive hydrological assessment of the proposed area. However, a lack of drilling and testing equipment in the communities will preclude this. A careful examination on foot will confirm the suitability of the site. Seeps or springs would necessitate moving the site because of their chance of contamination. A sloping bottom to the site will ensure positive drainage, reduce undue bulking of the waste material and lower construction costs.

A prevailing wind that blows in a direction perpendicular to the orientation of the site will generate a significant amount of wind blown debris. The proposed site may have to be oriented into the wind to avoid the problem of wind blown debris. In the case of land fill sites above the tree line, planting of trees is impossible for wind breaks, so artificial wind breaks, both fixed and portable, as well as "catchment" fences are used to reduce the detrimental effects of the wind. Substantial cost however, may be associated with these remedies. Distance and direction to the airport is of primary importance. Ironically, both airports and land fill sites must be oriented in relation to the prevailing wind. Birds scavenging for food at the land fill site often come in contact with arriving or departing aircraft. A distance of at least 3 km, into the prevailing wind, should reasonably guarantee safety between bird strikes and aircraft departing or approaching the airport. Surface drainage patterns can be modified with minor flows directed around the site. It is extremely important that the site be designed properly with a basic plan of operation in mind. An "area fill" operation would be most suitable for the type of sites often selected.

A technique known as "area fill" is commonly used when backfilling land fill sites. This technique involves spreading the current days volume of solid waste over the entire face of the land fill in a thin layer. When the solid waste is spread in a thin layer, the equipment used to shove the waste into the site is then able to compact the thin layer efficiently, and reduce the bulking of the waste, by repeatedly travelling back and forth over the surface of the waste (minimum 5 passes).

8.5 Waste Reduction

Toxic materials such as paint, and solvents should be stored in used drums which have been pressure treated for leaks; the drums could be later removed for safe disposal. Reduction of bulk waste can be accomplished by several methods, namely:

- a) Compaction - minimum 5 passes - reduces volume up to 80%.
- b) Burning - selected waste (wood products, grass) - by authorized personnel only.
- c) Recyclable materials - 90% of materials can be removed by household.
- d) Rubber tires - small quantity, used as blasting mats, cover for dump, rip-rap.

8.6 Calculation of Land Fill Requirements

The size of a disposal site will depend on the annual volume of waste generated and can be determined from the population it serves, and the length of time the site is designed to operate. Average volume of waste per capita in southern and central Alberta amounts to 5.5 lbs. per day or 5,500 lbs. per capita per annum.³³ A remote community with a population of 500 people would require space for 800 cubic metres per year. The approximate cost for operating a land fill of this size would be approximately \$20.00 per capita per annum.

³³ City of Calgary - *Annual Report 1990, Sanitation Division*, T.A. Montgomery P.Eng.

8.7 Solid Waste Collection

The community administration team will have several options to consider related to solid waste collection in the residential neighbourhoods:

- a) Frequency of collection.
- b) Individual or area pick-ups.
- c) Hamlet forces or private contractors.
- d) Recycling.

8.7.1 Frequency of Collection

For most small communities, a collection schedule of a single pick-up per week should suffice. Industrial or commercial areas may require collection more often or on a **demand** basis. Administrators may choose a more frequent schedule to avoid strewn waste or offensive odours. Alternately, administration may choose to divide collection areas in smaller schedules and stagger pick-ups, allowing greater flexibility in responding to problem areas. Dividing the settlement into several collection areas will allow the supervisory staff to use the waste collection staff in a more effective way, less time per task ie: more tasks completed in a day, greater planning flexibility.

8.7.2 Individual or Area Pick-Up

More communities are utilizing a large community sized container, and residents in an area, use this container as an area collection point for their household waste. These larger containers are not as susceptible to animals, vandalism or malicious damage as small individual waste containers. These containers are designed to be handled by settlement maintenance equipment.

Other advantages of the large area containers are:

- 1) Reduced number of pick-up stops by maintenance personnel reduces the cost of operation.
- 2) Containers can be painted attractively and carry environmental, recycling messages.
- 3) Containers are a visible reminder of settlement services.
- 4) Waste containers accept a greater variety of household waste packaging without the chance of breakage and littering.
- 5) Containers reduce the number of unattractive, unsupervised collection points.

8.7.3 Hamlet Personnel or Private Contractor

The choice between a private contractor and using hamlet forces for waste handling is a decision to be made by community administration, and should be based on community employment needs, versus the independence and encouragement of private enterprise. If private enterprise is favoured by community administrators, this will have a direct effect on the operational budget. The community will not be required to front the cost of the equipment necessary to collect and dispose of the solid waste. The community will be responsible for the monthly financial obligation to the contractor, supervision of the contractor's activities and ensuring community satisfaction with the service.

8.7.4 Recycling

The land fill site should be enclosed with security fencing, restricting access to public works personnel only. When the security fencing is being erected, three areas for storage should also be constructed. These areas should be at least 20 feet square and each accessible by a gate opening from outside the compound.

Access to these areas should be convenient to the road access as these areas are for temporary storage of recyclable materials.³⁴

1. Plastic containers.
2. Used rubber tires.
3. Metal waste, appliances.

Recycling should be encouraged to promote environmental awareness. If the community administration, or private enterprise, establishes a recycle/return depot (for cash refunds) in the community, for the return of bottles and plastic containers, this will encourage a recycling effort by households. Recycling of bottles and cans contributes to a clean, litter-free community. Bottles and containers which often litter streets, and other public areas, will be retrieved, and returned for a cash refund by the younger population. This recycling effort will also reduce unnecessary waste, and the handling of it, at the land fill. The public works staff, who are responsible for maintaining the land fill, should also be encouraged to sort and pile reusable materials, which are transported to the site in commercial or industrial waste; for example, lumber, plywood, drums and used tires. Used tires are often used at land fill sites above the tree line to contain wind blown debris, as a replacement for the cover layer.

³⁴ Bullock, Wayne, C.E.T., Superintendent of Public Works, Alberta Municipal Affairs, Slave Lake, Alberta

Chapter IX

SUMMARY AND CONCLUSION

Small northern communities have been in a process of change almost since their beginning in the late 1800's. Recent changes in technology, communication and transportation have accelerated these changes and in many cases have left community residents with a feeling of frustration and helplessness.

Community band members view the administration of their own community as a necessary first step in the process of re-establishing the stability of cultural values and historical standards. Community affairs have recently been administered by others, whose standards and values are unfamiliar to residents, leaving band members unprepared to administer their own affairs in the current climate of rapid change.

This MDP recommends that native bands wishing to accept responsibility for the management of their own daily affairs, be given the right to do so. In order that minimum disruption take place in the order of community life, the community council is advised to acquire the services of an experienced community administrator. This administrator can hire and train his staff according to a schedule that will parallel the adoption of administrative responsibilities. This MDP recommends a phased approach to autonomy, a sequential assumption of civic duties; which should be phased in, as follows:

- a) Recruit a Superintendent of Public Works, and allow him to begin planning the developmental sequencing of operational activities for the public works department. For example, establish the requirement for equipment, materials, employees, and operational routines for the handling and disposal of solid waste.

For details, see Chapter VIII, Section 8.1-8.2, 8.7-8.7.3

- b) Hire employees and install them as apprenticeship assistants to the current treatment plant operators, and building maintainers. Wages for these apprentices will begin with a basic salary and wage increments will increase in direct proportion to each increased level of knowledge.

For further details refer to Chapter VI, Section 6.11

- c) The Superintendent of Public Works will purchase equipment, and hire employees to carry out road, and street maintenance duties. The Superintendent will establish training, and on-going educational programs relative to Provincial or Territorial operating requirements.

For further details on equipment, see Chapter VI, Section 7.1 to 7.6 and Appendix F. For details on employee training, and public works requirements, see Chapter VI, Section 6.0 - 6.5, 6.8 - 6.12

Community council and its planners are advised to develop strategic guidelines for the administration of their community. This MDP outlines the many duties, and responsibilities associated with changes to the physical infrastructure of the community, that community planners must consider, in order to efficiently, and effectively plan the day-to-day operation of their community.

In order that the community council, and its employees acquire the necessary skills, and gain familiarity with current technological requirements; responsibilities should be *phased-in*, or incrementally introduced. As each stage of the autonomous procedure is assumed, this MDP recommends the following guidelines:

- a) Community staff performing these duties are allowed to become, not only competent, but also comfortable, and confident in their new role as a community employee, before introducing them to a new employment position.
- b) Community residents are assured of a reliable, and dependable service being delivered *before the introduction of a new service.*

c) This method of assuming responsibility, in increments, cannot be rushed, but should be allowed to evolve into an efficient addition to previous services, before assuming the next operational, or administrative responsibility.

Traditional planning methods, and family values are no longer a sufficient force to overcome the influences of a highly mobile population, with a more modern lifestyle. Younger members of the community population are migrating to the larger urban areas for reasons of employment, entertainment, and the amenities. If nothing is done to reverse this trend, this migration will eventually lead to the demise of these small communities. This trend can be countered if communities are developed in such a manner as to provide facilities for a meaningful and complete life style.

The installation of a water treatment plant, and delivery system, coupled with a waste water treatment plant and collection system, provides many benefits to small communities other than the obvious ones. Benefits include many tangible and intangible improvements to community life style, grooming and aesthetic quality, as well as providing employment opportunities.

Educational opportunities in the community can also be increased by offering a program of adult education linked to the requirements of community employees. For example, formal operator training could follow an on-the-job apprenticeship, and be regularly scheduled. Training for these operators can be arranged for on site. Advanced training may also be arranged with visiting instructors from Westerra Campus, Mount Royal College, and the Northern Institute of Technology. A greater utilization of existing educational facilities, will offer opportunities for self improvement in educational upgrading, computer literacy, and engineering technology. If educational opportunities exist in their home community, and the community administration assumes responsibility for the delivery of community services, then employment opportunities will also increase, and the migration trend may reverse itself.

When autonomy is given to communities for governing their own affairs, the need for skilled and semi-skilled workers will increase, and a desire for greater amenities will follow the return of the younger generation to their home communities.

This MDP has identified priorities which are vital to the autonomous development of small northern communities. These priorities, such as housing, employment, land use planning, education and autonomy will make a significant contribution towards the improvement of community life style and cultural reawakening. Community councils, however, should not expect these improvements to solve all problems associated with cultural and administrative autonomy. Community councils and their planner will have to employ a wider range of vigorous, proactive effort to retain their cultural identity, establish economic independence, and at the same time develop a sustainable community.

Using this MDP as a guide, the community who wishes to change or expand its limits or services, may choose that direction and be aware of the responsibilities and/or the options it faces in doing so. This MDP is offered as a guide to changing the physical aspects of the community infrastructure, and in doing so, recommends incremental adoption of each service or change, only when the community and its residents are comfortable with the previously acquired responsibility.

In order to meet the housing, employment, and infrastructure needs within these communities, the Federal Government should redirect funds from the bureaucratic maze in Yellowknife directly to the community councils in the small communities. This redirection of funds will substantially increase the yield of improvements, per dollar.

APPENDIX A

FORM OF LOCAL GOVERNMENT AND RELATIVE COMMUNITY SIZE

COMMUNITY	POPULATION	GOVERNMENT
Outpost Camp	Less than 16 persons Family or group of persons A semi-traditional way of life Represented by M.L.A.	No recognized form of government, may be represented by a sub-chief. N.W.T. government has programs in place to provide financial assistance and other services.
Settlement	Population of 50 or more persons Represented by M.L.A.	Locally elected council. Council has advisory powers only - consulted by G.N.W.T. on day-to-day administrative matters. Has input in 5 year budget - awards minor service contracts for settlement maintenance.
Hamlets	Population 50 - 499 persons Represented by hamlet council and M.L.A. Funds for capital works from G.N.W.T.	Hamlet and executives are incorporated. Incorporation gives authority for municipality to enter into contracts. Assumes responsibility for delivery of essential services. Prepares own budget, no revenue granting authority.
Villages	Population of 500 or more can raise revenue by way of property taxes.	Direct representation at G.N.W.T. municipal government departments.

APPENDIX B

AREAS OF CONCERN	SYMPTOMS	PROBABLE CAUSES
Sociological	Family abuse Substance abuse High rate of suicide Loss of social values	Lack of employment Relative expectation No outlet for social expression Lack of self esteem
Economic	No local economy Government dependency Lack of employment	No economic opportunity No incentives for self sufficiency No opportunity for self improvement "Leakage" of funds
Cultural	Elders disinterested Inappropriate technology Lack of community interest No traditions or established norms for behaviour	Undermining of culture Top down directives Competing cultural values Exposure to artificial and unrealistic expectations
Institutional	Lack of maintenance and inadequate operation of low tech systems Competing interests cultural, social	Lack of skills or appropriate training No input or acceptance of government programs Inappropriate service level

APPENDIX C

WATER TREATMENT

MANUFACTURER	PLANT MODEL & CHARACTERISTICS	COMMENTS
Neptune Trident Industries	Micro Flocc, "Water Boy" True package. Mechanical components designed for each specific application and water condition. Established reputation. ³⁵	Very compact. Designed for convenient service. Standard parts by industry known manufacturers and suppliers. Bolt-on replacements. Small foot print. Minimum power requirements. ³⁶

NOTES:

- Plants are designed with custom components to accommodate the chemical composition of the raw water source.
- Plants must be capable of producing optimum quality product over the full range of the plants production capability, for minimum to maximum capacity.
- The building which enclosed the water treatment plant must be large enough to provide room for chemical storage, operator's office and testing lab as well as accommodation for operator's personal needs.
- A qualified process engineer and the plant operator should be present when the manufacturer's installer commissions the installation.

³⁵ Zircon Projects Ltd., Edmonton, Alberta (403) 461-3224

³⁶ Mistry, Cham, Process Engineer

APPENDIX D

WASTE WATER TREATMENT

TYPE OF PROCESS	QUALITY OF TREATMENT	CHARACTERISTICS	FEATURES
Waste Treatment Pond (Lagoons)	Primary treatment and disinfection	Primary treatment only Separate system required to disinfect effluent.	Large land area. Odourous. Requires moderate temperature for biological action.
Trickling Filter	Primary Secondary Tertiary Disinfection	Requires grit removal and sludge digested Equipment. Also requires filtration media, synthetic or natural aggregate.	Three separate processes involved in Treatment. Requires complex mechanical features. Produces Volatile gases.
Activated Sludge	Secondary Tertiary Disinfection	Process accelerates biological action and re-uses mixed liquor. Influent is re-circulated, incremental levels of treatment.	Complex process. Produces volatile gases. Requires very skilled operator. Produces high quality Level of effluent.
Rotating Biological Contractor (R.B.C.)	Secondary Tertiary Disinfection	Similar to trickling filters Replaces method used for secondary treatment. Does not require circulation or splitting of influent for treatment.	Induces oxygen into secondary process. Reduces size and complexity of treatment process. Simple process Requires housing.

SOURCE:

Operation of waste water treatment plants
U.S. Environmental Protection Agency
Office of Water Programs

APPENDIX E

SUMMARY OF RECREATIONAL ACTIVITY/GROUPS

<u>Age Group</u>	<u>Activity</u>	<u>Location</u>
0 - 5	Supervised outdoor areas, benches, swimming pools, indoor "learn while you play" activities. Day care facilities.	Central community location, local community parks, close to shopping areas, convenient for mothers, good visible location for "hands-off" supervision.
6 - 15	Softball, soccer, seasonal sports, hockey rinks indoor and outdoor, opportunity for social contacts, curling, movies, etc.	Because of area necessary for summer sports - area should be located on perimeter of settlement. Winter sports located in outdoor/indoor rinks.
16 - 35	Bingo, movies, live entertainment, concerts, community discussions, curling.	Indoor facility - close proximity to residential area, Community centre, accessible to all age groups, location central in community.
36 - 66	Bingo, movies, social interaction, adult educational activities, crafts. Trade seminars.	Indoor facility, building may double as a school gym or Court room.
67 -	Bingo, movies, social interaction, crafts, community events, holiday celebrations.	Same as above.

Note:

Existing community facilities can be improved to facilitate activities. Community development plans should accommodate these activities with appropriate facilities.

APPENDIX F

SUMMARY OF MAINTENANCE EQUIPMENT

MANUFACTURER	LOADER/BACKHOE	GRADER	LOADER
Caterpillar ¹	Model #426 Purchase \$90K Trade In Value 2 Years \$55K	Model #120G Purchase \$160K Trade In Value 5 Years \$55K	Model #935 Purchase \$85K Trade In Value 2 Years \$38K
John Deere ²	Model #310 Purchase \$85K Trade In Value 2 Years \$60K	Model #670 Purchase \$150K Trade In Value 5 Years \$95K	Model #555 Purchase \$87K Trade In Value 2 Years \$50K
Case ³	Model #590 Purchase \$85K Trade In Value 2 Years \$45K	No Equivalent Model	Model #650 Purchase \$94K Trade In Value 2 Years \$45K

EQUIPMENT	MANUFACTURER		
Single Axle Dump Gas Powered Truck	Chevrolet New \$38K Used \$9-12K (5 Years Old)	Ford New \$35-40K Used \$10K (5 Years Old)	International New \$34-38K Used 10-12K (5 Years Old)
Tandem Axle Dump Diesel Powered Truck	Chevrolet New \$55K Used \$25-30K (5 Years Old)	Ford New \$55K Used \$24-28K (5 Years Old)	International New \$55K Used \$24-32K (5 Years Old)

Prices are approximate and subject to requested options, credit and lease arrangements.

- Monthly lease fees are calculated at 4-5% of new equipment cost.
 - Operator training is available and charged at \$600.00 per day plus disbursements. (2-4 days approximately)
- Maintenance training for operators and mechanics is available and charged at \$600.00 per day plus expenses.
- Warehousing of air, oil and fuel filters, oil, fluids and spare parts are approximately \$3,500.00 +/-.

¹ Finning Tractor Ltd., Calgary, Alberta Contact Bob Bergeron (403) 275-3340

² Twin Tractor Equipment Ltd., Calgary, Alberta Contact Brian Hardy (403) 248-0018

³ Hammer Equipment Ltd., Calgary, Alberta Contact Gary Brown (403) 243-8600

APPENDIX G

OWNER BUILD SWEAT EQUITY CREDITS

<u>TASK</u>	<u>CREDITS</u>
Site clearing/preparation	2
Excavation/gravel pad	4
Foundation	6
Backfill, grading	2
Beams, floor, subfloor	4
Exterior wall framing	4
Interior partitions	4
Roof framing	6
Roof flashing and shingles	2
Electrical	4
Plumbing	4
Heating	4
Exterior doors and windows	2
Exterior siding	6
Steps, landings and railings	2
Insulation	4
Vapour barrier	4
Install drywall and panelling	6
Tape and finish drywall	6
Cabinets	2
Finish stairs and frames	2
Cabinets	6
Finish stairs and trim	4
Interior painting	4
Exterior painting	4
Floor coverings	2
Site work and improvements	2
TOTAL	100

APPENDIX H

OWNER BUILD AND LEASE TO PURCHASE

Profit Sharing on Sale of Units

Mortgage Term	15 Years
Original Loan Amount	\$150,000
Sale Price after 5 Years	200,000
Less Outstanding Mortgage	121,650
Less Commission and Fees	5,000
Less Value of Land	0
NET PROFIT	\$ 73,350

Calculation of Subsidy - Client Payments for 5 Years

Subsidy Payments for 5 Years	30,000
Full Mortgage Payments	95,604
Percent of Payments Paid by Client	31.4%

Calculation of Client Profit

For example --- 5/15 Yrs. X .314% X \$73,350 Net Profit = \$7,677.00 Client Profit

APPENDIX I

PLANNING PROCESS TIME/COST ESTIMATE

YEAR ONE	COMMUNITY NEEDS ASSESSMENT	
	<ul style="list-style-type: none"> - Housing Needs - Educational Requirements - Employment/Training Requirement - One and One Half Person Years 	
		<u>\$ 95,000.00</u>
YEAR TWO	COMMUNITY SURVEY	
	<ul style="list-style-type: none"> - Topographical/Engineering Survey - Geo-technical Investigation - Inventory of Existing Resources - Three Person Years 	
		<u>\$235,000.00</u>
YEAR THREE	COMMUNITY DEVELOPMENT GUIDE	
	<ul style="list-style-type: none"> - Land Use Plan - Introduce Administration Policies - Education/Employment Program - Introduce Economic Development Plan - Begin Employment, Search and Selection - Two and One Half Person Years 	
		<u>\$250,000.00</u>
YEAR FOUR	PUBLIC WORKS INFRASTRUCTURE	
	<ul style="list-style-type: none"> - Introduce Service Schedules - Begin Purchase of Equipment/Buildings - Responsibility for Administration - Introduce Incremental Autonomy - Two Person Years 	
		<u>\$120,000.00</u>
TOTAL		\$600,000.00

Note: Above costs are estimates, they do not reflect the actual cost of purchase of equipment, materials or buildings. Costs include salaries, subsistence, materials and professional fees directly related to establishing the individual programs noted.

APPENDIX J

IMPLEMENTATION OF GUIDELINES TIME/COST

YEAR ONE	ADMINISTRATION <ul style="list-style-type: none"> - Education/Employment Program - Staff, Search Selection Here - Purchase Offices and Administration Equipment - Renovate Existing Buildings - Construct Storage and Maintenance Building 	\$ 650,000.00
YEAR TWO	PUBLIC WORKS <ul style="list-style-type: none"> - Purchase Equipment as per Service Requirements and Trained Staff - Employment of Administration and Maintenance Staff - Purchase or Construct Buildings - Employment Training - Begin Housing Program - Housing Materials (10 Houses Per Year) 	\$2,500,000.00
YEAR THREE	PUBLIC WORKS AND ADMINISTRATION <ul style="list-style-type: none"> - Purchase Equipment - Housing - Improve Infrastructure - Introduce Economic Development - Improve Community Amenities 	\$1,500,000.00
YEAR FOUR	<ul style="list-style-type: none"> - Adjust Programs as Required by the Current Social/Economic Climate - Encourage Private Investment 	
YEAR FIVE	<ul style="list-style-type: none"> - Continuous Adjustment of Programs Determined by Community Needs Assessment - Encourage Private Investment 	\$1,500,000.00
TOTAL		\$7,650,000.00

Note: Above prices include the cost of employee wages, job searches and staff training. Purchasing of buildings will reflect the requirements of the specific services identified in the Community Needs Assessment. These requirements will vary by Community

REFERENCES

- Arctic Institute of North America, The Sustainable Development Group. "Coping With The Cash". A Financial Review of Five Northern Land Claim Settlements, prepared for the Legislative Assembly, Special Committee on the Northern Economy, May 1989.
- Arctic Institute of North America. "Reflections from the Arctic Rim". Journal of the Arctic Institute of North America, Volume 8, Number 3, 1990.
- Bastedo, Jamie. "Framework for a Northwest Territories Conservation Strategy." Plan Canada, Summer 1987.
- Carefoot, E.D. "Solid Waste Management in the Canadian North". Report prepared for The Environmental Protection Service, Environment Canada, 1973.
- Canada Mortgage and Housing Corporation. "Rental Market Report". October 1993.
- Canada Mortgage and Housing Corporation. "Housing Needs in the Northwest Territories". Northwest Territories Housing Corporation, Winter 1993.
- Canada Mortgage and Housing Corporation. "Study of Core Housing Needs". 1992.
- Environmental Protection Service, Government of Canada. "Canadian Clean Water Act". Ottawa, Ontario, 1993.
- Gerein, H.J.F. "Towards an Urban Land Policy for the Northwest Territories". MDP, Faculty of Environmental Design, University of Calgary. 1979.
- Government of the Northwest Territories, Department of Municipal Affairs, Community Planning Division. "Sub-Division Design - Terms of Reference". May 1991.
- Government of the Northwest Territories. "Report on Restructuring from a Crown Corporation to a Government Department". Prepared for G.N.W.T., Summer 1992.
- Government of the Northwest Territories, Municipal and Community Affairs. "Sub-Division Handbook". August 1992.
- Government of the Northwest Territories, Municipal and Community Affairs, Community Planning Division. "Municipal Land Development: Councillors Handbook". May 1990.
- Heike, G.W. "Arctic Waste Disposal". Department of Indian and Northern Affairs, 1977.
- Honigmann, John J. and Honigmann, Irma. "Eskimo Townsman". Canadian Research Centre for Anthropology, University of Ottawa, 1965.

- Jewczyk, S. Davis Inlet: "A Community in Crisis". Plan Canada, January 1994.
- Makale, Holloway & Associates Ltd. "Arctic Bay Development Plan". December 1976.
- McCaw, Ronald. "A Good Foundation, A Report on the Construction Division". Northwest Territories Housing Corporation, Lands and Sites Section, Summer 1983
- Northwest Territories Housing Corporation. "Construction Procedures Manual". Construction Development Division, July 1987.
- Ontario Ministry of Housing. "Site Planning Guidelines for Medium Density Housing". Toronto, Ontario, Canada, January 1980.
- Roberts, Ian and Jones, David. "North of Sixty: Planning with the People". Plan Canada Summer 1987.
- Salway-Black, Sherry. "Address to the National Meeting of the State Rural Development Councils". Summer 1992.
- Salway-Black, Sherry, Vice President. "Understanding the Tribal Context for Development". First Nations Development Institute, October 1992.
- Semczyszyn, D.I., P. Eng. "Operations Maintenance Manual". District of Tumbler Ridge, September 1992.
- The U.M.A. Group. "Plan - Design - Build - Manage, A Functional Overview". Report prepared for the Northwest Territories Housing Corporation, January 1981.
- Thomas, Gerald. "The Hamlet of Red Earth: A Challenging Planning Experience". Plan Canada, 1987.
- University of Calgary, Arctic Institute. "Tuktoyatuk - A Community Study". Summer 1977.
- Wolfe-Keddie, J. "Aboriginal Community Development Planning: Trials of Australia's Pilot Project". Plan Canada, January 1994.

Information Received from Personal Interviews with:

Bullock, Wayne, C.E.T., Superintendent of Public Works; Slave Lake, Alberta, August 1993.

Chorniak, Daniel, Superintendent of Public Works; District of Tumbler Ridge, B.C. January 1994.

Kitchen, Robert, P.Eng., M.B.A., Field Engineer; City of Calgary, August 1993.

Mathews, M., Accommodations Officer; Alberta Housing, High Prairie, Alberta, 1991.

Mistry, Cham, M.P.Eng., Process Engineer; Zircon Projects Ltd., Edmonton, Alberta, February 1994.

Pittman, Milton, C.S.T., Lands Manager; Northwest Territories Housing Corporation, Yellowknife, N.W.T., January 1994.

Semczyszyn, Dave, P. Eng., City of New Westminister, B.C., November 1993.