TOWN OF MARKHAM

ASSESSMENT REVIEW

OF TURF CARE

AND

MAINTENANCE PRACTICES

PHASE 2 – ORGANICS

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GLOSSARY OF TERMS:

AERIFICATION – The slicing or coring of turf grass using mechanical means to remove soil from the top soil layer of the soil profile.

INTEGRATED TURF MANAGEMENT (IPM)- is multiple tactics used in a compatible manner in order to maintain pest populations below levels that cause economic or unacceptable aesthetic injury without posing a hazard to humans, domestic animals or other non-target life forms

CULTURAL PRACTICES – mowing, watering, fertilizing, and cultivating combined to reduce weed, insect and disease problems and to produce turf of high quality

PLANT HEALTH CARE (PHC) – minimizing the use of potentially harmful pest control products

PESTICIDE USE – The use of chemically produced products that have been classified for application onto turf grass to eliminate weeds, fungus and insects.

INSECTICIDE – The use of a chemically produced material used to eliminate insects found in turf grass

FUNGICIDE – The use of a chemically produced material used to eliminate fungus found in turf grass

HERBICIDE – The use of a chemically produced material used to eliminate weeds found in turf grass

NON SELECTIVE HERBICIDE – A herbicide used to treat weeds that will eliminate all forms of turf grass as well as weeds

SELECTIVE HERBICIDE – A herbicide used to treat weeds that will specifically remove an identified weed without injuring the turf grass

SOIL SAMPLING – The removal of a 6 – 8" core sample of soil from the topsoil layer of the soil profile using a t-bar soil probe. The material is analyzed by the laboratory to determine soil pH, micro and macro soil nutrients, and chemical composition

TOPDRESSING – The mechanical application of an approved soil material on turf grass. The material is in the form of sand, peat moss or soil or a combination of all three.

OVERSEEDING – The mechanical application of turf type grass seed to replace turf grass that has deteriorated leaving bare soil patches

A – TYPE SPORTS FIELD – This field has been identified as one having spectator seating, sports lighting, sub surface irrigation, drainage and a mowing practice program that requires the field to be mowed every 5-7 days

B – TYPE SPORTS FIELD – This field has been identified as one similar to a A-Type field. However, the B-Type sports field does not have lighting, nor spectator seating. There are some B-Type sport fields that do have sub surface irrigation

C- TYPE SPORTS FIELD – This field does not have lighting, nor irrigation and the turf grass is mowed every 12-14 days

CORN GLUTEN – A naturally produced product that is used to assist in the elimination of weeds

BEET PULP MOLASSES – A naturally produced product used to assist in the elimination of weeds

1.0 INTRODUCTION

1.1 PHASE 1 REPORT

The Town of Markham Phase 1 report was presented to Town Council on February 8, 2006. The Turf Grass Maintenance Evaluation report was the result of an investigative study conducted in the fall of 2005 by Marshall Macklin and Monaghan. The purpose of the report was to evaluate the Turf Maintenance of a selected inventory of turf conditions in Markham's parkettes, neighbourhood/ community parks, sport fields, boulevards and medians. The report compared the maintenance practices of three York Region municipalities including the Town of Markham, Town of Richmond Hill and City of Vaughan. Also included in the study was the random review of parks in the City of Waterloo and comparing the maintenance practices to that of Markham.

Maintenance practices for the Town of Vaughan and the Town of Richmond Hill were determined through face-to-face interviews with maintenance staff. Interviews with staff at each municipality elicited information regarding Integrated Pest Management (IPM), Plant Health Care (PHC), pesticide use, soil sampling and analysis, vertical mowing, aerification, topdressing, pesticide use, overseeding, turf seed varieties, mowing height of cut, maintenance of mowing equipment and frequency, mowing quality, mowing crews, turf nutrition, irrigation systems, and fertilizer application/applicator type.

Maintenance practices for the City of Waterloo were determined through casual discussions with maintenance staff and touring the parkettes, neighbourhood / community parks, sport fields, boulevards and medians. The same request for information was used in Waterloo as in Vaughan and Richmond Hill.

The project goals for Phase 1 were as follows:

A. To compare turf maintenance practices of Markham with Vaughan and Richmond Hill for Regional context and with Waterloo for comparison of environmental practices.
B. To compare appearance and features of turf within parks of differing sizes and street boulevards.
C. Prepare an inventory report ready for a follow–up evaluation of the observations.
D. To provide unbiased observations of all parks and boulevards reviewed, using one set of scales and criteria for all sites observed. The work must be completed during a two-week review period to ensure comparable conditions of observation.

Steps in Field Review and Observation included:

1. General visual observations including colour and consistency of the turf grass.

2. Visual review of areas bare of turf and interpreted reasons for the lack of turf cover.

3. Random sample of topsoil profile, using a soil probe, and visual analysis to determine if the soil has sandy, clayey or organic qualities. This review helped determine the relative level of compaction in soils of all selected turf grass areas.

4. Photographs of general turf grass condition of features in the site

5. Random area sample of turf to determine percentage of grasses and weeds.

Turf was categorized as follows:

A. Turf grass – These grasses include fescues, perennial ryes, Kentucky Blue, annual bluegrass, and native bent grasses.

B. Non – Turf type grasses –These grasses are generally broader leaved such as twitch grass, and crab grass. They are identified as they may pose a higher risk to players during wet conditions.

C. Clover – Clover tends to grow in groups of plants creating a dense mat of broadleaved material. Young soccer players may have difficulty moving the ball through a mass of this plant.

D. Other Weeds – Other weeds observed include knotweed, ironweed, plantain, and dandelion. These weeds are indicative of poor soil conditions, thriving in environments that turf grasses have difficulty growing. Knotweed and ironweed are found in heavily compacted and salt prone areas where no other plants can survive.

1.1.1 Relationship Between Markham, Richmond Hill, and Vaughan

The maintenance and management of turf grass in the Town of Markham, Town of Richmond Hill and the City of Vaughan varies in many ways. Many of the cultural practices performed by the three municipalities are similar. Many of the problems, with turf, experienced by the three maintenance departments relate to their inability to eradicate broadleaved weeds and clover using a selective pesticide program. In many cases, it is not unusual to have a Park, or Parkette, with as high as 60% weed count in the turf cover. Sport Fields tend to be better maintained than general park areas. Weed counts on Sport Fields in the Markham survey did not exceed 50% of turf area.

The other cultural practices, including the mowing of turf grass, are utilized by each of the municipalities. Markham may aerate more than Richmond Hill, and Vaughan may overseed and topdress their parks more than Markham but essentially all of the park sites in the three municipalities are receiving some form of cultural turf maintenance.

Each of the three municipalities, due to their geographical relationship, can offer many opportunities to one another. This can be in the area of staffing and staffing expertise. During the assessment and review of the park facilities in Markham, Richmond Hill and Vaughan, it became very evident that there is a mutual respect and/or working relationship between the staff at the Town of Richmond Hill and the Town of Markham. Information on cultural practices is shared on occasion, and staff meet on an informal basis to discuss subjects that are pertinent to both departments, and that staff compare notes relating to the operation of each area.

There did not appear to be the same kind of relationship between Markham and Vaughan; and Richmond Hill and Vaughan; as there is between Richmond Hill and Markham. All three municipalities have a great deal to offer one another as all three appear to have dedicated, knowledgeable, and hard working staff. The very fact that Markham and Vaughan are operating without a pesticide program and that Richmond Hill has a very restrictive pesticide program opens the door for communication opportunities that will benefit one another.

In the comparison of the municipalities, there is reference to two policies that relate to the use of sport fields in the City of Vaughan. The "Wet Field Policy" and the "Managing Use Policy" has enabled the City of Vaughan to manage their sport fields in a way that not only has the blessing of City Council but also of the user groups.

The *Wet Field Policy* allows the municipality to close a specific field(s) with the understanding that any use of the field(s) would create significant damage to the field(s) and render the turf dangerous due to rutting and divotting by the athletes playing at the facility. The *Managing Use Policy* allows the fields to be closed, to any sport field schedules, on two successive days each week, through the playing season. The two days are agreed upon by the sport user groups and by staff. In both of these policies any contravening of the policies by a sport group could lead to team suspension for a number of days and ultimately to the team being suspended for the duration of the year.

1.1.2 Comparison with City of Waterloo

The City of Waterloo has a reciprocal agreement with each of the Boards of Education that allows the Boards' Elementary and Secondary Schools to use the Corporation's sport fields. The Schools must adhere to the same kinds of regulations and guidelines as those used by community sport groups. Again, any contravening of the regulations and guidelines by the Schools could result in a school being suspended from using the field for a number of days or a school being suspended from using City-owned facilities for the remainder of the school year.

One area that is contributing to the overall improvement in quality of the turf grass on playing fields in the City of Waterloo is the length of the playing season. Staff from the City of Waterloo, the School Boards, and the community meet annually to determine the length of the playing season. The length of the season will impact on staff's ability to renovate the turf in anticipation of the following season. Normally, the season will commence during the second week in May and will terminate with the Canadian Thanksgiving weekend.

For this kind of policy to work in the Towns of Markham, Richmond Hill and the City of Vaughan, staff will need the cooperation of the user groups from the elementary and secondary schools as well as the community. Improvement will occur in turf grass quality if fields remain unused in October, allowing staff to renovate and prepare the fields for the following spring.

Waterloo parks are not built next to schools. This means that sport fields are used less during the day when pupils will use fields at recess. After-school event schedules would have to be planned with the City. Although they receive similar maintenance practices in Markham, sport fields in Waterloo have less use, less stress and are therefore in better condition than the York Region sport fields.

1.2 PHASE 2 PROCESS

Phase 2 was intended to take the information from the Phase 1 report and determine appropriate standards and make recommendations regarding the turf maintenance practices that reduces the use of pesticides on publicly owned property.

The following was the approach used to establish a framework for the Phase 2 process:

1.2.1 WORK PROGRAM AND PHASE 2 METHODOLOGY

- Marshall Macklin Monaghan Limited established a team of specialist consultants to meet with Town of Markham staff to prepare the report
- Marshall Macklin Monaghan Limited Team included a project manager (Mark Inglis), and an acknowledged expert on pesticide – free or cultural turf maintenance practices (Bob Kennedy). The invited experts included Tom Clancy, Cheryl Shour, and Dave Smith, all experts in turf grass management practices variously focusing on municipalities, residential lots, and construction.
- The team met in a workshop discussion on April 13, 2006 with Markham staff
- The Marshall Macklin Monaghan Team prepared minutes from that meeting, distributed the minutes to the attendees in preparation for a second workshop.
- The second workshop was held on April 26, 2006 with Markham staff to establish appropriate standards and recommendations for achieving these standards and identifying associated costs. Those results are part of the concluding section of this report.
- This report has been prepared for the Operations Division and will be presented to Council in June 2006.

1.2.2 The Team of Specialists

Cheryl Shour, B.Sc., MBA has extensive experience in organic turf management, assessing turf management protocols and analyzing outcomes of different strategies. Extensive consulting and project management experience in both the private and public sectors supplement her specific expertise in the field. She has consulted and spoken widely on the issue of transitioning properties away from pesticide dependence towards organic management. She has an honours Bachelor of Science degree and an MBA with a finance and economics major from the University of Toronto. In 1993, Cheryl began one of Toronto's first 100% organic lawn care services and the basis of her current consulting work derives from 10 years of experience in the provision of residential and commercial organic turf programs. As chief Environmental Officer of Healthy Home Service Inc. Cheryl developed the organic lawn care protocols for her company based on the objective of creating aesthetically pleasing and environmentally sustainable green spaces. All programs applied sound horticultural principles including site specific plant selection, soil enhancement, good cultural practices and a minimum of resources and synthetic inputs. Products were carefully selected on an 'as needed' basis and only those that would contribute to the long term health of the turf were used.

David Smith is an Articling Agrologist and a Certified Golf Course Superintendent. He holds an Ontario Diploma in Horticulture from the Guelph Agricultural College, University of Guelph. He has over 25 years of experience in the golf industry and has been involved in the management of high end professional sport turf, sod production, lawn bowling clubs and general park land.

In 1996, he established **DCS Agronomic Services.** He samples and develops recommendations for over 100 golf courses, 3,500 acres of sod production, 250 sports fields and more than 1000 acres of municipal parkland. He interprets over 2,500 soil tests annually. In addition to working with golf courses he assists sod producers, general contractors and municipalities with fertility and cultural management programs. The list of clients includes: Zander Sod Co., Dol Turf Restoration, The City of Hamilton, The City of Mississauga, The Town of Collingwood, and The Town of Clarington.

During the grow-in phase of construction he assists with challenges such as nutrition, pathology, entomology and cultural management practices.

Tom Clancy worked for the City of Kitchener in the capacity of Director of Parks for 25 years and General Manager of Parks and Recreation for 6 years. Tom's education includes a Diploma in Horticulture from the Niagara Parks Commission, (NPD) graduating in 1961. Tom received a Bachelor of Science (BSc.) from Cornell University in Ithaca New York in 1968. The Kitchener position as Director of Parks was awarded in June of that year. Believing in Life Long Learning, Tom gained his CMM Level III (Certified Municipal Manager) in 1997 from the Ontario Municipal Management Institute.

Tom has worked with many Community Groups and Service Clubs in partnership with the development of projects and events over the years. His style is to gain consensus with teams for the betterment of the projects and the community. He was the Chairman of the successful Schneiders 2002 International Softball Congress World Fastball Tournament held in Kitchener and is chairing that tournament again this year.

Since October of 1999 he has managed **Three C Consulting** as well as volunteering for several committees. He made a presentation at the Ontario Sports Turf Association in January 2004 and has written articles for their newsletter.

Tom has conducted sport field management and maintenance training for Kitchener, Waterloo, Cambridge, Pettawawa and The Ontario Recreation Facilities Association weeklong course in Guelph each year for the past six years. Tom utilizes the latest information on cultural practices and emphasizes aerating, overseeding with the best varieties of grass species and best practices from conferences, GTI and many sources to keep students up to date with the latest information. Tom is an active member of Ontario Parks Association, Niagara Parks Alumni Association and the Sports Turf Association.

Mark Inglis, maintained close contact with the Town of Markham and performed site analyses and research for the project. Together with the professional consultant team at MMM, he ensured that this project was delivered in June 2006. **Bob Kennedy** is a Maintenance Specialist. Bob has been involved with municipal park maintenance for over thirty years. Mark and Bob were co-authors of the Phase 1 report for this project.

Town staff participating in the workshops were **Paul Ingham**, General Manager of Operations and **Mark Ingwersen**, District Manager of Operations

2.0 GOALS AND OBJECTIVES

The Goals and Objectives for Phase 2 of this program were to determine the opportunities for decreasing or eliminating the use of pesticides in the Town of Markham's turf grass maintenance program. To achieve the goal, the following actions were considered:

- Confirm Classifications for all turf grass areas maintained by the town
- Analyze current Town of Markham standards of care and maintenance practices in turf grass management;
- Review the successful cultural practices of the other municipalities;
- Propose alternatives to the current turf management practices; and,
- Cost the proposed alternatives and compare to the status quo and practices that involve the use of pesticides.

2.1 PARK CLASSIFICATIONS

The Town has a park and street classification system of maintenance areas that include turf management. A definition of each of the classifications follows:

Parkettes serve the passive recreation needs of the adjacent community usually with totlot, benches and paths. The size of the parkettes is usually less than 2 hectares. Turf tends to be a lower percentage of the land area than other parks in the hierarchy of the parks system. Turf is usually a rye and bluegrass based mix. Clover is a satisfactory green plant in the turf.

Neighborhood Parks may serve as recreational and social focus of neighborhoods and may provide a combination of active and passive opportunities. Turf is used for organized, permitted sports and impromptu games, not programmed by the municipality. The size of the parks is 2 to 4 hectares. Turf is usually a rye and bluegrass based mix. Clover is a satisfactory green plant in the turf outside active programmed sports fields. Clover is an unsatisfactory green plant in turf on sports fields because it can create slip hazards during wet weather conditions.

Community Parks serve the broader community with a more active and programmed recreation component than neighborhood parks. Community parks serve active and passive uses. The park may have multiple user groups on site at any one time. Turf is usually a rye and bluegrass based mix. Clover is a satisfactory green plant in the turf outside active programmed sport fields. Clover is an unsatisfactory green plant in turf on sport fields because it can create slip hazards during wet weather conditions.

Sport fields may be part of community parks or neighborhood parks or may be a single use facility associated with a recreation centre or school. It should be noted that due to the fact that ball diamonds do not incur the same wear and tear as those fields used for soccer, football, and rugby, the maintenance of the ball fields will be similar to the standards established for the general neighborhood parks. Turf can be a rye and bluegrass based mix that can withstand the rigors of cleated athletes. Clover and broadleaf plants are unsatisfactory green plants in turf on sport fields because they can create slip hazards during wet weather conditions.

Boulevards are the spaces between the curbs of streets and sidewalks. The size varies between 0.5 and 3 metres in width: the wider the road right-of-way, the greater the width of the boulevard. Turf is usually a rye and bluegrass based mix. Clover and a high percentage of weeds are considered satisfactory in the turf if they are tolerant of the urban conditions.

Window Streets are paved local streets that parallel arterial or major collector roads. The space between is planted or grassed. Turf is usually a rye and bluegrass based mix. Clover and a higher percentage of weeds than for parks are considered satisfactory in the turf.

Medians are spaces surrounded by curbs within the pavement of roads. If the space between curbs is wide enough, turf is included and is maintained at the same level as boulevards. Hard surface medians include unit pavers, concrete and/or asphalt. Weeds are present in these areas and require maintenance.

2.2 CURRENT STANDARDS OF CARE

The consultant in Phase 2 reviewed the standards of care required for turf management. The Town's current policies and actions will be taken into account including:

- Mowing height of turf
- Frequency of mowing
- Mowing equipment
- Acceptability and definitions of weeds including: clover; dandelions, etc. in the classification areas
- Percentage of weeds in turf and relationship to the classification areas.

2.3 PROGRAMS

Previously, the report indicated that there are four Park classifications of turf grass in the Town of Markham. These classifications: Parkettes; Neighborhood Parks; Community Parks; and Sports fields. Also, boulevards and medians are included in this group. Each of these classifications have been categorized with those maintenance practices that are presently being used. Status Quo allows staff to spray pesticides when weeds achieve a population of greater than 20% on sports fields and 40% on parks.

A. CURRENT PRACTICES – STATUS QUO

PARKETTES

Parkettes receive a basic maintenance program. The turf grass is mowed every 12-14 days using a large area rotary mower at a 2 ½" height of cut. There is no application of fertilizer. The turf grass does not receive any mechanical aeration nor are there any topdressing or overseeding procedures occurring at these sites.

NEIGHBORHOOD PARKS

Neighborhood Parks receive an advanced program from that of Parkettes. The turf grass is mowed every 12-14 days using a large area rotary mower at a 2 ½" height of cut. There is no provision for topdressing or overseeding the turf. Fertilizer applications occur once a year

BOULEVARDS AND MEDIANS

Boulevards and medians have no cultural programs attached. The turf is mowed every 12 -14 days at a height of cut of 2 ½". Weeds found growing in the concrete, asphalt or lockstone medians are manually removed twice annually.

SPORTS FIELDS

A -TYPE

A type sports fields receive two aerations per year. The fields are topdressed twice a year and are overseeded four times a year. Fertilizer is applied five times per year, and the turf is mowed every 5-7 days using a large area rotary mower at a 2 ½" height of cut

B - TYPE

B-Type sport fields receive two aerations per year. The fields are topdressed once a year and overseeded 2 times per year. Fertilizer is applied five times per year and the fields are mowed every 5-7 days using a large area rotary mower at a 2 ½" height of cut.

C - TYPE FIELDS

These sports fields are maintained in a similar fashion to neighbourhood parks. Although sports are permitted on these fields, there is no cultural practice program in place other than mowing the turf grass. The fields are mowed every 12-14 days using a large area rotary mower at a 2 ½" height of cut

B. PROGRAMS BASED ON APPROVED STANDARDS – (Pesticide use on sport fields, parks and parkettes)

PARKETTES

Weeds can be sprayed in parkettes providing that the weeds exceed 40% population.

NEIGHBORHOOD PARKS

Weeds can be sprayed in neighborhood parks providing that the weed population exceeds 40%

SPORT PARKS

A - TYPE – weeds can be sprayed in A-Type sports parks providing that that weed population exceeds 20%
B - TYPE – weeds can be sprayed in B-Type sports parks providing that the weed population exceeds 20%
C - TYPE - weeds can be sprayed in C-Type sports fields providing that the weed population exceeds 40%

N.B. There have been no applications of chemically produced pesticides due to pressure from various stakeholders to reduce and eliminate pesticide use on turf grass in parks

C. DEFINITIONS OF WEEDS

For the purpose of this report the turf grass cover found in Parkettes, Neighborhood Parks, and Sport Parks have been categorized as follows:

1. turf grass – commonly known as native turf ie: Kentucky Blue
2. non – turf grass commonly known as grass weeds ie: twitchgrass
3. clover
4. other weeds commonly known as broadleaved weeds – ie: plantain

D. PERCENTAGE OF WEEDS AND RELATIONSHIP TO THE CLASSIFICATION AREAS

Based on the established levels of service the acceptable percentage of weeds for the various classifications of park land is as follows:

- Parkettes – less than 40% weed population
- Neighborhood Parks – less than 40% weed population
- Sport Parks – A- Type – less than 20% weed population
- Sport Parks – B – Type – less than 20% weed population
- Sport Parks – C – Type – less than 40% weed population
- Boulevards and Medians – less than 40% weed population

E. PILOT PROJECT AND RESULTS

A "Pilot Project" was initiated at five specific and different parks in Ward 2 as well as the Town of Markham Civic Centre. The intended purpose of the project was to identify those cultural practices that were required on the turf and to determine if the practices were making a difference in the quality of the turf grass. Each of the sites included in the program received the benefit of a full cultural practices program. There was no application of pesticides. These practices included the following:

- Increased mowing frequency (approximately 12 more mowing operations per season
- Aeration – 3 times per year
- Topdressing – 3 times per year
- Overseeding – 4 times per year
- Fertilization – every 6 weeks during the growing season
- The use of alternative sources to combat an increase in the weed population. Some of these sources were Beet pulp Molasses, Corn Gluten and the manual weeding and cultivation of shrub beds

Staff monitored the program and analyzed the results. The results of the cultural practices program have been that there has been no appreciable increase in the weed population at each of the specified sites. However, it should also be noted that there has been limited decrease in the

total weed population since the program commenced at the various sites. The success of cultural practices is subject to favorable weather conditions.

3.0 ISSUES

During Phase 1, an investigative report was prepared to evaluate the turf maintenance of the Town of Markham parks, boulevards and medians.

From this report a number of issues emerged. These are:

- Stakeholders concern regarding the appearance of the noted areas
- Sport Turf grass injuries. What is the risk management factor? What is the accepted management standard? Markham needs to determine what is acceptable?
- Excessive use and wet field use
- Building new parks is performed by a different department than the Operations Department which maintains the parks
- Communication with the Stakeholders
- Standardization and capital construction of Sport fields need to be reviewed in light of maintenance requirements
- Monitoring Sport field use should be compared with the amount and type of maintenance for the field.
- Lack of a soil testing program required to improve the quality of turf grass on Sport fields based on the needs of specific locations with varying degrees of soil types
- Providing opportunities for staff to educate user groups on the need for change to the current structure of sport field permitting.

Each of the issues has been addressed by the Team. Each is important to the overall improvement of both communication with the stakeholders and with augmenting the turf grass maintenance program.

3.1 STAKEHOLDERS CONCERNS:

During the review, items were discussed and documented that demonstrate concerns and frustrations among the stakeholders. In some cases, operations staff are hamstrung by their inability to create change as a result of inappropriate sports field use by community and school based teams. Users are undoing the positive work that they perform. In many cases, this work has been critical to the well being and safety of those young athletes playing on the fields. Staff want to hear that they are making positive changes for the Community. Winning Communities in Bloom competitions is a positive indication of the success the staff have achieved.

Many sporting groups in Baseball and Soccer feel that their requests for better and safer fields are not being addressed. However, staff do not have the resources to monitor the use of these sport fields. On many occasions, unscheduled games are played on the fields when there should be no activity. As a consequence, the well maintained fields begin to deteriorate.

With pressure on staff to improve the quality of the turf grass on sport fields, many cultural practices are not performed due to a lack of equipment, materials, and manpower necessary to compete with weeds, insects, inappropriate play, weather conditions and vandalism.

Stakeholders have requested a review of pesticide use. Many fear that the continued use of chemically produced pesticides by the Town of Markham will lead to a decline in the well being of the community. Many municipalities have determined to eliminate the use of pesticides. The consequence has been an increase in the weed population, a deterioration of the sports turf grass and an increased exposure to sports injuries by young athletes. In some municipalities, staff has been able to initiate a cultural practices program commencing with a "one –off" pesticide spray program. This procedure has allowed staff the opportunity to eliminate the weed population while starting a turf grass improvement program. Those municipalities that have initiated this type of program have been able to keep a tighter control on the growth of weeds due to the expansion of the cultural practices program.

3.2 SPORTS TURF INJURIES

Sports Turf injuries are often an occurrence of turf grass that has been allowed to deteriorate leaving large areas of bare soil, weeds and clover, rolling or bumpy turf and turf with no roots that often expose young athletes to lower body debilitating injuries. In many cases, these injuries are a result of turf that has very little to no cultural practice program in place. The turf grass and the topsoil layer become hardpan preventing athletes from being able to plant their cleats into the turf. Often the cleat gives way and athletes are injured.

During the growing season, young athletes are confronted with turf of varying types. As the weather conditions call for warm temperatures with little natural moisture, the sports turf becomes increasingly hard and the fields become well worn. Often these conditions lead to the canceling and re-scheduling of games due to poor field conditions. As the fields dry out an increase in the weed and clover population occurs. As was noted in Phase 1 of the turf grass review program, a number of non – irrigated fields in Markham continue to see an increase in the weed population. As the weeds continue to grow the quality of the turf grass will continue to deteriorate, as there is other artificial means of providing water to the turf. With the increased demands for more sports field facilities, particularly soccer, it is imperative that an annual or capitalized program be initiated to address the lack of irrigated sports fields in Markham.

3.3 EXCESSIVE SPORTS FIELD USE / WET FIELD USE

As noted in the Phase 1 review of Sport Parks in Markham, many of these parks continue to suffer from over use. The use of sports fields by the schools and community is putting an extra burden on the stakeholders. Often the fields are scheduled beyond the capabilities of staff to keep the fields in an acceptable shape. At each of the fields that were visited, the turf grass was mowed at the proper height of cut, there was no debris or garbage littering the field and "out" area, the amenity was in good shape (benches, spectator seating, goal posts, chainlink fencing) were all in good repair, and the general appearance of the facility was satisfactory.

Due to the increased numbers of players playing different field events, the sport fields were showing signs of fatigue. Many of the goalmouths were bare of turf, most of the centre portions of the field from the 18-yard box to the 18-yard box at the other end of the field were rutted and devoid of any quality turf grass. Not only are these bare spots and ruts unsightly, they are creating potential for liability for the Town. In each of the cases, neither the soil conditions, nor the lack of a scheduled cultural program were contributing to the decline of the field. Each of the fields are core aerated, top dressed, overseeded, and fertilized on an annual basis in accordance with Town policy.

In other towns and municipalities of Ontario, policies have been put in place to ensure that the sports infrastructure is supporting the community without creating a concern for player's safety. Often user groups will put pressure on staff to keep a facility open, sometimes compromising the safety of the athlete. In the Town of Vaughan, Council has two policies that relate to the use of Sport field. The one policy "Managing Use Policy" sets aside two days out of every week, during the playing season, in which the playing fields are not scheduled for use, by teams, for either practice or games. The two days are the same two days throughout the season. The second policy that the Town of Vaughan has in place is the "Wet Field Policy". This policy prevents user groups from using a field, if in the opinion of staff the field is unplayable.

In Markham, during the sports season, when inclement weather occurs, teams often play on sports fields when the fields should be declared unplayable. However, due to the size of the Department field management program there is no mechanism in place that would notify teams that play has been cancelled. Many municipalities are now using communication tools that allow teams to access the information immediately. For example, all field use for any given day can be posted on the Town's Web site. This information can be made readily available to the stakeholders providing them with up to date information about the condition of the sports fields. Also, the stakeholders can access a 7 day 24 hour information phone line. Teams would be required to access the information prior to playing on a field that may have been declared unplayable. These two options require both staff and the stakeholders to "buy" into a system that when implemented will improve the quality of communication between staff and the stakeholders.

3.4 BUILDING NEW SPORTS PARK FACILITIES

The Town of Markham builds and reconstructs Sport Fields on an annual basis. The Design and Construction of the fields is the responsibility of departments other than the Operations & Asset Management Department. In Phase 1 of the Turf Care and Maintenance Practices Review, several park locations were noted for the lack of quality soil conditions. Many of the sites visited exhibited soils heavy in clay and silt content. In some locations, there was lack of drainage preventing excess water from leaving the playing field.

Capital projects (new construction) require standardization. Using the Sports Turf Manager's Association classifications for Sport Field development and maintenance should be considered. Fields are categorized according to the amenity present at the site. The standardizing of all fields puts all of the same fields on the same level (i.e.: "A-Type" fields). All departments that have an interest in the development of sports turf grass fields should have input into the establishment of Construction and Maintenance Standards for the Town of Markham.

During the design and construction phases, stakeholders should be sought out for there opinions relating to the development of the facility. For example, the sporting community should assist in determining the location of a baseball field. Their expertise will prevent a field from being constructed in an east/west location.

Involving the stakeholders and other municipal departments would offer sounding boards for: consideration for irrigation, drainage, soils and the type of soils to be used, construction methods (ie: the use of laser guided construction equipment to improve the quality of the sub and final grades), and surrounding amenity such as garbage receptacles, spectator seating, backstops, security, fencing, and scoreboards will reduce the post construction cost of the facility. Presently, many municipalities are constructing fields that provide staff with the flexibility to improve the quality of the sports turf. Fields are being designed to allow staff the room to maneuver relocatable soccer goal to prevent the deterioration of turf at the 18-yard penalty kick zone and in front of the goal posts. Stakeholders could also assist in the allocation of fields by helping to determine the use of the field, whether it is for House League, All Star play or Adult use.

Sport fields should be allowed to mature for one year following the construction or major turf retrofits of a playing facility. There should be no formal programmed or allocated use of the sport field during the one year maturation period.

3.5 COMMUNICATION WITH THE STAKEHOLDERS

It is essential for staff to broaden the scope of the information that they are providing to the public. Previously in this report, it was stated that the municipality lacked the resources to monitor the use of sport fields. Often, quick response enforcement can and will occur when various emergency services are networked into the departmental system. Signs can be erected at the entrances to various playing fields alerting those wishing to use the fields that the fields are unplayable and out of service. Further, those teams found playing in abeyance of a field use by-law would be subjected to a suspension penalty that could affect their ability to play on Markham fields during the season.

Permits used to allocate sport fields to sports teams require changes that limit field use during inclement weather. A policy or a communication strategy can be developed regarding the issuance of permits to sports teams. Other municipalities require the sporting associations rather than the teams to handle the permits. This prevents teams from capturing or "hoarding " sports field playing time. It also ensures that teams receive a fair share of allocated field time. A further enhancement of this strategy is to identify which teams (divisions) use the field, which day they use the field, and for how long.

Another form of communication tool used by municipalities is the development of a Sports Council. This group is a volunteer group composed of all of the sporting groups in the Town. Each of the groups has voting members and there is no differentiation of seasons. The purpose of the Sports Council is to monitor the use of sports field use by the associations and to act as positive vehicle for staff and the sporting organizations in the Town.

3.6 MONITORING SPORT FIELD USE AND THE TYPE OF MAINTENANCE REQUIRED FOR THE FIELD

Previously, it has been stated that neither staff nor the Town has the resources to monitor the use of the sport fields. Suggestions have been made that will help to assist in augmenting staff's ability to prevent play on fields that have been determined to be unplayable.

It is evident that the use of the Markham Sport Fields occurs too early in the growing season and too late in the season. Often, user groups are on the fields using the facilities when the frost is just coming out of the ground. Also, the fields are being used until first snow. This overuse contributes to staff's inability to close a field and direct their energies to preparing the fields for the spring of the following year.

Preparatory work that is conducted by staff on the playing field will be wasted by groups playing without due regard to the work that has been completed, such as overseeding of goal mouths. Regularly, the seed is kicked out of the goal mouth area by user groups, leaving an appearance that staff had not repaired the goal mouth. Another example is the repair of low areas in the field using sod. On many occasions, the sod will not be placed on the field until there is frost in the ground. Use of the field has prevented staff from accessing the field at an earlier date. The sod is difficult to place and ridges form on the sod. When play resumes in the spring these ridges become hazardous, are often kicked out by players, and within a very short period of time the sod is removed and bare soil is exposed.

The same can be said for playing field use in the late winter/early spring. Either there is still frost in the ground, or the ground is saturated, from the frost coming out of the ground. Teams that access the field when either of these scenarios occur, damage the fields to the point that the turf becomes rutted, and is generally unsafe for play.

Many municipalities have hard and fast rules that prevent the use of sports fields prior to the May 1st weekend and after the October Thanksgiving weekend. Those teams or organizations found using the fields outside of the designated time periods could be subject to having their permits suspended the following season.

3.7 LACK OF A SOIL TESTING AND MONITORING PROGRAM

During the Phase 1 review process, it was pointed out that the Town does not have a soil testing and monitoring system in place to test the soil for nutrients and contaminants and monitor materials and foreign substances entering into the soil's profile. Depending on the type of sport field, soils can be tested and monitored for improvement using the data derived from the laboratory analysis. The data assists staff in providing the correct amount of micro- and macronutrients needed to sustain good quality turf grass growth. This information enables staff to reduce the amount of fertilizer and water used on an irrigated playing field.

Coupled with the soil testing and the monitoring of the soil profile are audits on the amount of water being used on a playing field and the leaching ability of the soil beneath the playing fields turf. An audit of the irrigational water will assist in reducing the amount of water and fertilizer

used to keep the turf grass in a healthy state. The purpose of water audits is to reduce the amount of treated water being used in North America on sport fields. Irrigation audits are presently being used in the United States and in Alberta. The American Irrigation Association is lobbying states and provinces to invoke penalties on those municipalities that do not have water audits in place prior to 2010.

Since the inception of water and turf grass quality audits, municipalities throughout North America have seen the need to expand their areas of monitoring turf grass development. The addition of a full time turf grass technician (staff person) or a contracted turf grass consultant (seasonal) enables the person to take responsibility for the organization of the turf grass management program. This would include, but not be limited to weekly / bi-weekly/ monthly and annual reports documenting the progress of the turf and soil quality of the parks and playing fields, monitoring sports field use and scheduling the allocation of permits for those sport fields. The person would also provide input and make recommendations regarding the type of maintenance required for each of the Town's sport fields. The technician would couple their responsibilities with coordinating all concerns raised by the stakeholders. Although the person would work for the Parks Department, many of the duties (ie: irrigational water quality) would cross into other municipal departments

3.8 EDUCATING USER GROUPS AND THE NEED TO CHANGE THE SPORTS FIELD PERMIT STRUCTURE

In the previous text regarding communication, it was noted that it is essential for staff and the stakeholders to keep an open line for communication. We have noted that this communication is paramount to ensuring that the stakeholders know when fields are available for play and when they are unplayable due to inclement weather. Also, identified was the overuse of Markham's sport fields.

The Markham sport field permit structure has created some challenges for staff. The issuance of permits is performed by an agency outside of the Operations & Assets Department. Circumstances have occurred whereby a field has been closed for renovations while playing field permits have been issued to organizations during this period. As a result, games have had to be cancelled. This situation can be avoided if there was one group responsible for both the issuance of permits and the maintenance of the sport fields. This type of operation has become standard throughout the province

Many municipalities have had a great deal of success in providing educational opportunities for sports field user groups. Sports park allocation meetings, and mini-conferencing can provide the stakeholders with information relating to the long range capital goals of the municipality. Opportunities can occur for the municipality when user groups are consulted about the following:

1. the expansion of a cultural practices program
2. differentiating pesticide use. Communicating the difference between the use of fungicides, herbicides and insecticides
3. educating the stakeholders on the need to consider a "one off" pesticide application to eliminate weeds with the understanding that following the spray application Markham would only apply cultural practices to the turf grass thereafter.

4. sharing thoughts on the establishment of a "City of Toronto like pesticide ban" in Markham
5. educating stakeholders on the need for staff to establish such programs as Integrated Pest Management and Plant Health Care programs that will reduce the amount of chemically produced materials used by staff and stakeholders
6. educating stakeholders on the use alternatives to chemically produced materials. Some of these alternatives would be Corn gluten and beet pulp molasses

4.0 MAINTENANCE PRACTICES

4.1 OPTIONAL MAINTENANCE PRACTICES

During this Phase 2 review, various options of cultural practices were investigated. Each of these four options will be reviewed with a view to providing options regarding the maintaining of the status quo or changing the way that Markham manages their turf grass programs. The following is a list of the options and a series of thresholds that will relate to each option for Parks, Parkettes Boulevards (this will include window streets and medians) and Sports Parks A,B and C Types:

A. Cultural practices without the use of pesticides (status quo) actual current practices;
B. Current approved standards (spray weeds when there is more than 20% weed population on Sports fields and greater than 40% weed population in Parks;
C. Some cultural practices (Ward 2 park sites plus Civic Centre) being used
D. Full System Wide Cultural Practice program

OPTION A - ACTUAL CURRENT PRACTICES WITHOUT PESTICIDES

PARKS:

Parks have a turf grass management program that addresses the need to mow the turf. The turf is mowed every 12 -14 days at a height of cut of 2 ½ ". There are no funds set aside for the aerating of turf. The turf is topdressed and overseeded as needed. Fertilization of the turf occurs once per year in the fall. There is no use of pesticides in Parks. However, the threshold for spraying the turf is 40% total weed population. Parks are monitored on a twice per year basis

PARKETTES, MEDIANS, BOULEVARDS and SPORTS PARKS C-TYPE FIELDS:

Parkettes, Boulevards, Medians and Sports Parks C-Type fields are grouped together as they receive the same cultural practices. The turf grass is mowed every 12 – 14 days at a height of cut of 2 ½". The turf does not receive any aerating, topdressing of materials nor is the parkette or boulevard overseeded. There is no use of pesticides in Parkettes, C-Type sports fields or on boulevards. However, the threshold for spraying the turf grass is 40% total weed population. The medians are maintained using manual labour. There is no option to use a chemical spray nor can mechanical means be used due to concerns over public liability. There is no fertilizer applied to Parkettes or boulevards during the growing season. C- Type sports fields receive an application of fertilizer in the spring and the fall of the growing season. Parkettes are monitored twice per year. Boulevards do not have a monitoring system and C-Type sports fields are monitored monthly.

SPORTS PARK – A-TYPE AND B-TYPE FIELDS:

The A-type and B-Type sports park fields receive similar cultural practices. The turf grass is mowed at a height of cut of 2 ½ "every 5-7 days. The sports fields are aerated three times a year, topdressed in the spring and the fall and are overseeded four times per year. The turf grass has a pesticide threshold of 20% total weed population. However, there is no use of pesticides on A-

Type and B-Type sports fields. Fertilizer application occurs every 6 weeks during the growing season. A-Type sports fields are monitored on a weekly basis whereas B-Type sports fields are monitored monthly.

OPTION B - ACTUAL APPROVED PESTICIDE USE PROGRAM

The Parks Department discontinued the use of pesticides on parkland in the Town of Markham in 1991. The actual approved pesticide use on sport fields is 20% of the total weed population and on parkland boulevards and medians is 40% total weed population.

OPTION C – PARTIAL CULTURAL PRACTICES

Partial cultural practices refers to the development of a cultural practices program for Parks, Parkettes Boulevards, and C-Type sport fields that would be similar in nature to the cultural practices performed on A-Type and B-Type Sport fields as well as the current Pilot Project in Ward 2 and the Civic Centre. The turf grass would be mowed at a height of cut of 2 ½" every 5-7 days. The turf grass would be aerated twice a year, topdressed twice a year and the overseeded four times per year. Fertilizer would be applied to Parks, Parkettes, C -Type sports fields, and boulevards five times during the growing season. The threshold level for these parks for the use of pesticides would be 40% of the total weed population. The Parks, Parkettes, and C-Type sport fields would be monitored on a monthly basis and the boulevards on a yearly basis. Median maintenance will be manual removal of weeds and increased to three times per year.

OPTION D – SYSTEM WIDE CULTURAL PRACTICES PROGRAM

A system wide cultural practices program refers to the implementation of a system wide cultural practices program that creates a parkland turf grass management program that has the same type of cultural practices being exercised on all Parks, Parkettes, Sport fields and boulevards. On A-Type and B-Type sports fields the turf grass would continue to be mowed every 5-7 days at a height of cut would be raised to 3 ", the fields would be aerated four times per year, topdressed and overseeded four times per year and fertilized five times during the growing season. The threshold for pesticide use would be 20% of the total weed population. The sports fields would be monitored on a weekly basis

On C-Type sports fields, Parks, Parkettes, and Boulevards, the turf grass would be mowed every 12 -14 days at an increased height of cut of 3". The turf grass would be aerated three times per year, topdressed and overseeded twice per year and fertilized three times during the growing season. The threshold for pesticide use on these sites would be 40%. The turf grass would be monitored on a monthly basis with the C-Type sports field being monitored weekly, while the Parks and Parkettes would be monitored on a monthly basis. The boulevards would be monitored yearly. Median maintenance will be manual removal of weeds and increased to 4 times per year.

4.2 REVIEW OF CULTURAL PRACTICES:

The MMM Team reviewed the area of the cultural practices and evaluated the success and or failure of these practices. The Team investigated the development of certain thresholds which staff could use to determine the short term and/or long term benefits of the turf grass management

program. Each of the cultural practices will be listed with various thresholds. Staff has had the benefit of the Pilot program in Ward 2 and the Civic Centre, which has provided them with information relating to the overall increase and/or decrease of the weed population at each of these sites.

AERATION:

The aeration of parkland varies with the type of activity occurring at the site. A-Type and B-Type sports field turf grass receives considerably more aeration than Parks, Parkettes, Boulevards and C-Type sports fields. The rationale for this activity is that there is far more compaction created on an active sports field than any other parkland facility. However, it is the contention of the MMM Team that failure to include an aeration program in Parks, Parkettes, and Boulevards will continue to create an increase in the compaction of the turf/soil and a subsequent increase in the development of weeds and clover.

TOP DRESSING:

Similar to aeration, A-Type and B-Type sports fields are mechanically top dressed twice a year in Markham. The team would like to see this cultural activity available to the C-Type sports field as well as Parks and Parkettes. The rational for including the top dressing activity into all of the parkland sites is to thicken the turf grass plant. Various top dressing materials such as sand, soil and peat moss combinations were suggested. These materials could be used on the turf grass provided that a soil testing and monitoring program was put in place.

OVERSEEDING:

The overseeding of A-Type and B-Type sport fields is performed on a regular basis in Markham. In total, these fields receive four mechanical overseeding procedures per year. Although this program addresses the turf renovation requirements of the A-Type and B-Type sport fields, it does not reach out to include the Parks, Parkettes and C-Type sports fields. The team believes that there is a need to create consistency in the deliver of this cultural practice. Also, consideration should occur when choosing the type of seed for the overseeding of parkland. Seed types should vary with each location as different soils, water availability and facility use will dictate the type of seed required.

MOWING:

Presently, mowing of parkland turf grass is performed by large and small rotary type mowers at a height of cut of 2 ½". The Team felt that this height of cut is too short and that the height should be raised to 3". This change is more consistent with the recommended mowing heights used by most municipalities. The frequency of cut need not change, although it was suggested that the C – Type fields mowing program should change to the 7 day cycle used on A-Type and B-Type sports fields. The rational for the higher height of cut is the turf grass will be able to withstand higher temperatures and increased numbers of days without rainfall.

FERTILIZER:

The importance of providing proper nutrition to turf grass has been overlooked except for the A-Type and B-Type sports fields. The A-Type and B-Type type fields receive a balanced application of fertilizer throughout the growing season. This cannot be said for the Parks, Parkettes and the C-Type sports fields. The application of fertilizer on C-Type fields twice a year and once a year on parks and Parkettes does not meet the needs of the growing turf grass plant. On many occasions, turf starts to deteriorate with the lack of nutrient being made available to the grass plant. The Team suggested that the need for increased application of fertilizer is required on C-Type sports fields, Parks and Parkettes. Also, the Team would like to see alternatives to chemically produced fertilizers investigated. Although organically produced fertilizers are more expensive and considered not to be as effective as chemically produced fertilizers, there are some organic fertilizers that are on par with the quality and price of chemical fertilizers. The Team believes that the promotion and use of organic fertilizers would send a positive message to the stakeholders.

PESTICIDE USE:

The Team was surprised that the Parks Department is approved to use pesticides on turf grass on Parkland in the Town of Markham. As previously noted, the Department can spray A-Type and B-Type type sports fields, when the population of weeds exceeds 20% weeds. On C-Type sport fields, Parkettes, Parks and Boulevards pesticides can be applied when the population of weeds exceeds 40%. The Team expects that pesticides were not being used due to pressure from the stakeholders.

The Team was not advocating the use of pesticides on turf grass on parkland. However, the Team believed that there needs to be a system put in place that will address the continued increase in the weed population on parkland turf grass. One of the issues that the Team spoke about was the expectation of the stakeholders as it relates to the use of pesticides. Is the public aware of the high cost of maintaining turf grass if weeds and clover are not eliminated or at least kept in check? Has there been an opportunity for public education relating to the use of pesticides? The Team indicated that there needs to be a starting point for the development of a turf grass management program that would include the use of pesticides in which weeds are eliminated in a "one – off" spray application? This is similar to what Waterloo and other municipalities in Ontario have used to initiate their turf grass programs. Does the Town of Markham need to look at a Pesticide by-law similar to the City of Toronto Pesticide by-law?

4.3 ACHIEVING THRESHOLDS

During the debate relating to the use of pesticides, thresholds were discussed with a view to determining at which threshold is there a need to establish a pesticide use program that would reduce the cost of maintaining turf grass, eliminate the presence of weeds and clover and prevent the total rehabilitation of the parkland facility.

Several points were made that highlighted the need to address the issue of reducing or eliminating weeds and/or clover. These are:

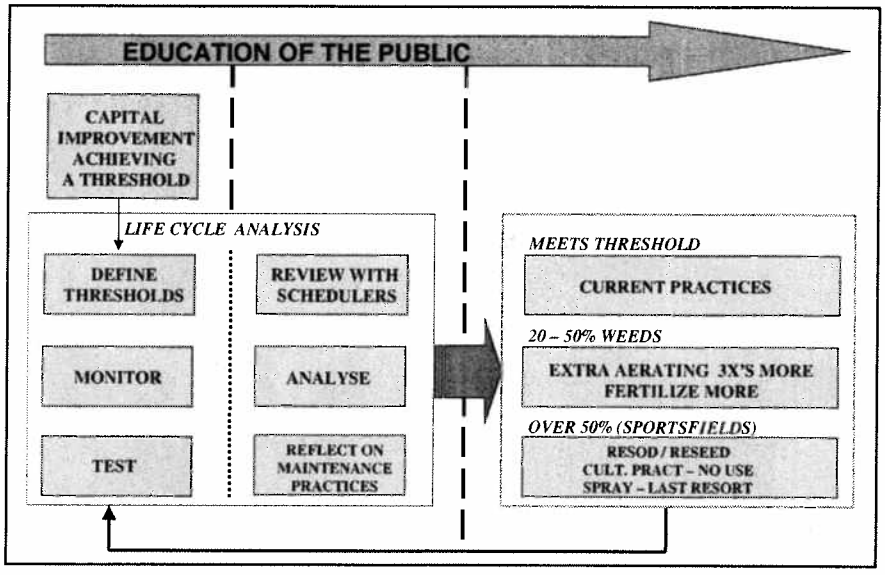
1. Failing to remove weeds increases the risk factor and liability when young athletes are playing soccer at a high level; and,
2. The sport fields, depending on the percentage of the weed population, may need to be closed in order to accommodate the complete sod or seed renovation of the sports field.

During the closure of the sports field there are negative economic spin offs. These are:

1. Loss of revenue, by the Town, from the permitted use of the sports field;
2. Stakeholder complaints and public perception of the closure;
3. The high cost of renovating the field whether it be sod or seed;
4. The concern that unless weeds are completely eliminated, the renovation of the field is only a short term remedy as weeds will return to the field unless there is a turf grass management program put in place;
5. The loss of a park or playing facility out of the department's inventory for periods 6-8 weeks if the facility is sodded and upwards to a year if the facility were to be seeded; and,
6. The loss of revenue by businesses in the area of the park or playing facility that would normally do business if the park or facility were open for use by the public

4.4 LIFE CYCLE ANALYSIS AND WEED THRESHOLDS

The following chart resulted from the April 26, 2006 workshop. The chart provides a process by which the Town can monitor its fields. Following the construction of a field, Capital improvement that achieves a prescribed threshold, the department responsible for maintenance enters a Life Cycle Analysis stage. In this stage the Town has defined the thresholds by which action should be taken on turf conditions. Maintenance staff must regularly review the sport field schedule of use with the scheduling department. Maintenance staff monitor the use against the schedule and analyse the condition of the turf. If warranted, testing of soils and compaction may be implemented. Maintenance staff will review the maintenance practices on the fields.



If the amount of weed growth meets or betters the prescribed threshold, current practices will be sustained. If there are 20%-50% weeds on a field or park then extra aerating and fertilizing will be implemented. If weed growth exceeds 50%, normal cultural practices will have little or no effect on weed reduction and stronger measures will be required. Increased cultural practices are unlikely to produce results to satisfy stakeholders. Time and cost would be prohibitive. Reconstructing a field will remove the field for at least one season. Preparing the field with sod requires at least six weeks to take root and use on the field should be light. Preparing the field with seed will require a full growing season, spring to fall before use for sports is recommended. If lost field time and cost are designated as important factors, then pesticide spray to remove weed count will be implemented. Immediately following any of these measures, maintenance staff will return to life cycle analysis.

In Appendix A, the chart provided, illustrates the various thresholds and the types of services and programs for turf grass on Parks, Boulevards and Medians, Parkettes and all Sports Fields. The chart also indicates when turf renovation will be required should weeds reach a population threshold.

Throughout the foregoing, the public and stakeholders should be informed and educated concerning the need for and impact of maintenance practices. Through scheduling, the user groups will be informed of times at which the fields may be actively used. Through field signage, the public can be made aware of cultural practices being performed and reasons for any closures, either weather or maintenance related.

4.5 MAINTENANCE COSTS

Appendix B includes costing for the cultural practices as learned by the Operations & Assets Department through their pilot project. The base cost is listed with incremental costs provided separately for additional work required to suppress weed growth or repair / reconstruct fields.

APPENDIX 'A'

PROPOSED WEED POPULATION THRESHOLDS

	SPORTS FIELDS			PARKS	PARKETTES	BLVDS	MEDIANS
	A	B	C				
LEVEL ONE							
CULTURAL PRACTICES PROGRAM WOULD MATCH THE PILOT PROGRAM WITH THE EXCEPTION OF THE ENHANCE GRASS CUTTING	<20%	<20%	<20%	<50%	<50%	N/A	N/A
LEVEL TWO							
INTENSIFIED CULTURAL PRACTICES PROGRAM	20% TO 50%	20% TO 50%	20% TO 50%	>50%	>50%	N/A	N/A
LEVEL THREE							
COMPLETE REHABILITATION OF ALL TURF	>50%	>50%	>50%	SEED IF BARE OF TURF AND/OR WEEDS	SEED IF BARE OF TURF AND/OR WEEDS	SEED IF BARE OF TURF AND/OR WEEDS	N/A

REHABILITATION OPTIONS	
1. RESEEDING	CLOSURE FOR UP TO 2 SEASONS
2. RESODDING	CLOSURE FOR 2 MONTHS
3. HERBICIDE SPRAY	CLOSURE FOR 2 WEEKS

NORMAL REHABILITATION PROCEDURES INCLUDE INSTALLATION OF DRAINAGE TILE WHERE REQUIRED, APPLICATION OF 100 mm TOPSOIL, AND FINE GRADING PRIOR TO SODDING OR SEEDING

APPEN X 'B'

ADDITIONAL OPERATING BUDGET REQUIREMENTS FOR TURF MAINTENANCE OPTIONS PER YEAR

A'SPORTS FIELD

QTY = QUANTITY OR NUMBER OF APPLICATIONS

ITEM	CURRENT ACTUAL PRACTICES (No additional operating funds required)					LEVEL 1 CULTURAL PRACTICES (In addition to current operating budget)					LEVEL 2 CULTURAL PRACTICES (In addition to current operating budget)				
	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST
SOIL AERATION	2	4	$38.00	$304.00	$0.00	3	4	$38.00	$456.00	$0.00	4	4	$38.00	$608.00	$0.00
TOPDRESSING	2	4	$1,617.00	$12,936.00	$0.00	3	4	$1,617.00	$19,404.00	$0.00	4	4	$1,617.00	$25,872.00	$0.00
OVERSEEDING	4	4	$147.00	$2,352.00	$0.00	4	4	$147.00	$2,352.00	$0.00	4	4	$147.00	$2,352.00	$0.00
FERTILIZER	5	4	$85.00	$1,700.00	$0.00	5	4	$85.00	$1,700.00	$0.00	5	4	$85.00	$1,700.00	$0.00
IRRIGATION	1	4	$1,700.00	$6,800.00	$0.00	1	4	$1,700.00	$6,800.00	$0.00	1	4	$1,700.00	$6,800.00	$0.00
TOTAL COST				$24,092.00	$0.00				$30,712.00	$0.00				$37,332.00	$0.00

$6,620.00
27% increase

$13,240.00
54% increase

B'SPORTS FIELD

QTY = QUANTITY OR NUMBER OF APPLICATIONS

ITEM	CURRENT ACTUAL PRACTICES (No additional operating funds required					LEVEL 1 CULTURAL PRACTICES (In addition to current operating budget)					LEVEL 2 CULTURAL PRACTICES (In addition to current operating budget)				
	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST
SOIL AERATION	2	24	$38.00	$1,824.00	$0.00	3	24	$38.00	$2,736.00	$15,000.00	4	24	$38.00	$3,648.00	$30,000.00
TOPDRESSING	1	24	$1,617.00	$38,808.00	$0.00	3	24	$1,617.00	$116,424.00	$20,000.00	4	24	$1,617.00	$155,232.00	$40,000.00
OVERSEEDING	2	24	$147.00	$7,056.00	$0.00	3	24	$147.00	$10,584.00	$10,000.00	4	24	$147.00	$14,112.00	$20,000.00
FERTILIZER	3	24	$85.00	$6,120.00	$0.00	5	24	$85.00	$10,200.00	$0.00	5	24	$85.00	$10,200.00	$0.00
IRRIGATION	1	10	$1,700.00	$17,000.00	$0.00	1	14	$1,700.00	$23,800.00	$700,000.00	1	14	$1,700.00	$23,800.00	$700,000
TOTAL COST				$70,808.00	$0.00				$163,744.00	$745,000.00				$206,992.00	$790,000.00

$92,936.00
131% increase

$136,184.00
192% increase

C'SPOR' FIELD

QTY = QUANTITY OR NUMBER OF APPLICATIONS

ITEM	CURRENT ACTUAL PRACTICES (No additional operating funds required)					LEVEL 1 CULTURAL PRACTICES (In addition to current operating budget)					LEVEL 2 CULTURAL PRACTICES (In addition to current operating budget)				
	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST
SOIL AERATION	0	29	$38.00	$0.00	$0.00	2	29	$38.00	$2,204.00	$15,000.00	3	29	$38.00	$3,306.00	$30,000.00
TOPDRESSING	0	29	$1,617.00	$0.00	$0.00	1	29	$1,617.00	$46,893.00	$20,000.00	2	29	$1,617.00	$93,786.00	$40,000.00
OVERSEEDING	0	29	$147.00	$0.00	$0.00	1	29	$147.00	$4,263.00	$10,000.00	2	29	$147.00	$8,526.00	$20,000.00
FERTILIZER	0	29	$85.00	$0.00	$0.00	2	29	$85.00	$4,930.00	$0.00	3	29	$85.00	$7,395.00	$0.00
IRRIGATION	0	29	$1,700.00	$0.00	$0.00	0	29	$1,700.00	$0.00	$0.00	0	29	$1,700.00	$0.00	$0.00
TOTAL COST				$0.00	$0.00				$58,290.00	$45,000.00				$113,013.00	$90,000.00

$58,290.00

$113,013.00

PARKS (350 Ha)

QTY = QUANTITY OR NUMBER OF APPLICATIONS

ITEM	CURRENT ACTUAL PRACTICES (No additional operating funds required)					LEVEL 1 CULTURAL PRACTICES (In addition to current operating budget)					LEVEL 2 CULTURAL PRACTICES (In addition to current operating budget)				
	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST
SOIL AERATION	0	350	$38.00	$0.00	$0.00	2	350	$38.00	$26,600.00	$30,000.00	3	350	$38.00	$39,900.00	$60,000.00
TOPDRESSING	0	350	$1,617.00	$0.00	$0.00	0	350	$1,617.00	$0.00	$0.00	0	350	$1,617.00	$0.00	$0.00
OVERSEEDING	0	350	$147.00	$0.00	$0.00	1	350	$147.00	$51,450.00	$30,000.00	2	350	$147.00	$102,900.00	$60,000.00
FERTILIZER	1	350	$85.00	$29,750.00	$0.00	2	350	$85.00	$59,500.00	$0.00	3	350	$85.00	$89,250.00	$0.00
IRRIGATION	0	0	$1,700.00	$0.00	$0.00	0	0	$1,700.00	$0.00	$0.00	0	0	$1,700.00	$0.00	$0.00
TOTAL COST				$29,750.00	$0.00				$137,550.00	$60,000.00				$232,050.00	$120,000.00

$107,800.00

362% increase

$202,300.00

680% increase

BOULE' RDS (142Ha)

QTY = QUANTITY OR NUMBER OF APPLICATIONS

ITEM	CURRENT ACTUAL PRACTICES (No additional operating funds required)					LEVEL 1 CULTURAL PRACTICES (In addition to current operating budget)					LEVEL 2 CULTURAL PRACTICES (In addition to current operating budget)				
	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA (Ha)	COST (Ha)	OPER. COST	CAP. EQUIP. COST
SOIL AERATION	0	142	$38.00	$0.00	$0.00	0	142	$38.00	$0.00	$0.00	0	0	$38.00	$0.00	$0.00
TOPDRESSING	0	142	$1,617.00	$0.00	$0.00	0	142	$1,617.00	$0.00	$0.00	0	0	$1,617.00	$0.00	$0.00
OVERSEEDING	0	142	$147.00	$0.00	$0.00	0	142	$147.00	$0.00	$0.00	0	0	$147.00	$0.00	$0.00
FERTILIZER	0	142	$85.00	$0.00	$0.00	0	142	$85.00	$0.00	$0.00	0	0	$85.00	$0.00	$0.00
IRRIGATION	0	142	$1,700.00	$0.00	$0.00	0	0	$1,700.00	$0.00	$0.00	0	0	$1,700.00	$0.00	$0.00
TOTAL COST				$0.00	$0.00				$0.00	$0.00				$0.00	$0.00

HARD SURFACE MEDIANS (1 Ha)

QTY = QUANTITY OR NUMBER OF APPLICATIONS

ITEM	CURRENT ACTUAL PRACTICES (No additional operating funds required)					LEVEL 1 CULTURAL PRACTICES (In addition to current oeprating budget)					LEVEL 2 CULTURAL PRACTICES (In addition to current operating budget)				
	QTY	TOTAL AREA	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA	COST (Ha)	OPER. COST	CAP. EQUIP. COST	QTY	TOTAL AREA	COST (Ha)	OPER. COST	CAP. EQUIP. COST
MAN. WEED REM.	2	1	$30,000.00	$60,000.00	$0.00	3	1	$30,000.00	$90,000.00	$0.00	4	1	$30,000.00	$120,000.00	$0.00
TOTAL COST				$60,000.00	$0.00				$90,000.00	$0.00				$120,000.00	$0.00
									$30,000.00					$60,000.00	
									50%					100%	

NOTES:

1. Irrigation - currently 20 of the Town's 48 class 'B' sports fields are irrigated. Estimated cost to install new irrigation systems in the remaining 28 class 'B' sports fields is approximately $700,000 ($25,000 per field x 28 fields)
2. Equipment Capital Cost - the figures provided for capital equipment costs are estimates only based on current market prices.
3. Equipment Operating Cost - The estimated annual operating and maintenance costs for both on road and off road units is approximately 12% of the Capital purchase price. Equipment Operating costs have not been included in these tables.

SPORTS FIELD RECONSTRUCTION OPTIONS

OPTION 1 - RESOD FIELD

The field would need to be stripped, regraded and sodded. The field would be removed from use for a period of 2 months. This would provide a quality field below recommended weed thresholds. Estimated cost approximately $127,000 per ha.

OPTION 2 - RESEED FIELD

The field would need to be stripped, regraded and seeded. The field would be removed from use for a period of up to 1½ playing seasons. This would provide a quality field below recommended weed thresholds. Estimated cost approximately $74,000 per ha.

OPTION 3 - SPRAY HERBICIDE

Herbicide would be applied to eliminate the weeds and then the field would be fertilized, aerated, overseeded and topdressed. The field would be removed from use for a period of 2 weeks. This would provide a quality field below recommended weed thresholds. Estimated cost approximately $3,000 per ha.