



Corporate GIS Strategy



Final Report

Jun 7, 2018

**Perry Group
Consulting** Ltd.

Executive Summary

Importance of GIS

GIS, which stands for Geographic Information Systems¹, is the term used for the technologies and capabilities that allows data to be located, mapped and analyzed. Given that over 80% of municipal information is spatially related², GIS is a critical tool for any municipality and municipalities across Canada are putting GIS to work to help them tackle key challenges in their communities.

By applying a spatial lens to complex challenges, Canadian municipalities are gaining insights into service delivery, enabling the implementation of innovative solutions that improve efficiency and can have significant community benefits.

GIS Strategy Development

The development of a Corporate GIS Strategy was a recommendation of the IT Strategy (approved by Council in July 2017), which observed that the Town was not fully utilizing GIS capabilities.

Perry Group Consulting Ltd. was engaged by the Town of Richmond Hill to develop this GIS Strategy in late 2017. The work was carried out in an extremely collaborative manner, with over 90 stakeholders engaged throughout the project (see Appendix B).

The project begun in January 2018 and included three main phases:

- Phase 1: Project Planning and Identification of Key Resources
- Phase 2: Key Findings and Directions Report
- Phase 3: Develop the GIS Strategy

Key Findings and Directions

The current state assessment in Phase 2 revealed a unique situation. The Town is relatively advanced with the modernization of business services and supporting enterprise systems. GIS integrated systems implementation are well underway and either in or nearing use. These systems include:

- Maximo for Work Management,
- Access Richmond Hill (CRM) for web-based service requests, and
- PRM for Planning and Regulatory Services automation.

However, at the same time, there are well founded concerns across the organization about map-based data quality, and a closer look revealed that many of the GIS datasets are not meeting corporate needs, which undermines day-to-day operations as well as the potential success of these enterprise systems. GIS specialist staff are distributed

¹ A glossary of terms can be found in Appendix A

² From <https://www.gislounge.com/80-percent-data-is-geographic/>

across a number of Departments and operate in disconnected siloes without corporate coordination. Most data management processes, tools, and methods were defined many years ago to support Departmental needs and paper not digital process models. In fact, the corporate needs for accuracy, completeness, and content are not defined and there are significant GIS resource gaps in multiple workgroups in the organization.

One of the most critical gaps identified was the lack of leadership, coordination and awareness along with points of contact, processes, and plans to advance GIS to more fully support the business of the Town.

All of these realities were documented into a Key Findings and Directions Report and discussed at the end of the second phase of the project with the GIS community and key stakeholders.

In the third phase the GIS community and key stakeholders came together to participate in a series of four three-hour-long workshops facilitated by the consultants. The results of those workshops form the key parts of the Strategy to move forward.

Recommendations

This Strategy introduces a new vision for GIS at the Town of Richmond Hill:

We will establish a collaborative geographic information system (GIS) that underpins exceptional public service to our community.

A collaborative GIS will strengthen the management of data necessary to support service delivery, empower spatially informed decisions, and drive innovation.

To achieve this vision, the Strategy makes a series of targeted recommendations, including:

1. **Establish new GIS Leadership, GIS Organization and Operating Model:** including hiring a new GIS Manager, establishing a new GIS Steering Committee and work plan intake and coordination process
2. **Implement a Data Improvement Program:** Conducting an inventory of needed GIS data (to support Enterprise and divisional objectives) and a series of significant data improvement initiatives to re-design data models and provide staff with the tools and processes to manage datasets needed for real-time, digital operations
3. **Provide Ongoing GIS Production Support, including supporting new Enterprise System needs:** It will be critically important to continue to provide mapping and data services to current service levels, without interruption, while processes, tools and services are redesigned and retooled.
4. **Support small – medium sized projects:** Ensuring that small-medium projects receive sufficient attention alongside large Enterprise GIS projects.
5. **Define Reusable Application Capabilities (patterns):** The identification of common GIS self-service tool requirements and the development of reusable

GIS Apps that can be used across the organization (for example for field data collection or for the automation of simple, repetitive mapping requests). The goal is a democratization of GIS with a gradual move toward further distribution of GIS capabilities and data maintenance activities to front-line staff, not GIS specialists

6. **Build and Enhance GIS Technology Platform:** A review of the GIS technology architecture to better meet the Town's needs specific to the identified use cases
7. **Develop GIS based Content and Data Sharing capabilities:** Implementation of improved GIS content sharing capabilities via public web mapping and open data portals

To support all of these needs it was determined that a new approach will be needed to provide stronger central support with the flexibility and critical mass of resources while still meeting Department needs. Under the proposed new model, GIS specialists from across the Town will be brought together to form a Corporate GIS Team which will report to a new GIS Manager in IT. GIS specialists will remain physically embedded in current Departmental locations as a transition plan is developed and executed over time.

This transition will take time, but it will allow the GIS Team to carefully move to improve processes, data, and automate work for front-line staff to support investments in enterprise systems and new ways of doing business over time. This GIS Strategy documents the approach to move forward.

Sometimes the journey is as important as the destination. In this case, the process of developing this Strategy has already greatly increased the level of awareness, communication and collaboration across the organization regarding GIS. Simply by shining a light on the current situation and talking together about what needs to be improved the Town has started on the journey towards success. With the right leadership, supported by a new governance model and augmented through partnerships, everything outlined in this strategy is achievable, and the results will be a stronger foundation for modern business services and data-driven decisions for the future.

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1. Introduction

1.1 Introduction to the Project

The IT Strategy (approved by Council in July 2017) had previously observed that GIS was significantly under-utilized at the Town, and thus one of its key recommendations was to undertake a focused GIS Strategy.

Perry Group Consulting Ltd was engaged by the Town in December 2017 to facilitate the development of this corporate GIS Strategy.

The project was jointly sponsored by Gwen Manderson (Director of Strategic Initiatives) and Anthony Iannucci (CIO) and has been led by Leah Zilnik (Project Manager, Strategic Initiatives). The consulting team worked closely with the Executive Leadership Team (ELT), the IT Steering Committee (ITSC) and GIS Advisory Committee (GISAC) in the development of the Strategy.

1.2 Our Approach

The project was divided into three phases:

- Phase 1: Project Planning and Identification of Key Resources
- Phase 2: Key Findings and Directions Report
- Phase 3: Develop the GIS Strategy

This is the final report for the project which summarizes key findings and directions, makes a series of recommendations and provides a workplan for moving forward. Beyond the details of these sections of the document, the final report provides a new vision for GIS that will enhance the value of GIS to the organization, partners, and the community.

During the first phase of the project, the project plan was finalized, and a stakeholder assessment conducted to ensure that all key stakeholders could be actively engaged and involved in the process. A well-attended kick off meeting was held in January 2018.

Moving into the second phase collaborative workshops with ELT, the ITSC and the GISAC were conducted in January 2018. These were followed by a series of one-on-one and group meetings in late January and early February with staff actively involved in day-to-day GIS operations and management. In early February the consulting team met in group settings with representatives from Divisions and Departments that currently use or could utilize GIS in the future to discuss the current GIS situation and future opportunities.

The consultation was broad, involving over 90 staff. A complete list of all participants is included in Appendix B. A summary of Findings and Directions was provided to the Town prior to a series of workshops that were conducted in March and April 2018. These findings and directions are summarized in Section 2 of this report.

In the third phase a series of four workshops were conducted with key stakeholders and GIS specialists. Participation was strong with approximately 30 attendees. Each workshop progressively built on previous topics and led towards a workplan developed collaboratively by the participants. The four workshops were focused upon:

1. Defining GIS Success - Brainstorming GIS Success for the Town
2. Prioritizing projects and initiatives – Defining GIS Success from the perspectives of Technology, Data, People, and Process
3. Prioritizing initiatives and sequencing - required activities and important decisions
4. Reviewing the draft workplan and developing a vision for corporate GIS – putting it all together in a plan and establishing vision and principles

The consultants developed this final Strategy based upon the discussions and conclusions reached during the workshops, resulting in a truly made in Richmond Hill Strategy.

1.3 GIS Defined

Before we proceed further, it is important to provide a consistent definition and explanation of what GIS is and therefore define the scope of the GIS Strategy.

GIS stands for **Geographic Information Systems**. A classical definition of GIS explains that;

“A **geographic information system (GIS)** is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. [...] In general, the term describes any information system that integrates, stores, edits, analyzes, shares, and displays geographic information.”³

Applying a broader definition to the notion of “a GIS system” requires a more holistic view. Thus, the GIS system itself encompasses GIS technologies (software and hardware), but also includes people with GIS skill sets ranging from expert to casual, GIS data (both spatial and spatially related), GIS processes (map requests, project intake data editing, quality assurance), and GIS methods (data design, map standards, routing analysis). Thus, the GIS Strategy itself is concerned with, and will address all of these aspects.

More expansively still, and perhaps most importantly, GIS should be viewed and managed as a platform. Platforms in technology allow solutions to be built upon them, can be easily integrated with, enable people to create new content and experiences within them, gain from curation which contributes to improved quality, and benefit from network effects – that is their value grows with increased use.

³ Taken from https://en.wikipedia.org/wiki/Geographic_information_system

1.4 Importance of GIS in Municipalities

Clearly, much of the work that municipalities do is spatial in nature; location is fundamental to the services that they provide – knowing legal boundaries, understanding distributions, measuring densities, and setting policies to influence and monitor future development all rely on a good understanding of the geography of the Town.

Indeed, it is often argued that over 80% of municipal information is related to a geographical location in some form or other². For example, addresses and service points are core to municipal service delivery, assets are physically located throughout the municipality, work that the Town undertakes most often occurs at specific locations – at addresses and in neighbourhoods, on streets and in parks.

It is GIS that allows municipalities to capture and integrate location into its thinking and processes. GIS tools and processes enable map making, understanding what assets the Town has and where, analyzing proximity and spatial relationships between policy and actions, and developing detailed understanding of spatial distributions and patterns to address issues or optimize processes. Most municipalities have moved away from traditional paper map-based products to real-time, online GIS services that ensure that the most up to date and complete information is at the fingertips of its staff and citizens.

When a municipality can achieve a comprehensive enterprise GIS platform it can be used to spatially enable all data and processes, empowering the application of location intelligence to every-day operational and strategic long-term decision making.

Furthermore, outside of municipalities the public has grown used to online mapping, relying on Google Maps and other location-based services to find restaurants (Yelp), avoid traffic (Waze) and find nearby friends (Facebook, Foursquare). Consequently, municipalities have turned to simple to use online mapping Apps to provide user friendly interfaces for searching planning applications, accessing historical aerial photography, finding the nearest park, searching for property history information, and looking up zoning information.

1.5 Examples of GIS use in Municipalities

GIS has such a broad spread of potential applications within municipalities. Here are examples of how Canadian municipalities are using GIS to improve quality of life in their municipalities.

Fire Prevention

City Fire officials in the City of London, ON were determined to reduce residential fires in the City. They turned for help to data collected over the years on residential fires. Spatial analysis identified a number of hot spots in the City with a higher propensity for

² From <https://www.gislounge.com/80-percent-data-is-geographic/>

residential fires. The combination of this insight with data about the type, severity and cause of fires and other demographic and socio-economic data, allows Fire officials to identify important characteristics of fires in these hot spots – such as unattended cooking and smoking. This information helped the Fire department target its resources more effectively – with concentrated communications and advertising, fire prevention education and inspections were able to contribute to reduced residential fires (London experienced 6.44 fires per 10,000 residents in 2008, this ratio dropped to 3.52 per 10,000 by 2013) significantly reducing loss of life and property in the City.⁵

Public Health

Public Health Officials in Sault Ste Marie were struggling to contain a significant outbreak of West Nile Disease. West Nile is transmitted to humans by mosquitoes, so identifying collections of stagnant water became critical to identifying and treating the situation. All known locations had been treated, but the disease continued to be problematic. Until the GIS unit at the City compared outbreak distributions with asset information from the City and other partners. They identified a pattern related to electrical infrastructure – transformer vaults that had been placed underground to improve the aesthetics of neighbourhoods. Lacking drainage, the vaults had a tendency to fill with water and become perfect breeding grounds for mosquitoes. Public Works began larval treatment immediately, and within a month significant reduction in disease occurrences were seen.

In fact, there are also some good examples of GIS at work at the Town.

Contract Coordination

A recent Town program to replace garbage cans in parks was coordinated using GIS. Using GIS, Public Works staff identified required garbage can replacement locations, details and types and shared the information via an app with the Town's contractor. The contractor's staff could then use their smartphones to identify locations, take pictures of installed cans – accurately and in real time allowing Town staff to track progress against the contract. Many similar programs, contracts, or inspections could benefit from the same approach – a common pattern in municipalities.

Routing

UPS and FedEx invest heavily in optimizing routes; avoiding left turns and other tricks to improve the efficiency of its fleet. Increasingly municipalities, that also manage significant fleets of vehicles in the form of snow plows, garbage collection, street sweepers, building inspectors, bylaw officers, roads inspectors and maintenance crews are turning to GIS to assist with route optimization. Recently Town staff in Public Works conducted a GIS based review of its snow plow routes to optimize route efficiency. The implementation of optimized routes, reduced the plow needs, allowing for the re-deployment of 2 snow plows to areas that required additional attention – an important illustration of the power of using data to help Town staff do more through more effective allocation of existing resources.

⁵ <https://resources.esri.ca/ann-stories/marketing-fire-safety-london-fire-uses-demographic-data-maps-and-analysis-to-reduce-residential-fires-written-by-john-kobarda-and-paul-voe>

In addition to these examples, the following list provides a broader representation of just some of the GIS capabilities that municipalities typically take advantage of:

Customer Service

- Place-based citizen reporting – location-based problem reporting
- Find my nearest – park, bus stops
- Property information – find my zoning, my councillor, permits, development applications

Development & Planning

- Application review and handling
- Land-use analysis
- Sustainability initiatives
- Zoning management and communication
- Permitting
- 3D visualization of development proposals

Economic Development

- Available land inventory
- Site selection and site suitability tools
- Special areas / districts
- Employment inventory
- Business retention and attraction

Environment

- Air quality improvement
- Energy management planning and monitoring
- Endangered species and environmental protection
- Contaminated land and site remediation
- Watershed analysis
- Disaster / spills response

Emergency Management & Public Safety

- 911 dispatch and management
- Deployment planning and response-time analysis
- Building based threat and risk assessment
- Critical infrastructure protection
- Hazmat response
- Natural disaster mitigation and response

- Situational awareness
- Special events planning and management
- Evacuation planning

Finance / Revenue

- Property tax assessment
- Revenue projection
- Storm water fee assessment
- Delinquency analysis

Public Works & Utilities

- Vehicle route planning for inspections, trash pickup, and snow plowing
- Vehicle tracking for risk management and public communications
- Asset inventory and condition data management
- Work management system integration
- Mobile work management and inspections
- Parks and grounds maintenance management
- Infrastructure management
- Storm water management
- Asset management
- Ontario One Call
- Demand forecasting
- Dispatching
- Outage notification and response

Recreation

- Find my nearest – facility, park
- Demand analysis

Transparency & Engagement

- Place-based citizen notification – neighbourhood / local alerts
- Citizen engagement
- Open data
- Crowdsourcing

Transportation

- Accident management
- Transit management
- Congestion management / traffic counts and modelling

- Demand modeling
- Infrastructure design and maintenance
- Capital project management
- Long range asset management planning

The wealth of examples makes clear that GIS is a foundational capability that should be deeply woven into the Town's business practices, and that the potential for GIS use at the Town is both broad and deep.

It is undoubtedly challenging to lead a GIS Program that identifies and realizes all of these opportunities and leading organizations have learned that a significant amount of coordination and effort are required to build GIS success in municipalities – but the rewards, in terms of improved productivity and customer service and increased transparency are tremendous.

2. Key Findings and Directions

For any strategy, understanding where the organization currently stands is important to determine what work is needed to close the gap between the current situation and the vision for the future. In the second phase of the project the consulting team conducted a current state assessment of the GIS program to help the Town understand its existing position.

The current state assessment was based on interviews and workshops with key stakeholders and GIS specialists, those active in the GIS community and the Town's leadership. The evaluation also involved a comparison with two industry maturity models to assess the Town's GIS practices against industry best practices.

At the conclusion of Phase 2 the consulting team provided a Key Findings and Directions Report which was reviewed and validated with the GIS community. It has been summarized in this section.

2.1 Current Organization of GIS

As a starting point it is helpful to understand how GIS is organized and who is actively involved in GIS operations and management.

The current organization of GIS resources can best be described as siloed. GIS staff are organized in several Divisions: Information Technology, Design and Construction, Support Services in Planning and Regulatory Services, and Public Works Operations. The IT and Design & Construction Divisions and Divisions in Planning & Regulatory Services are the larger groups with the most dedicated GIS staff.

The GIS program has no formally defined corporate leader and ownership of GIS at the Town is not clear. An informal advisory committee has recently been struck to attempt to fill the leadership gap.

Each Divisional group has grown from their own operational needs and has done so independently with little communication or coordination over the last decade. This has led to a use of differing, incompatible tools, a lack of sharing and transparency, duplication and inefficient work practices.

In total the Town has 11 staff actively involved in GIS work, a reasonable number of staff for the size of the organization, though collectively these resources are not well coordinated or aligned, nor are they working efficiently. Two GIS specialist positions, included in the 11, which are seen as essential positions are currently filled with contract staff.

2.2 Maturity Model Assessment Results




Two maturity assessments were used to support the current state assessment phase of the project; the National Geospatial Advisory Committee (NGAC) Assessment and the Even Keel Maturity Model.

















Each of these models provides a perspective on the advancement and health of any GIS Program.

2.2.1 NGAC assessment results

The National Geospatial Advisory Committee (NGAC), a Federal US body staffed with local governance GIS experts, has identified a set of recommended best practices for the operation of local government geospatial programs.⁶

A summary of the Town's scoring against the best practices is shown below. For scoring purposes, a simple red, orange, green scoring method is used.

	Best practice approach not in evidence
	Best practice approach in evidence, but partially deployed
	Best practice approach fully adopted

Area	Assessment
Establish a Geospatial Program	
Executive sponsorship and support	
A defined strategic vision and mission	
Shared GIS governance	
A designated coordinator / manager	
Use of recognized industry standards	
A geospatial strategy or plan	
Develop and maintain data as an Asset	
Framework / Base geospatial data	
Transactional / live geospatial data	
Metadata	
Published data maintenance standards	
Take an Enterprise Systems Approach	
Centralized approach to application delivery	
Centralized database / warehouse	
Shared / pooled software licences	
Mobile computing	
Implement GIS web services	
General IT services and support	
Share with the public	

⁶ <https://www.fgdc.gov/ngac/ngac-local-gov-gis-best-practices-paper.pdf>

Publication of core basemaps	X
Web based data clearinghouse / open data	X
Data feedback loop	X
Provide data where your customers want it	X

There are no green check marks. The Town's NGAC assessment evidently shows **many areas for improvement**, but specifically the assessment points to a lack of a formally defined GIS program, a lack of GIS leadership, challenges with data management and with sharing geodata with the public.

2.2.2 Even Keel Assessment Results

For large organization's the goal is to achieve an Enterprise GIS state – that is a state where GIS is fully utilized across the whole organization in a coordinated and effective manner.

The Even Keel Maturity Model provides definitions and characteristics of the various stages travelled on the way to a true Enterprise GIS operation. It uses a series of assessment categories and criteria to determine whether the approach to GIS at an organization is Enthusiast, Department, Centralized, Integrated or Enterprise.

One of the most valuable parts of the Even Keel method is that it shows a one-page view of the Enthusiast to Enterprise state of GIS in an organization.

	Characteristics	Enthusiast	Department	Central	Integration	Enterprise
Alignment	Alignment		■			
	Governance		■			
	Budgeting		■			
	Enterprise Projects				■	
	Exec Support				■	
Data Management	Data Quality		■			
	Data Modeling	■				
	Data Management		■			
Access	Ease of Use		■			
	Services		■			
Integration	Enterprise Workflow				■	
	Tech Architecture		◆		■	
	Systems Integration		◆		■	
Sustainability	GIS Workflows		■			
	Skill Sets + Focus		■			
	Roles		■			

Figure 1: Even Keel Assessment Results

Based on our assessment, the Town is a unique mix of Department and Integration patterns. Figure 1 illustrates the results in a visual way. What is clear from this diagram is the extent to which the alignment, data management, access and sustainability (roles and skills) are lagging the Enterprise and Integration projects that the Town is undertaking. This reflects the gap between the modern enterprise systems being implemented and the Departmental GIS approach to data and GIS process management.

2.3 Current GIS Situation Summary

Both assessments paint a challenging picture. The NGAC assessment demonstrates the lack of a formally coordinated GIS program and the lack of leadership. The Even Keel assessment highlights the disconnect between the implementation of enterprise systems and the departmental approach to data, processes and GIS resourcing.

2.3.1 Strengths and Positives

Nonetheless, there are some positive aspects of the situation which bear noting.

- The Town's Esri technology and core GIS architecture is reasonably up to date, robust and reliable
- There is a strong willingness to work together across the various pockets of GIS at the Town and there is no evidence of acrimony between GIS units (which is unfortunately all too common in other organizations)
- The CIO and ELT are very focused on the importance of data and data quality and recognize the value of GIS to the organization as a whole. This is a strong foundation to underpin the future GIS program
- The Town has capable GIS technical staff
- The Town has implemented, or is in the process of implementing a number of enterprise GIS integrated solutions, including CRM, MAXIMO, PRM

2.3.2 Challenges and Risks

Meanwhile, the key challenges and risks that the GIS program faces include:

- A clear lack of GIS leadership and authority
- A lack of authoritative and effective GIS governance
- Overall confidence in data and data quality are low due to a lack of data quality control and assurance processes
- No formal CAD to GIS migration program in place resulting in many standalone, siloed data sets that are maintained in the wrong format by staff that have no time to convert them to modern GIS formats and data models
- Data management processes across multiple teams and departments are complex and difficult to manage
- The Town's core web GIS solution, OnPoint, represents a somewhat dated application delivery paradigm which is in need of modernization

- A lack of career development opportunities for GIS specialists in siloed groups

Overall, taking all of the challenges and risks into consideration, the Town is not ready for the GIS to become more business critical – as it is sure to do over the coming years.

2.4 Future Directions

In our view GIS is at an important turning point at the Town of Richmond Hill.

While the Town's current state assessment was not particularly strong, the silver lining is that there are several key enterprise systems (ERP, PRM, Maximo, CRM) emerging that are modernizing front-line business services. While there are justifiable concerns about GIS leadership and data, the consultants observed many times that the Town is *"poised for greatness"*.

In many other municipal organizations similar GIS challenges exist to those identified in the Town's assessments, but those cities and towns are often just beginning the development of enterprise systems – which require funding and commitment that can take a long time to establish, and then these programs require significant change management over several years. This modernization of services is already well underway at Richmond Hill, and there is a unique opportunity to build data and other GIS capabilities to support the enterprise needs of the organization.

Because the supporting GIS processes, data, and organization are not nearly as advanced, these lagging areas present significant challenges to the organization moving forward and will undermine the integrated, enterprise solutions unless they are addressed.

The results of the assessment of the current state established that the GIS Strategy must:

1. Establish formalized leadership of the GIS program with an appropriate mandate allocated to that leadership
2. Establish formalized governance of the GIS program that has clear authority and is fully integrated and supportive of existing corporate Information Technology and data governance programs
3. Determine a future organization model and distribution of GIS program resources to be as effective as possible
4. Establish the approach to modernizing the technology delivery model. The underlying technology is up-to-date, but the use and deployment of the technology requires completing the migration from CAD data maintenance to GIS, reviewing the future for OnPoint, and the adoption of modern GIS application delivery patterns
5. Propose a redesign of a targeted set of GIS processes, including project identification and intake, data design, new asset data creation (as-built processes)
6. Establish confidence in the Town's GIS data, which will require a significant effort to modernize data management processes and practices, data models and tools

to support real-time, accurate data provisioning to the organization, along with maintenance agreements and regular report cards for ELT to ensure that data is maintained to the required standards.

The next section introduces the recommended changes that will position the Town for success, the following sections will introduce the recommended organizational changes and the projects to be undertaken to take the Town to the next level.

3. GIS Strategy

With the input from phase 2, a team of GIS practitioners and stakeholders came together during March and April 2018 to participate in a series of workshops that shaped this Strategy.

The following section introduces the GIS Strategy the group developed and sets out important strategic directions.

3.1 A New Vision for GIS

In support of the recommended changes the Strategy introduces a new Vision for GIS at the Town:

We will establish a collaborative geographic information system (GIS) that underpins exceptional public service to our community.

A collaborative GIS will strengthen the management of data necessary to support service delivery, empower spatially informed decisions, and drive innovation.

The vision encapsulates three important goals; that the Town will use GIS to:

- 1) Strengthen the management of data necessary to support service delivery
- 2) Empower spatially informed insights and decisions
- 3) Drive innovation and innovative use of spatial tools, data and insights

3.2 GIS Program Guiding Principles

A set of GIS guiding principles were also developed during the workshops.

The principles are intended to set the tone for the way that the GIS program will be approached. They should be used to guide future decision making and approaches. As they are made, decisions should be regularly validated against the principles to ensure that they are operating within the spirit intended for the GIS program.

3.2.1 Open & Transparent

The approach to GIS program management is to be open and transparent – with stakeholders from all Departments actively involved in the governance of the program, decision making and priority setting. Agreed priorities and work that adds value across the Town will be prioritized. Effective communication amongst interested parties is paramount.

Openness and transparency applies equally to the Town's data. The Town's data should be open by default internally, with active and open data sharing externally with the public and partners.

3.2.2 Accessible & Empowering

The intent is to empower all staff throughout the organization to understand the capability and applicability of GIS, and to use maps, GIS tools and data analysis powered by GIS as part of their day to day work. The aim is to democratize access to GIS tools, getting simple to use, but often sophisticated GIS tools into the hands of the staff, thus empowering them with the knowledge and the capability to apply GIS to business problems and challenges.

3.2.3 Collaborative

The Town's approach to GIS is to be broadly collaborative. GIS can be effective at bridging information sharing between Divisions and Departments, and with the community and other public organizations; breaking down silos and establishing new foundations for relationships. GIS projects should reach beyond usual boundaries, both within the organization and beyond.

3.2.4 Integrity and Accountability

Data integrity is central to the success of the Town's GIS capabilities. Without it, the GIS has no value. The data upon which the GIS is built must be reliable, accurate and up to date. Clear accountabilities for designing, building and sustaining data will be allocated. Staff and groups that are responsible for data maintenance will be held accountable for delivering upon commitments.

3.2.5 Integrated

GIS has value when it is integrated with day-to-day processes, when data is produced as a bi-product of producing the work, and when GIS is fully integrated into the enterprise technology environment.

3.3 Key GIS Strategy Recommendations

To establish GIS success at the Town there are significant changes recommended.

The following section outlines the key changes to the way GIS is to be approached and managed. It identifies the key ideas put forward by this strategy and is intended to establish the frame of reference for the implementation plan that follows. Note that not all changes can be achieved immediately; instead they are intended to identify the trajectory that the Town should be working towards.

3.3.1 Establish GIS Leadership, GIS Organization and Operating Model:

During the GIS strategy workshops, and in meetings with leaders at the Town, there was consensus that establishing clear GIS program leadership was the highest priority for success. This sentiment reinforces the perspective of the NGAC best practice model – that establishing leadership, responsibility and accountability for the GIS program is critical for successful GIS programs.

Thus, a new operating model for GIS is recommended. Organizationally, it is recommended that the Town create a Corporate GIS team that will provide services to the rest of the organization. The team should be established within the IT department – due to the strong GIS linkages with the IT services and technology – with GIS specialists physically embedded in departments. The team should be led by a GIS Manager, governed by a GIS Steering Committee, and strong processes and management practices to support its operation.

Establish GIS Leadership

The Strategy identifies the need for stronger GIS leadership and recommends the creation of a GIS Manager position. This role should be the leader of the GIS Team in IT and staff embedded in departments and be responsible for the coordination of the GIS Steering Committee and leader of the Community of Practice.

The GIS Manager role will be responsible for:

- GIS leadership (the GIS Manager is the corporate GIS practice leader)
- Corporate GIS team leadership
- Corporate GIS Community Coordination
- GIS governance process design and operation
- GIS relationship management (internally and cross agency), including regular service reviews
- GIS project and asset portfolio management
- Collaborative setting of standards, policies

This person will build relationships across the organization and with partners because there is a need to build awareness about the capabilities of GIS and a need to better communicate the necessary data, processes, and systems that involve GIS to stakeholders and business owners in the Town.

At a high level, there is a need to help the organization to make good decisions on priorities and to better understand the impact of changing priorities. The GIS Manager will be accountable to the CIO and the GIS Steering Committee while supporting the needs of the organization.

Establish a Corporate GIS Team and Supporting Organizational Model

Beyond the GIS Manager there are other organizational changes recommended.

In considering organization options, a series of potential GIS operating models were reviewed by Town staff. Based on those discussions, it is recommended that the Town adopt a GIS operating model with the following characteristics:

- A new GIS Section should be established in IT to establish stronger corporate GIS leadership
- Existing dedicated GIS specialist staff based in departments (details of which staff have been shared separately with the Project Sponsors) will shift to report directly to the GIS Manager – staff will remain physically located in departments

- In the early stages, existing GIS staff (GIS specialists) should primarily continue to support their current business units and perform the same job functions
- Over time, as processes are reworked, automation opportunities are implemented, and new approaches to data management are established, staff should be expected to transition to providing different types of services, such as project work, solutions and analysis projects
- In the early stages a new process for service requests should be established and tracked in a system to build an accurate view of the current services provided. This will also provide a means for everyone in the Town to make requests and have them tracked whether they have dedicated GIS resources or not.
- Non-GIS specialists in departments are to be encouraged, empowered and enabled to use GIS tools to support their work, without the need of a GIS specialist.

The intent of this approach is to provide the best levels of support possible to heavy users of GIS across the Town, but also provide more flexibility and responsiveness to evolving needs in the organization. By treating the GIS staff at the Town as a pool of resources that can be assigned to emergent needs as required, the Town gains the ability to assign resources to the highest priority, highest impact work.

This style of model was desirable because the structure will create:

- Flexibility – in the short run, most staff will continue to do exactly what they are doing today. Over time, an orderly transition to a new way of business will provide the GIS manager the most flexibility to redeploy resources to meet existing and new service needs.
- Accountability – a team lead from IT will be able to measure and support the performance of the team more effectively than other options. There are requirements for new processes, changes to data management practices, and evolving enterprise system needs that will be challenging to manage. A single point of responsibility through the GIS Manager and strong reporting lines is considered to be the best way to manage the success of the GIS Program.

This approach will support modernizing GIS work, and the decision to centralize in IT was made based on the following points:

- GIS alignment with technology and data programs is key to success
- GIS program success critically linked to success of major enterprise program investment (PRM, Maximo, etc.)
- Increased ‘technicality’ of the architecture and integration requirements for the GIS program (cloud, integration, resilience)
- Separation from IT of GIS can create a separate technology ‘centre of excellence’ that are not aligned to overall IT direction

A suggested mandate for the newly established GIS team would be to:

Increase the reach and value of GIS at the Town by delivering high quality GIS services and products. We achieve this using thoughtful and collaborative design of processes,

technology and data and the implementation of GIS best practices.

Going forward, the following terms apply:

Corporate GIS Team: This includes everyone reporting to the GIS Manager in some capacity regardless of the department/business unit they may be assigned to. The GIS Manager is the leader of the team.

It is important for the Town to provide clarity through clear job descriptions of what each role within the GIS Team should be responsible for. It is also important to establish career paths for members of the GIS Team. It is recommended the following new job roles should be adopted, defined and standardized.

- **GIS Manager:** Leads GIS Section, oversees GIS community, runs GIS work plan, promotes GIS to the organization
- **GIS Analyst:** Leads GIS projects, data design, analysis and solutions implementation
- **GIS Application Analyst / Developer:** Plans, implements and maintains GIS technology solutions, administers GIS technology
- **GIS Operations Supervisor:** Supervises GIS data, mapping and visualization work and manages day to day work and work plans of the GIS technicians
- **GIS Technician:** Production of GIS map products, ongoing GIS data maintenance and QA, basic GIS analysis

The proposed model means that the following GIS functions are expected to be performed from within the IT Department by members of the **Corporate GIS Team**:

- Management and leadership of the GIS program
- GIS Technology and services
 - GIS application configuration
 - GIS application design and development
 - GIS data architecture, design and process design
 - GIS application procurement, licensing, contract administration
 - GIS application support and maintenance – note that GIS application support should be fully integrated into the IT support model to ensure a consistent user experience
 - GIS platform systems design, support and maintenance
 - GIS systems integration
 - GIS analysis
 - GIS awareness, education, training and communication
- Data Management
 - GIS base data administration (address, street, imagery)
 - Data input / editing and management of base GIS data (e.g. address data input, street updates) using agreed upon processes, tools to a collaboratively designed data specification

- Data input / editing and management of planning base GIS data (e.g. zoning updates) using agreed upon processes, tools to a collaboratively designed data specification
- Data input / editing and management of base asset GIS data (e.g. trails, water, sewer, storm, hydrants, road segments) using agreed upon processes, tools to a collaboratively designed data specification
- Partner data management; including data intake (Ortho, MPAC, etc.) and data outflow (GIS data sharing agreement management / administration, open data)

Departmental Staff with GIS responsibilities: While the intent of this strategy is to create a stronger central GIS team in the short run, over time the Corporate GIS Team will work on building capacity and capabilities in departments to allow staff in departments to be self-supporting (e.g. data editing, map making, analysis work) rather than performing the front-line services on behalf of departments.

Over time, as GIS becomes democratized the following activities are expected to occur outside of the GIS team, by Departmental Staff with GIS responsibilities, in other parts of the organization.

- Use of GIS applications and tools (use of online apps provided by the Corporate GIS team)
- Map making (self-service map making, using online apps provided by the Corporate GIS team)
- Simple GIS analysis (typically self-service analytics, dashboards, using online apps provided by the Corporate GIS team)
- Complex GIS analysis (using desktop GIS solutions)
- Tool enabled data input / data management (i.e. using processes and supporting tools provided by the Corporate GIS to maintain / edit data – e.g. to update addresses, or to add new properties to the Economic Development “properties available” list)

Note that in the proposed model, in the short-term, GIS specialist staff will continue to function without change, and much of the current departmental GIS work will continue to be performed by GIS specialists. Over time, the intent of the strategy is to modernize and automate the basic services being provided by these staff members. Ideally, modernization of the Town’s processes and systems will result in much of the repetitive backroom work being performed by front line staff. For example, rather than GIS staff manually preparing maps that show new development applications (an almost full-time role currently), the work should be automated through the PRM system and front-line planning work, and thus the need to have a parallel system/process in GIS should be minimized – and that time currently allocated to map making released to focus on more value-added activities.

This example also highlights the complexity of moving forward – there are multiple dependencies, significant process, technology, and skill set changes, and the Town will need to carefully plan this transition to be successful.

The GIS Community of Practice

The GIS Manager directly manages the members of the Corporate GIS Team. The GIS Community of Practice is a larger, more inclusive group that represents everyone doing GIS work and that is interested in GIS in the organization. This will include members of the Corporate GIS Team, Departmental staff with GIS responsibilities and management and staff that have an interest in utilizing GIS.

This is a broader GIS community designed to share information, experiences and learning as part of the promotion and democratization of GIS.

The GIS Manager will run the GIS Community of Practice, holding regularly scheduled meetings and lunch and learn sessions. Attendance at events should be voluntary and open to everyone, and it will provide a forum for communication and learning from each other.

Some role changes should be anticipated for all members of the GIS Community of Practice as GIS activities are reviewed, refreshed and aligned with the new philosophy and functional model.

Tasks that GIS community members currently undertake will be redesigned in ways that may save significant time. For example, there are several opportunities for streamlining asset data maintenance that could be significantly simplified using field-based technologies, and their back-office processing effectiveness significantly improved using available Esri tools (such as data reviewer and attribute assistant). In other cases, data that is maintained multiple times by different staff could be managed once and shared.

In each of these situations, over time this will free staff to work on other value-added activities; gathering new data, enhancing data quality, and supporting new data analysis.

Expand Corporate GIS Governance

Establishing strong corporate governance for GIS is a best practice highlighted in the NGAC model, and which aligns with the Town's broader activities surrounding governance and portfolio management. It will be central to the Town's ability to coordinate and align activities in the proposed organizational model.

The need to govern and shape the evolution of the new GIS program will be critical to overall success, both in terms of establishing accountability and measurement of activities, but also to support staff that are dealing with many competing priorities and need help to establish priorities and navigate change.

The GIS Manager, working closely with the CIO and other stakeholders should be responsible for establishing and operating the GIS governance model and supporting processes. The GIS decision-making process and governance model should integrate

with existing corporate governance bodies and processes (such as ITSC, business planning and the budget process) that are already established.

GIS Steering Committee

The Strategy recommends the creation of a GIS Steering Committee to facilitate effective GIS decision making, communication and coordination. The GIS Steering Committee will need to interact with ITSC and ELT on a regular basis.

The GIS Steering Committee is *the* strategic decision-making body for GIS technologies, solutions, data and process. Significant changes related to GIS and geospatial projects, technologies, data and resources should be reviewed and approved by this group.

The GIS Manager and CIO will work closely with this group, bringing forward recommendations designed to align GIS activities and GIS community work with agreed goals and plans.

Membership in the GIS Steering committee will include:

- GIS Manager
- CIO (chair)
- 1 director-level representative from each department

The group should meet regularly. In the initial 12-18 months of the execution of this strategy, this may be monthly, which may be reduced to 6 weekly, bi-monthly at later stages. The group's membership may be revised in due course but should not be changed before significant progress has been achieved, which will take at minimum 36 months. While additional Directors may be added as requested, it is typically most effective to have a small group of active leaders rather than a representative from every possible business area.

ITSC Involvement/Linkage

While ITSC oversees technology broadly, ITSC will only be actively involved in GIS projects that meet their criteria / dependencies for approval (e.g. capital budget thresholds). Thus, major or strategic GIS projects would be proposed through the standard ITSC intake process. Other project and data work would be managed at the GIS Steering Committee and operational level without ITSC involvement. ITSC would need to be broadly aware of the GIS Strategy and the Annual GIS work plan, but regular involvement with GIS activities would be expected to be limited.

This group will be a primary communication and approval forum for the workplan, which should include reporting on key metrics, project status, challenges, and trends.

ELT Involvement/Linkage

As part of regular CIO briefings to ELT, the GIS Manager and CIO should report to ELT on GIS strategy progress and key metrics.

Governance Processes and Methods

Key governance processes and methods must also be developed. These include:

GIS Intake Process

An intake process that scopes, categorizes and allocates GIS requests appropriately should be developed by the GIS Manager, and clearly communicated to the Community and the organization. This should, where appropriate follow common IT Department processes. Adopting a common, open, shared means of tracking requests and jobs (e.g. data edits, map requests, projects) would be beneficial for work coordination.

It will also support understanding the frequent requests that can be automated, the time spent on small-medium sized projects and any impact on production work, and where there are new datasets and processes that are beyond the scope of normal work.

It is important to measure everything and respond to the facts and trends. Establishing a common intake process is fundamental to measuring work across all GIS service areas and better understanding how things can be improved.

Annual GIS Workplan

An annual GIS work plan should be prepared by the GIS Manager and reviewed by the GIS Steering Committee. Any major work plan items, that meet required thresholds would go forward to ITSC, as part of technology funding requirements. Changes to the work plan would require GIS Steering Committee approval.

GIS Portfolio Reporting

The GIS Manager should maintain the annual work plan, providing regular (monthly) updates to the Steering Committee on project status through an agreed project portfolio reporting format. This will include scorecards and key metrics to assist with understanding and anticipating topics such as resources, data, and training needs across the organization.

Governance Policies and Standards

A set of policies and standards that will set GIS best practices and guide the way that GIS work is undertaken at the Town should also be prepared. The work to develop these standards will be led by the GIS Manager, but will be undertaken as projects with the involvement of representatives of the GIS Community and beyond. Draft standards will be reviewed by the GIS Community and approved by the GIS Steering Committee.

Important topics for the GIS policy and standards framework to address include:

- GIS roles and responsibilities
- GIS data standards (projections, storage, data format conventions, versioning, permissions and access, currency, accuracy, data duplication, data usage, data distribution, data partnerships, SLA's, SOP's)
- Support policies for Privacy and Open Data in the Town and with partners

- GIS technology standards (software, licensing, purchasing processes, lifecycle, upgrades)
- GIS hardware standards (workstations, laptops, mobile devices, plotters, GPS, lifecycle)
- Cartography standards (copyright, disclaimer, citation, acknowledgements, styles)
- Data design processes
- Quality Assurance processes
- Metadata standard and process

Process documentation

An important area for improvement is documenting current and to-be processes for GIS work. Process documentation assists with quality management but it is also useful for understanding and reworking GIS activities. It is relatively simple to document processes and then identify smaller pieces of work that can be used to modernize services. Process diagrams will be particularly useful to track work across multiple departments and lines of business.

Measurement/Reporting

Finally, the GIS Manager should establish a set of Key Performance Indicators (KPI's) that allow the Manager themselves and the GIS Steering Committee to monitor performance of the services provided by the GIS Team and the GIS Community. Initially KPI's may focus on a few targeted areas, before expanding in scope. Initial topics may include:

- Overall data completeness and quality
- Datasets reviewed / redesigned / SLA's defined
- SLA performance
- GIS application usage and trends
- Project delivery (portfolio reporting)
- GIS incident resolution
- Staff time utilization
- Training and skill set needs

Ideally these topics will be summarized in simple visual scorecard that can simplify communication and decisions.

Key Activities to Establish GIS Leadership, GIS Organization and Operating Model:

The first priority involves establishing the Leadership and Organization around GIS – these are the pre-conditions for success. This is an immediate to short-term set of activities that will lay the foundation for success by establishing the GIS Manager, a new Governance structure, and the revised reporting structure.

- Hire GIS Manager

- Establish GIS Steering Committee and associated governance processes
- Develop and refine GIS business processes
- Develop and implement a transition plan, including change management, (including implementing the new GIS organizational structure and operating model)
- Establish GIS request tracking system
- Build a communications program (employees, GIS community and partner)
- Build a formal GIS training program
- Build a relationship management plan
- Explore and expand regional partnerships
- Establish GIS Budget

3.3.2 Implementing a Data Improvement Program

To date, spatial data in the Town has largely been created by departments for their own use. Typically processes and tools were defined years ago based on specific needs and available software, and little has changed over time. There is a backlog of work that needs to be addressed to make these datasets “enterprise ready” – there are gaps in content, timeliness, and quality that will present challenges as the data is more widely used.

It will be important to modernize the data models, processes, and tools used to manage data. While it is tempting to attempt a single project that addresses all data needs at one time, the recommendation is to pursue a prioritized list of data in a series of smaller iterative projects or cycles. This will allow Town staff to focus on urgent items first and begin to simplify and automate existing processes. As data management is streamlined in key areas there will be more time for staff to focus on the next round of data, and ideally over time the same staff can work in a coordinated way to meet current and new business needs while improving data management. This may require some short-term external support but with the right tools and processes in place it should be possible to expand the scope and quality of data without a significant change in GIS resources.

A key part of the thrust to improve data accuracy and timeliness will be that front-line staff should be managing data in enterprise systems as they are deployed, and the traditional approach to using drawing and documents to piece together GIS data should be replaced by modern systems and alternate data collection techniques. Asset data needs are a particular challenge for most organizations and a fundamental rethink of data management in this area to support operations, finance, and public reporting requirements is needed.

While already struggling with data demands, today the Town is managing just a portion of the data that is required by a digital city, and the challenges of improving quality and scope for spatial data will consume a majority of resources in the coming years. Progress will need to be measured and communicated to the GIS Steering Committee, IT Steering Committee, and it is likely that ELT-level awareness and support will be needed to assist with navigating resourcing challenges, providing direction on priorities, and holding people accountable.

Key Activities to Implement a Data Improvement Program:

The data improvement program will work towards the data required by the organization. It is important to be pragmatic and focus on key data needs in a prioritized approach. The suggestion in this workplan is to start with a data inventory activity followed by three cycles of implementation work.

- Conduct an Inventory of GIS data holdings
- Phase / Cycle 1 data improvement (Urgent and Necessary data – core GIS, Asset and Planning data, build to schedule/milestone)
- Phase / Cycle 2 data improvement (Next most important datasets as needed)
- Phase / Cycle 3 data improvement (Additional datasets)

3.3.3 Providing Ongoing GIS Production Support, including supporting new Enterprise System needs:

While focusing upon improvements, enterprise projects and GIS advancement, it will be important to maintain existing levels of service. Furthermore, the introduction of new systems such as the PRMS will create new demands on existing processes.

The recommendation to keep staff in current locations but alter the reporting structure is the first step in a longer transition to a new way of doing business. A particular challenge is that some staff are considered GIS or mapping technicians, but they also have other job functions. Other staff have more general titles such as Parks Assistant, though this is not reflective of the current roles as they are the map makers and GIS specialist for several divisions in the Operations Centre. There are also contract positions that have evolved into critical roles without a long-term resourcing solution, and some staff that will be eligible for retirement soon.

It will take some time to consider the various perspectives involved and determine a careful path forward. For this reason, a Transition Plan, including change management considerations, has been recommended in the early stages of follow-on work to the GIS Strategy Project. This can start in parallel to hiring the GIS Manager and resourcing and staff changes will be an ongoing and significant part of the GIS leadership role.

New processes, tools, and skills will be needed to advance the production support activities. It will be challenging to do this on top of existing workloads but investments in this area will be important so that staff can transition to value-added project work.

Key Activities to Provide Ongoing GIS Production Support

While driving forward, there are a range of ongoing activities - Production Support and Data Improvement Program activities. These activities provide the most visible GIS services and data products to the organization. They are all important current and emerging services that will be required.

- Support new PRM system data and rollout needs
- Support and modernize Planning map-making and other operational needs

- Support and modernize Operation's needs (Operations Centre)
- Support evolving and growing Asset Management GIS needs
- Support and modernize Engineering design and construction needs
- Support and modernize Core GIS data management needs
- Manage Relationships
- Manage Communications Plan
- Manage Training Plan
- Manage Application/Data/Services Catalog
- Manage Budget and Resourcing

3.3.4 Deliver Small-Medium Sized Projects

Closely related to Production support is the need for small-medium sized projects. It will be important to balance the needs to deal with enterprise projects, with small-medium sized projects.

Frequently a map request is a bit more complex than initially thought, and after further discussion there can be new data and analytical needs that result in more work than anticipated at the point of the request. These projects often are unplanned and urgent, and this can have an impact on existing staff workloads and progress on other important work. Since they seem like a simple request, staff may not establish good project and scope management practices. As the project evolves the impact increases.

On the other hand, these requests are often the green shoots of important new applications that can make a big difference to the organization, so it is not wise to ignore the needs.

It is therefore important to establish a good intake and escalation process for these projects because they can create unplanned but important mid-course corrections to plans.

A key measure of GIS program health is the ability to deliver these projects and navigate the impacts and expectations around them, while supporting strategic or enterprise work. Improving visibility into challenges and making adjustments to other plans, along with raising awareness about successes is a high priority.

Key Activities to Deliver Small-Medium Sized Projects:

Smaller projects are the green shoots of a GIS Program and will need special attention. Not only are these important growth areas, unplanned projects can often impact other activities. It is important to have a responsive and agile approach backed up with well-defined priorities and the ability to navigate through changing priorities. An overview of the activities is shown below.

- Establish new process for project intake and execution
- Project Work – Cycle 1: 4 projects to be selected
- Project Work – Cycle 2: 4 projects to be selected

- Communicate activities and status

3.3.5 Define Reusable Application Patterns

As work on the projects and enterprise support activities progress, application patterns (reusable GIS tools and solutions) for different kinds of GIS work will emerge. For example, typical patterns include self-service mapping request applications, simple geo-analysis tools and field data collection. These patterns can be implemented as configurable solutions so that multiple tools can be built with the same approach. This speeds development and lowers lifecycle costs.

There are many options in this area, and rather than make this a primary activity, the recommendation is to harvest the results of successful implementation projects and apply them to other projects.

Key Activities to Define Reusable Application Patterns:

As work on the projects and enterprise support activities progress, application patterns for different kinds of GIS work will emerge. For example, typical patterns include self-service applications and field data collection. These patterns can be implemented as configurable applications so that multiple tools can be built with the same approach. This speeds development work and can lower lifecycle costs.

There are many options in this area, and rather than make this a primary activity, the recommendation is to harvest the results of successful implementation projects and apply them to other projects. Activities are highlighted below.

- Define Self-Service application patterns (use cases)
- Configure Cycle 1 application set using a sprint approach (4-6 week cycles, solutions and specifics TBD, examples may include: Frequent map requests, Data Collection, Simple web access, Quick Lookup (properties, infrastructure), Analysis, Feedback Loops, Operations Dashboards)
- Document and communicate opportunities
- Configure application set Cycle 2
- Refine Software architecture

3.3.6 Building and Enhance Technology Platforms

GIS technology provides a way to share maps and data between users and applications that is unique; using maps to integrate information from multiple sources. For that reason, many organizations and software vendors now consider GIS to be a technology platform. It supports multiple applications and lines of business that is inherently multi-purpose and multi-use with web-based maps and other technical capabilities.

The underlying technologies are changing quickly with newer Cloud, Server, Mobile, and Desktop deployment options. There are also newer configurable solutions for application areas, along with web application builders that are easier to build and

maintain than they were in the past. These paradigm shifts are impacting the ways that GIS is delivered to staff and the public.

Proactively managing and evolving this platform to support the evolving needs of the Town requires excellent support for the current systems, but it also requires anticipating the needs of the organization and building a future architecture that is closely aligned with other systems in the Town. This will require documenting the existing architecture and developing a to-be architecture that can be co-developed and managed with the lifecycle of other enterprise systems.

Key Activities to Build and Enhance Technology Platforms:

GIS technology is evolving quickly and there are many opportunities to leverage the Esri software in desktop, server, mobile, and cloud deployments. While this is primarily an IT-focused part of the workplan it will be key to the success of everything else. Recommendations in this area are to define and evolve the architecture in the coming year and have a specific project plan for the infrastructure plan.

- Define to-be architecture (1-2 years) to address: On-premise servers, desktops, laptops, data, field, cloud
- ArcGIS Version Upgrades
- Explore and implement licensing options
- Support GIS Platform
- Hardware updates
- Build Application/Data Catalog
- Revisit Maximo Integration (2-way)
- Enhance CRM Integration
- GIS integration with the Parking Control System (AIMS)

3.3.7 Developing Content and Data Sharing Capabilities

Today there is little data sharing inside the organization, with partners, and very limited sharing with the community. Access to maps and data is a key way to engage and interact with the community – new ways of connecting and telling stories.

Content sharing is broader than data sharing – this is a term that web developers and other technical people use to describe the various web pages, the text/images/maps inside them, and typically content is managed in a Content Management System.

For GIS this typically means a Gallery of Applications, maps, web services, web pages, and open datasets⁷. Often an organization creates one or more of these galleries that provide the opportunity to explore and discover content, and typically individual relevant items are embedded into corporate websites and other systems visible to partners and the community.

⁷ City of Brampton's Geohub is a good example to explore - <http://geohub.brampton.ca/>

While this is a longer-term need given the need to focus in other areas in the short term, it will be an important part of making GIS available and accessible to everyone.

Key Activities to Develop Content and Data Sharing Capabilities

Once processes and data foundations have been established there is a need to improve sharing of applications, maps, and data internally and externally. While these activities address specific work resulting from workshops and planning discussions, the opportunity to work with partners to collaboratively build the solutions for content sharing is significant and should also be addressed (i.e., Open Data solutions).

- Share Data and Apps with the Community, including defining guidelines and standards
- Implement Public website enhancements, including adding galleries and content to public website, and supporting Open Data

4. GIS Strategy Implementation Plan

In support of the Strategic Directions outlined in section 3, section 4 outlines the staging of their implementation.

4.1 Implementation Staging

Necessarily the implementation of the recommended improvements in the Strategy must be staged.

The 3 primary stages are:

- 1) Immediate Term: Transition (Pre-GIS Manager)
- 2) Short Term: Building GIS Capacity and Capability (Post GIS Manager)
- 3) Medium – Long Term: GIS Advancement

4.1.1 Immediate Term (Estimated 6-12 Months)

Transition (Pre-GIS Manager): There are several important immediate activities to be carried out in 2018. It will take some time to establish and hire the new GIS Manager. During that time there are opportunities to move forward with parts of the Strategy and there will also be a need to manage production and support existing enterprise projects underway (e.g. PRM). There is a need to develop a transition plan, with a project manager and business analyst, to ensure that progress is made, or items will need to be deferred until the GIS Manager is hired.

The following key activities are anticipated in the immediate term

- Develop GIS Strategy transition plan, including change management considerations, in anticipation of organizational changes. This will involve the analysis of current job functions and reworking of the organization. This work will take some time to complete, and it must be handled with sensitivity to ensure that staff are supported, and that service levels in multiple business areas are not impacted during any transitions that result from this work.
- Establish and operationalize GIS Steering Committee
- Secure funding and approval, establish job description for GIS Manager
- Review and redesign current high volume and priority GIS processes and production support activities for improvements (implement low hanging fruit)
- Conduct the GIS data inventory and begin work on Cycle 1 of data improvements
- Meetings to discuss partnership opportunities should be held in the next few months to explore opportunities and develop a coordinated plan. This work can start prior to the GIS Manager being hired and should continue afterwards.
- An early assessment of current skills and training needs for GIS specialists
- Support for the PRM system implementation
- Support for Parking Control/AIMS integration

4.1.2 Short Term (Estimated 9-18 Months)

Building GIS Capacity and Capability: The next stage sees the hiring of the GIS Manager, establishment of the new GIS team and processes and work beginning on GIS data improvements and projects.

The following key activities are anticipated

- Hire and onboard the GIS Manager
- Begin implementation of GIS transition plan, including staffing reporting transition and new job descriptions
- Evaluate non-GIS activities and work with business owners on plans to transition and modernize service delivery, include resourcing in this discussion
- Ongoing review and implementation of revised GIS process improvements
- Review and revision of data management processes – Cycle 1
- Building GIS training and communications programs
- Execute a series of small to medium sized GIS projects
- Identify and prepare use cases (patterns) for future development
- Review and revise GIS architecture plans

4.1.3 Medium & Long Term (Estimated 18-30 + Months)

GIS Advancement: During the next stages the Town will begin to visibly see the new GIS capability and capacity start to take hold – with new solutions, products, significantly improved data quality and improved systems integrations.

- Review and revision of data management processes – Cycle 2 and 3
- Automate frequently requests maps and outputs
- Execute ongoing series of small to medium sized GIS projects
- Configure a range of self-service application patterns (such as frequent map requests, field data collection, data analysis)
- Refine software architecture
- Revisit Maximo and CRM GIS integrations
- Implement consistent web mapping solutions; with clearly defined standards, gallery and approach
- Implement Open Data

4.2 Resource Requirements

There are a number of areas in which the Town should consider whether additional resources to support the implementation of the strategy are required. As noted several places in this document, it is premature to recommend specific changes for existing resources and positions. While many of the people that perform GIS Services for the Town will be part of the new GIS Section, it is important to reinforce that existing work will need to continue until new plans are made to ensure there are no disruptions in service levels. This strategy specifically recommends a gradual and careful transition from the current situation.

As a result of the decoupling of the GIS function and associated staff from the functional divisions there would be non-GIS work activities that could be impacted unless performed by other resources. As a consequence, one of the goals of the Transition project will be to define these remnant resource requirements needed to meet non-GIS functions within the functional groups after deployment of the existing staff. Where non-GIS resources are needed the transition project will need to work across divisions to establish the GIS Strategy resource requirements and ensure that staffing levels are addressed.

The transition will not be as simple as a status-quo reassignment of resources. Each business unit within the Town is changing, the underlying technologies are changing, and there is a need to do more with existing resources. The Town needs to fundamentally reevaluate data management practices, develop self-service applications, and work with business owners to redefine the ways services are provided. In the short run, existing work should continue, in the longer term work will be different and everyone will need to work together to understand staffing needs.

4.2.1 GIS Manager

As noted throughout the report, there is a clear requirement to add a new GIS Manager to lead the implementation of the recommendations presented within the Strategy. Significant improvement to the GIS program will be very difficult (as past history has shown) without the GIS Manager.

4.2.2 Interim Program Support

In order to begin to make progress in the short term, it is recommended that the Town identify Business Analyst and Project Management support to drive forward the GIS program while the GIS Manager position is being justified and approved.

4.2.3 Contract Conversions

Two current GIS specialist positions are contract positions and it is recommended that these positions should be converted to permanent positions.

4.2.4 Contract and Consulting Support

The projects identified within the work plan should be accommodated by existing staffing levels with some external contract and consulting support.

It is important to note that enterprise initiatives will require dedicated resources with GIS capabilities on a short term or permanent basis in future. At the planning stage for each of these projects the GIS Manager should be involved early in the process so that GIS requirements can be fully understood and appropriately planned for. Temporary resources may be needed to support GIS data and systems work to support these initiatives and should be funded by the program areas through project funding.

4.2.5 York Region Partnership

There are significant opportunities to work with York Region to advance the goals outlined in this Strategy, and the potential to not only achieve the Town's goals but in some cases accelerate the GIS program should be evaluated carefully. The Region has been investing in modernization of services, especially in the Data, Analytics, and Visualization Services (DAVS) Branch in Corporate Services (formerly the GIS Branch). It is in the strategic interest of both organizations to work towards solutions that provide benefits to the community.

4.2.6 Training and Education

The Town should budget for a significant investment in training and education.

The first priority is to make investments in existing GIS specialists to help them in the transition to the new GIS model. For example, in numerous situations the Strategy is predicated upon existing GIS specialists changing the tools that they use to do their work – that is they need to change the tools that they use for 5 – 6 hours of each and every day. So technical training is required for these staff.

Secondly, the GIS Manager will be responsible for developing and leading corporate training and education programs to support an increased awareness of the capabilities of and to facilitate the democratization of GIS.

4.2.7 Licensing

Current software licensing constraints limit the use of GIS at the Town. Increased use of GIS across the organization means that licensing constraints must be addressed, which will require investment in software licensing. For flexibility and cost effectiveness reasons, it is recommended that the Town evaluate an Enterprise License Agreement (ELA) for Esri software.

4.2.8 Data Improvement

Data is clearly an area that will require a significant investment of time and effort on the part of the Town. However, there are alternative approaches other than Town staff time that can be used to define, collect, clean or augment data. Options include using consulting support to define data models and data management processes, using data out-tasking services to convert data from existing sources, and using survey teams to improve as-built processes. The Town should budget funds to support work in this area.

5. Conclusions

At the completion of the project to develop the GIS Strategy it is useful to reflect back on key activities and decisions. The three phases of the project were:

1. **Project Planning and Identification of Key Resources** – these early stages involved planning for the project and conducting initial meetings with sponsors and stakeholders.

What we heard: At this early stage the consultants were impressed by the level of interest at senior levels of the organization, and the level of interest in understanding what could be done to improve data quality and confidence in data. Data is a central issue for GIS but not always foremost in people's minds.

2. **Key Findings and Directions** – individual and group interviews were held to better understand the current situation and begin the process of outlining the strengths, challenges, opportunities and risks moving forward.

What we learned: The consultants remarked that the organization is “poised for greatness” – that the advanced state of the enterprise systems and IT organization to support them was unique. At the same time, the background of inadequate data management practices and the potential for data content gaps and quality issues to undermine enterprise success came into full view.

3. **Develop the GIS Strategy** – through workshops and other meetings we jointly developed a plan and vision for the next phase of the Town's GIS.

What we built together: A pragmatic and collaborative conversation emerged that brought a more comprehensive and shared view of how to move forward. We envisioned a broader mandate for GIS and how to take the GIS Program to the next level at the Town, and we discussed the many opportunities, challenges, and issues that will be faced along the way while building a workplan to support the vision.

5.1 Key Activities

The result of the project is that the Town should move forward in a number of major areas. It will take some time and there are some challenges to be faced, but in addition to the good work that has happened to date, it is time to move ahead by:

1. **Establishing new GIS Leadership, GIS Organization and Operating Model:** including hiring a new GIS Manager, establishing a new GIS Steering Committee and work plan intake and coordination process
2. **Implementing a Data Improvement Program:** Conducting an inventory of needed GIS data (to support Enterprise and divisional objectives) and a series of significant data improvement initiatives to re-design data models and provide

staff with the tools and processes to manage datasets needed for real-time, digital operations

3. **Continuing to Support Ongoing Production Support, including new Enterprise System needs:** It will be critically important to continue to provide mapping and data services to current service levels, without interruption, while processes, tools and services are redesigned and retooled.
4. **Supporting small – medium sized projects:** Ensuring that small-medium projects receive sufficient attention alongside large Enterprise GIS projects.
5. **Defining Reusable Application Patterns:** The identification of common GIS self-service tool requirements and the development of reusable GIS Apps that can be used across the organization (for example for field data collection or for the automation of simple, repetitive mapping requests). The goal is a democratization of GIS with a gradual move toward further distribution of GIS capabilities and data maintenance activities to front-line staff, not GIS specialists
6. **Building and Enhancing Technology Platforms:** A review of the GIS technology architecture to better meet the Town's needs specific to the identified use cases
7. **Developing Content and Data Sharing capabilities:** Implementation of improved GIS content sharing capabilities via public web mapping and open data portals

One final point is that the consultants were impressed by the enthusiasm and support of everyone that participated in this process. The positive and forward-looking people at the Town should be congratulated for diving into an ambitious process, and for taking time from their busy schedules to imagine the future and start building a better Richmond Hill.

Appendix A: GIS Glossary

Term	Description
ArcGIS	Family of GIS products from Esri the Town's GIS software provider
Attribute Assistant	ArcGIS add-on used to streamline bulk data editing
AutoCAD	Suite of CAD products including Map, Civil, 3D software used for design, drawing and 3d model rendering. Used in Environment and Infrastructure department to manage drawing files
Basemap	A compilation of GIS data and imagery that is used to form the background for a map
CAD	Computer Aided Design – software used to digitally create and manage engineering designs and drawings.
Cartography	The science or art of making maps
Catalog	In this context a catalog of data and GIS solutions available within the Town. Searchable by staff to allow them to better understand what is available in the GIS
Change Management program	Change management refers to the controlled implementation and management of change within an organization. In this context, this involves communicating, securing buy in and implementing the changes recommended by this strategy.
CIO	Chief Information Officer. Leader of the IT Division and Corporate Technology program
Community of Practice	A community of practice is a group of people who share a discipline or interest and learn how to their work better as they interact regularly.
Core GIS Data	Term used to refer to those datasets that are core to the GIS functionality. At TRH this includes parcels, addresses, roads, aerial imagery, planning data (zoning, OP) and asset data.
CRM	Customer Relationship Management software. Used to track and manage incoming customer enquiries and complaints. Town recently implemented Salesforce with a GIS integration.
Data Reviewer	ArcGIS add-on used for Quality Assurance of data.
ELA	Enterprise Licence Agreement – a licensing agreement offered by Esri that provides additional flexibility for large organization's such as the Town.
ELT	Executive Leadership Team
Enterprise	Term used to refer to the whole of a company or organization. To take an Enterprise GIS approach means to take a whole organization approach.

Term	Description
Esri	The Town's GIS software provided – a dominant provider of GIS software to all industries, used by the Region and all area municipalities in York Region.
Even Keel	A maturity model used to assess the maturity of an organization's GIS capabilities
Geospatial	An all-encompassing term used to refer to spatially related activities including – mapping, data management, analysis, drawing, surveying, GPS
GIS	Geographic Information System
GISAC	The Town's current GIS Advisory Committee – a group of interested stakeholders that have come together to assist in directing the GIS program
Governance	Governance, in the context of this GIS Strategy, refers to is how GIS decisions are made, policies and standards set, and priorities established.
ITSC	IT Steering Committee – the Town's governance body for overseeing the Corporate Information and Technology program.
KPI	Key Performance Indicator – measures that are used to track the performance of a program or service.
MAXIMO	The Town's work and asset management system, used in Community Services and other areas to track and manage work against assets.
Metadata	Data that describes and gives information about other data. GIS metadata may describe a dataset, indicate its accuracy, who is responsible for its maintenance, and when it was last updated.
MicroStation	A CAD product used for managing CAD drawing files. Used actively by P&RS in maintaining its mapping products.
NGAC	National Geospatial Advisory Committee
OnPoint	Town's generic GIS viewer used internally for staff access to GIS data and tools.
Open Data	Refers to the publication of data freely, in open formats for use and re-use with limited restrictions. This concept, part of the Open and Transparent Government approach suggests that information collected by the Town should be freely available to Citizens for their use.
PRMS	Planning and Regulatory Management system. Currently the Town is implementing the Energov solution in planning, building, bylaw services. This system has a GIS integration.
Quality Assurance	Processes and procedures implemented to check and assure that data meets required standards (accuracy,

Term	Description
	completeness)
Scorecard	A means of representing Key Performance Indicators in an easy to understand visual format
SLA	Service Level Agreement – a formal agreement that defines the expected level of service. In this case this may relate to GIS services or to data – quality and timeliness.
SOP	Standard Operating Procedure – an agreed and documented procedure designed to standardize a process or procedure.
Sprint	A term used in the Agile project management methodology, whereby a sprint refers to a set period of time during which a specific task or activity is completed and reviewed.
Use Cases	A term used when designing systems to represent the actions or steps that define an interaction or set of interactions between a user and a system.
Versioning	A method for managing changes made to a multi-user spatial database that allows changes to be tracked and conflicts to be avoided.
YorkInfo Partnership	A partnership between the Region, the nine local municipalities, the school boards and the conservation authorities that has worked together to maximize their collective investment in GIS.
YorkTrax	York Region's Planning and Development Tracking system

Appendix B: List of Stakeholders

This project had a large and active list of participants that were essential to the success of the strategy.

	Name	Department	Division	Title
1	Brian Ellsworth	Community Services	Fire Services	Deputy Fire Chief - Support Services
2	Bryan Burbidge	Community Services	Fire Services	Deputy Fire Chief - Operations
3	Darlene Joslin	Community Services	Recreation & Culture	Director
4	Diogo Oliveira	Community Services	Public Works Operations	Manager, Water & Wastewater
5	Don Guy	Community Services	Bylaw & Licensing Enforcement	By-Law/Licensing Officer
6	Donald Hearn	Community Services	Recreation & Culture	Manager, Administration & Marketing
7	Grant Taylor	Community Services	Public Works Operations	Director
8	Jeff Baker	Community Services	Bylaw & Licensing Enforcement	Supervisor, By-law & Licensing Enforcement
9	Jeff Stewart	Community Services	Public Works Operations	Manager, Parks Operations
10	Rose Hypolite	Community Services	Bylaw & Licensing Enforcement	Supervisor Parking Control Enforcement
11	Scott Glew	Community Services	Public Works Operations	Manager, Fleet & Supplies
12	Shane Baker	Community Services		Commissioner
13	Steve Kraft	Community Services	Fire Services	Fire Chief
14	Tracey Steele	Community Services	By-Law & Licensing Enforcement	Director
15	Vishal Narula	Community Services	Fire Services	Technology Support Coordinator
16	Anna Romano	Corporate & Financial Services	Financial Services	Development Finance Coordinator
17	Annette Kimelman	Corporate & Financial Services	Financial Services	Assessment Coordinator
18	Anthony Iannucci	Corporate & Financial Services	Information Technology	CIO
19	Carlisle Kent	Corporate & Financial Services	Office of the Clerk	Records Analyst
20	Cedric Stone	Corporate & Financial Services	Financial Services	Manager, Revenue Services
21	Dan Mocanu	Corporate & Financial Services	Information Technology	System Analyst
22	Danny Bainbridge	Corporate & Financial Services	Information Technology	GIS Analyst

	Name	Department	Division	Title
23	David Dexter	Corporate & Financial Services	Financial Services	Director/ Treasurer
24	Donna Winborn	Corporate & Financial Services	Office of the Clerk	Elections Coordinator
25	Gigi Li	Corporate & Financial Services	Financial Services	Manager, Capital & Development Financing
26	Gloria Collier	Corporate & Financial Services	Office of the Clerk	Manager, Legislative Services/Deputy Town Clerk
27	Jimmy Chao	Corporate & Financial Services	Information Technology	System Analyst
28	Lily Attard	Corporate & Financial Services	Information Technology	Senior Systems Analyst
29	Mary-Anne Dempster	Corporate & Financial Services		Commissioner
30	Massimo Scocco	Corporate & Financial Services	Information Technology	Integration Specialist
31	Micheline Lafond	Corporate & Financial Services	Information Technology	Senior Systems Analyst
32	Phoebe Chan	Corporate & Financial Services	Information Technology	Application Analyst
33	Rob Jones	Corporate & Financial Services	Information Technology	Manager, Application Services
34	Ryan Ban	Corporate & Financial Services	Office of the Clerk	Manager, Information Governance
35	Samara Kaplan	Corporate & Financial Services	Human Resources	Director
36	Stephen Huycke	Corporate & Financial Services	Office of the Clerk	Director/ Town Clerk
37	Todd Kroeplin	Corporate & Financial Services	Information Technology	GIS Technician/Programmer
38	Xiaoying Ding (Jessie)	Corporate & Financial Services	Information Technology	GIS Programmer/Tech
39	Yuhua Sun	Corporate & Financial Services	Information Technology	Application Analyst
40	Alexander Mandatori	Environment & Infrastructure Services	Facility Design, Construction & Maintenance Services	Manager, Facility Maintenance & Repair
41	Ann Marie Farrugia	Environment & Infrastructure Services	Corporate Asset Mngmt Planning & Envmt Services	Manager, Natural Environment
42	Doug Morris	Environment & Infrastructure Services	Design & Construction	Manager, Construction
43	Ellen De Guerre	Environment & Infrastructure Services	Design & Construction	Supervisor, Mapping and Technical Support Services
44	Geoff Hunt	Environment & Infrastructure Services	Design & Construction	Manager, Parks & Open Space Design

	Name	Department	Division	Title
45	Graham Scott	Environment & Infrastructure Services	Design & Construction	GIS Mapping Technologist
46	Italo Brutto	Environment & Infrastructure Services		Commissioner
47	Janet Matsumoto	Environment & Infrastructure Services	Design & Construction	GIS Mapping Technologist
48	Jeremy Wychreschuk	Environment & Infrastructure Services	Corporate Asset Mngmt Planning & Envmt Services	Manager, Water Resources
49	John Ebor	Environment & Infrastructure Services	Design & Construction	GIS Mapping Technologist
50	Lucius Maitre	Environment & Infrastructure Services	Design & Construction	Manager, Municipal Engineering Design
51	Nick Kalyvas	Environment & Infrastructure Services	Facility Design, Construction & Maintenance Services	Manager, Facility Engineering Services
52	Pat Caron	Environment & Infrastructure Services	Facility Design, Construction & Maintenance Services	Director
53	Stephen Fick	Environment & Infrastructure Services	Design & Construction	Director
54	Steve Morgan	Environment & Infrastructure Services	Facility Design, Construction & Maintenance Services	Manager, Facility Design & Construction
55	Terry Ricketts	Environment & Infrastructure Services	Corporate Asset Mngmt Planning & Envmt Services	Director
56	Vlad Gaiu	Environment & Infrastructure Services	Corporate Asset Mngmt Planning & Envmt Services	Manager, Energy and Waste
57	Anthony Petrielli	Office of the CAO	Communication Services	Web & Social Media Coordinator
58	Antonio (Tony) Dimilta	Office of the CAO	Legal Services	Town Solicitor
59	Brenda Osler	Office of the CAO	Strategic Initiatives	Coordinator, Economic Dev Programs
60	Carol Moore	Office of the CAO	Communication Services	Manager, Communication Services
61	Christian Greco	Office of the CAO	Legal Services	Manager, Real Estate
62	Dayna Alexander	Office of the CAO	Communication Services	Manager, Access Richmond Hill
63	Graham Sue	Office of the CAO	Strategic Initiatives	Manager, Economic Development
64	Gwen Manderson	Office of the CAO	Strategic Initiatives	Director
65	Martina Jedinak	Office of the CAO	Strategic Initiatives	Coordinator, Economic Dev Programs

	Name	Department	Division	Title
66	Meeta Gandhi	Office of the CAO	Communication Services	Director
67	Neil Garbe	Office of the CAO		CAO
68	Ahsun Lee	Planning & Regulatory Services	Development Engineering & Transportation	Transportation Engineer
69	Chris Burns	Planning & Regulatory Services	Regulatory Services	Supervisor, Plans Examination
70	Dan Harrietha	Planning & Regulatory Services	Policy Planning	Parks Planning Technician
71	Dan Terzievski	Planning & Regulatory Services	Development Engineering & Transportation	Director
72	Deborah Giannetta	Planning & Regulatory Services	Development Planning	Manager, Development-site plans
73	Denis Beaulieu	Planning & Regulatory Services	Development Planning	Manager, Development - Subdivisions
74	Gus Galanis	Planning & Regulatory Services	Development Planning	Director
75	Herman Law	Planning & Regulatory Services	Administrative Services	Technical Services Coordinator
76	Jeff Walters	Planning & Regulatory Services	Development Engineering & Transportation	Manager, Development Engineering Subdivisions & Stormwater Mgmt
77	Joanne Leung	Planning & Regulatory Services	Policy Planning	Manager, Urban Design
78	John DeVries	Planning & Regulatory Services	Regulatory Services	Director/CBO
79	Josh Ward	Planning & Regulatory Services	Development Engineering	Sustainable Transportation Coordinator
80	Kelvin Kwan	Planning & Regulatory Services		Commissioner
81	Maria Flores	Planning & Regulatory Services	Policy Planning	Manager, Sustainability
82	Michael Janotta	Planning & Regulatory Services	Regulatory Services	Manager, Plans Review & Compliance
83	Morris Lucchetta	Planning & Regulatory Services	Regulatory Services	Manager, Inspections
84	Patrick Lee	Planning & Regulatory Services	Policy Planning	Director
85	Richard Hui	Planning & Regulatory Services	Development Engineering & Transportation	Manager, Transportation
86	Rob Cowie	Planning & Regulatory Services	Development Engineering	Senior Traffic Analyst

	Name	Department	Division	Title
87	Salvatore Aiello	Planning & Regulatory Services	Development Planning	Manager, Development - Zoning
88	Scott Simpson	Planning & Regulatory Services	Regulatory Services	Senior Building Inspector
89	Sybelle von Kursell	Planning & Regulatory Services	Policy Planning	Manager, Policy
90	Sylvester Saverimuthu	Planning & Regulatory Services	Administrative Services	Technician

