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Performance Audit of Winter Maintenance  
Programs for Roads

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August 31, 2019

Final Report

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## AUDIT OBJECTIVE

To assess the extent of regard for value for money within the winter maintenance programs for the City's roads.

## BACKGROUND

The Linear Infrastructure Services Division of the Growth and Infrastructure Department is responsible for the maintenance of roads in accordance with City policies which are based on the Minimum Maintenance Standards for Municipal Highways (MMS) **which are established by Ontario Regulation 239/02**. These standards stipulate minimum levels of service for maintenance activities such as snow plowing, salting and sanding of roads and sidewalks, snow removal and pothole repairs that collectively accounted for 72.5% of the actual expenditures to date for winter maintenance in 2019. The balance was for ditching, cleanup, supervision and other activities.

Winter maintenance programs for the City's roads are delivered using a mix of City staff and contractors from a network of five depots that are located in the North West, North East, South, South East and South West sections of the City.

The approved capital budget for roads infrastructure was ***\$103.8 million<sup>1</sup> in 2018*** and \$50.5 million for 2019. During the 2019 budget process, Council also applied the entire amount of one-time additional gas tax of \$10.2 million to road renewal and repairs.

The approved operating budget for the winter maintenance program for roads was \$17.6 million in 2018 and \$18.7 million in 2019.

## AUDIT SCOPE

Winter maintenance programs for roads from January 1, 2015 to May 31, 2019.

## REPORT HIGHLIGHTS

Despite the recent increases to budgets for City roads, this audit identified a need for increased capital expenditures to stem the deterioration of City roads as well as a need for increased winter maintenance budgets to respond to changing weather patterns. Opportunities to improve risk management and value-for-money within operations were also identified.

## AUDIT STANDARDS

We conducted our audit in accordance with Generally Accepted Government Auditing Standards which require that we adequately plan audits; properly supervise staff; obtain sufficient, appropriate evidence to provide a reasonable basis for audit findings and conclusions; and document audits. For further information regarding this report, please contact Ron Foster at the City of Greater Sudbury at 705-674-4455 extension 4402 or via email at [ron.foster@greatersudbury.ca](mailto:ron.foster@greatersudbury.ca)

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<sup>1</sup> The figure for 2018 has been revised.

**OBSERVATIONS AND ACTION PLANS:**

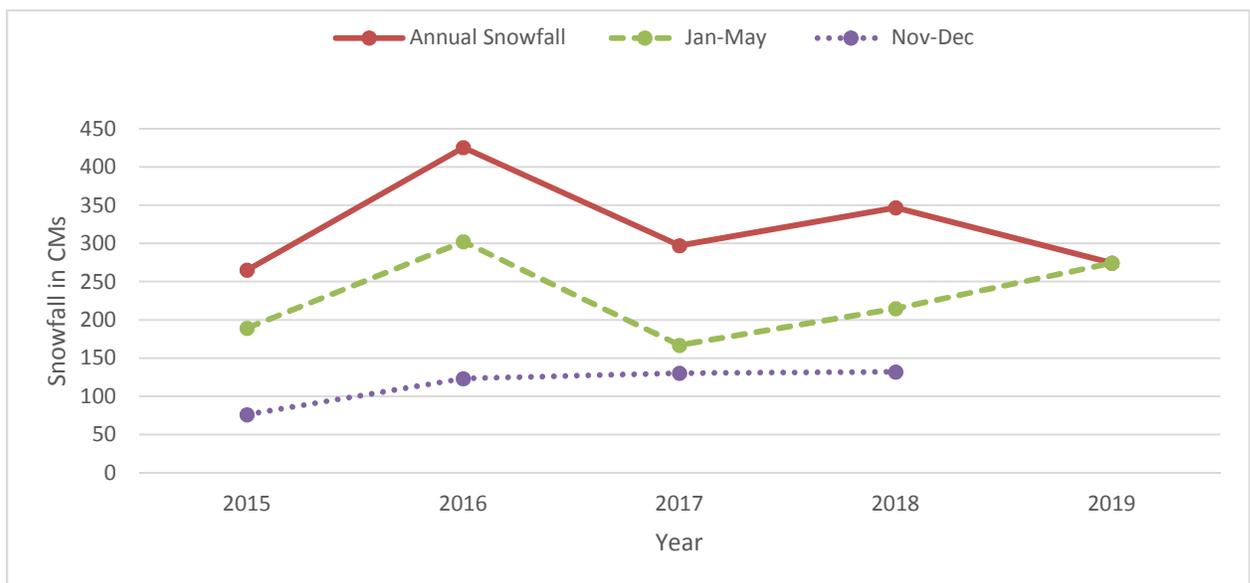
**1. Operating Budgets**

Actual expenditures for winter maintenance on roads exceeded budgeted amounts from 2016 to 2018. Actual expenditures are projected to be approximately \$4 million higher than budget at the end of 2019.

**TABLE 1 – WINTER MAINTENANCE EXPENDITURES FOR ROADS (\$MILLIONS)**

Expenditure Type	12 Months								Pro-rated over 5 Months	
	2015 Budget	2015 Actual	2016 Budget	2016 Actual	2017 Budget	2017 Actual	2018 Budget	2018 Actual	2019 Budget	2019 Actual
Contract services	4.1	3.9	4.2	5.9	4.3	5.0	4.4	5.2	3.6	7.7
Salaries & Benefits	4.0	4.0	4.0	4.2	4.1	3.9	4.1	4.7	2.9	3.0
Materials	2.6	2.4	2.7	2.8	2.7	3.8	2.9	3.7	2.0	2.6
Energy costs	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.8	0.5	0.5
Internal Recoveries	5.2	4.9	5.3	5.4	5.4	5.7	5.6	5.5	3.9	3.8
<b>Total</b>	<b>16.5</b>	<b>15.8</b>	<b>16.7</b>	<b>18.9</b>	<b>17.1</b>	<b>19.0</b>	<b>17.6</b>	<b>19.9</b>	<b>12.9</b>	<b>17.6</b>
<b>Over-budget in \$</b>	<b>\$ (0.7)</b>		<b>\$ 2.2</b>		<b>\$ 1.9</b>		<b>\$ 2.3</b>		<b>\$ 4.7</b>	
<b>Over-budget in %</b>	<b>(4.2)%</b>		<b>13.2%</b>		<b>11.1%</b>		<b>13.1%</b>		<b>36.4%</b>	

**GRAPH 1 – SNOWFALL BETWEEN 2015 AND 2019 (CENTIMETERS)**



## **Observations :**

- Despite progressive annual increases to operating budgets, actual expenditures have been higher in all recent years except in 2015.
- Cost increases in 2019 were primarily due to the increased use of contractors to remove unusually high levels of snowfall in late 2018 and 2019.
- Operating budget shortfalls in recent years have exhausted the winter maintenance reserve and contributed to the depletion of the tax stabilization reserve.

## **Recommendation:**

Years with high amounts of snowfall, such as 2016, should be included in the 5-year average when determining annual operating budgets.

## **Management response:**

*Management agrees that recent weather patterns have contributed to budget shortfalls to meet operating service levels. Management would be receptive to considering alternative methods of calculating the annual budget that the Auditor may recommend.*

## **2. Winter Maintenance and Pothole Repair Management**

### **A. SANDING, SALTING AND PLOWING:**

The City's service levels for winter maintenance are based on City policies and provincial Minimum Maintenance Standards (MMS) for sanding, salting, plowing and clearing roads and sidewalks. The budgeted financial resources for these activities comprise roughly 50% of the annual winter maintenance budgets. The City maintains 52 snow plowing routes. Management assigns contractors to 27 routes and City-owned plows to 25 routes. Eighty-six (86) staff are assigned to plow roads, clear sidewalks and operate other equipment for winter maintenance activities. Up to 64 contract staff are used to operate loaders, 4x4s, plows and graders. Resource deployment decisions for winter maintenance activities are made at the depot level by the five supervisors that cover five different areas across the City which spans more than 3500 square kilometers.

## **Observations:**

1. Our review of winter maintenance events in 2018 and 2019 identified opportunities to make greater use of technology when responding to winter maintenance events.
2. The City does not always make effective use of data from its Road Weather Information Station (RWIS) in Levack or from the Ministry of Transportation's RWIS network when deploying in-house and contract staff to respond to winter maintenance events.

3. Our review of costs indicated that the current 60/40 mix of contractors and in-house staff for sanding, salting and plowing activities does not provide an optimal balance between economy and effectiveness for years with higher levels of snowfall.
4. The last round of collective bargaining resulted in scheduling changes that will provide 6,000 labour hours at regular rates which will reduce annual overtime costs and reliance on contractors.
5. Comparisons of performance are not being made between in-house staff and contractors.

**Recommendations:**

1. Examine opportunities to make greater use of technology when deploying staff and contractors to manage winter maintenance events.
2. Prepare a business case for additional RWIS stations across the City for more proactive resource deployment.
3. Work with Finance staff to prepare a business case for additional staff and equipment to identify the savings that might be realized from reducing reliance on contractors for winter maintenance activities.
4. Consider revising the standing offer for plowing to 8 years to coincide with the expected useful lives of the snow plows to obtain more competitive rates from contractors.
5. Develop performance measures to enable comparisons of the efficiency, economy and effectiveness of City crews and contractors for winter operations.

**Management response:**

1. *Roads Operations will examine opportunities to make greater use of technology when deploying staff and contractors to manage winter maintenance events.*
2. *A business case will be prepared for additional RWIS stations across the City for more proactive resource deployment.*
3. *Management understands that the balance of contracted services versus in-house services requires review on a regular basis. Changes in weather patterns, as well as changes in road usage can impact the ability to maintain service levels with anticipated utilization of contracted services. Business cases will be prepared to analyze alternative service delivery models with additional City staff and equipment.*
4. *Management is currently working on a new plowing service contract and is willing to consider this change.*
5. *Management agrees and will move to incorporate performance measure comparisons throughout the annual business processes.*

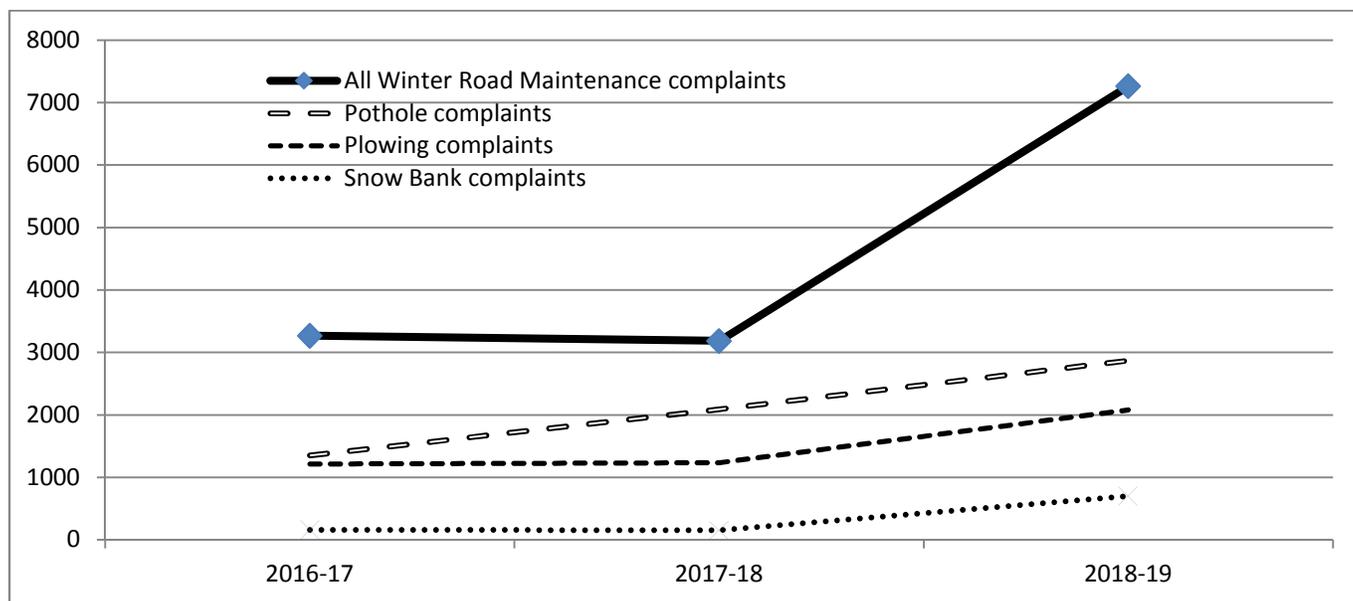
**Citizen Satisfaction Survey and Service Complaints**

The Auditor General's Office issued a citizen survey to 100 residents in each of the City wards in April 2019 to assess service levels for winter maintenance programs. Table 2 provides a summary of the responses received as well as a comparison of service complaints in the last three winter seasons. Graph 2 indicates that complaints for winter maintenance have been growing since 2016. This trend is not surprising, given the significant amount of snowfall received between November 2018 and May 2019 and the colder than average temperatures during this period which led to higher than normal snow banks.

**TABLE 2 - CITIZEN SATISFACTION SURVEY AND ACR COMPLAINT TREND FOR WINTER MAINTENANCE**

2019 CITIZEN SURVEY RESULTS ON TIMELINESS (T) AND QUALITY (Q)					ACR COMPLAINTS
SERVICE	ACTIVITY	NO RESPONSE	SATISFIED	DISSATISFIED	INCREASE (2016-17 & 2018-19)
ROADS	Sanding, salting and plowing on main roads	T 0% Q 0%	T 67% Q 40%	T 33% Q 60%	60%
	Sanding, salting and plowing on residential roads	T 0% Q 0%	T 40% Q 40%	T 60% Q 60%	
SIDEWALKS	Clearing	T 24% Q 24%	T 33% Q 31%	T 43% Q 45%	90%
BUS STOPS	Clearing	T 53% Q 55%	T 19% Q 18%	T 28% Q 27%	243%
SNOW BANKS	Removal across the City Removal in Downtown	T 17% Q 22%	T 24% Q 21%	T 59% Q 57%	228%

**GRAPH 2 – WINTER MAINTENANCE COMPLAINTS (1-Nov to 30-Apr)**



**Observations:**

1. The City communicates service levels for winter maintenance of roads on the City’s website and in local newspapers. Despite this communication, customer survey responses suggested that many residents are not aware of the different levels of service for the different classes of City roads.
2. The City does not declare significant weather events to warn residents of hazardous road conditions.

## **Recommendations:**

1. Additional steps should be taken to communicate service levels for winter maintenance on the City's different classes of roads.
2. Significant weather events should be declared to warn residents of weather hazards on the City's roads.

## **Management response:**

1. *Management agrees. Additional steps will be taken to actively communicate service levels for winter maintenance to residents prior to the 2019/2010 winter season.*
2. *Staff presented a report to Operations Committee at the August 12<sup>th</sup>, 2019 meeting asking for approval to declare significant weather events to warn residents of weather hazards and possible service delays. The report was subsequently ratified at the August 13<sup>th</sup>, 2019 Council Meeting. As per the report, this initiative will be put in place for the 2019-2020 winter season. This option was recently made available through changes to provincial regulations for road maintenance. Management agrees that this new operational feature will improve communications and create a greater awareness among road users, which may assist with customer satisfaction.*

## **B. POTHOLE REPAIR MANAGEMENT**

Like many municipalities in Northern Ontario, the City faces significant challenges managing its road infrastructure with limited capital budgets. To address these challenges, the amount of capital funding for the renewal and repair of existing road infrastructure has nearly doubled during the last 5 years compared to the average annual expenditure between 2002 and 2014. During the 2019 budget process, Council approved a capital budget that included \$50.5 million for new and existing road infrastructure and applied the entire one time additional gas tax of \$10.2 million for 2019 to road renewal and repairs.

In spite of the additional investments made to the City's existing road infrastructure in the last 5 years, this audit revealed that the condition of the City's paved roads has declined since 2002, causing significant potholes every winter and spring. Below, we provide an overview of the annual pothole program as well as our observations and recommendations to address relevant risks.

**Reporting and tracking:** A tracking list is maintained at each of the five depots identifying the location of potholes reported in Active Citizen Requests and those identified during inspections. Repair work for road stretches is prioritized based on road class. Work completed is input and updated in CityWorks.

**Resourcing:** In-house crews and contractors repair potholes identified by road inspections and complaints from residents. Expenditures for pothole repairs in 2019 accounted for approximately 10% of the total.

**Patching:** Subject to availability and weather conditions, road crews are deployed with a 'tracking list' issued by depot scheduling staff that identifies road sections for repair work. Repairs are completed with a variety of materials including cold mix, warm mix and hot mix depending on their availability.

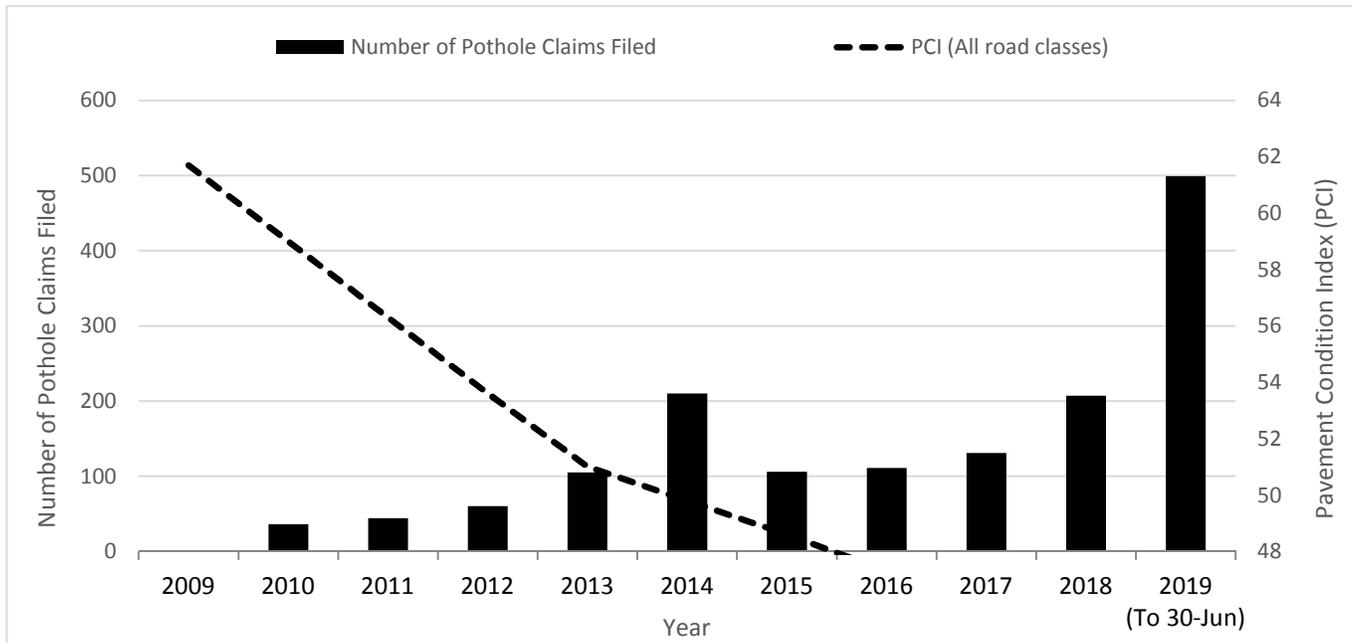
**TABLE 3 - CITIZEN SATISFACTION SURVEY AND COMPLAINTS FOR POTHOLES**

2019 CITIZEN SURVEY RESULTS			COMPLAINTS
SERVICE ACTIVITY	SATISFIED	DISSATISFIED	INCREASE BETWEEN 2016 – 2019
Pothole Repair – Timeliness	8%	92%	112%

**TABLE 4 - COMPARATIVE HOURLY RATES – POTHOLE PATCHING**

Contractor Crew Size	Average Contractor cost/hour in April 2019	Direct Costs per hour of City Crews <sup>2</sup>		
		Regular shift (Weekdays)	Overtime @ 1.5 (Mon – Sat)	Overtime @ 2.0 (Sundays/Holidays)
(3 person crew)	\$237.63	\$157.75	\$199.26	\$242.46
(4 person crew)	\$250.72	\$194.19	\$249.53	\$307.13
(5 person crew)	\$268.21	\$230.63	\$299.80	\$371.80

**GRAPH 3 - TREND OF POTHOLE CLAIMS AND PAVEMENT CONDITION INDEX (PCI)**



**Observations:**

1. Insufficient capital budgets have resulted in the ongoing deterioration of the City’s paved roads which has led to increasing levels of public dissatisfaction and pothole claims filed against the City.

<sup>2</sup> Include costs for labour, benefits, supervision, city equipment and fuel

2. The City currently has insufficient capacity to use recycled asphalt for repairs to the City's paved roads which had an overall PCI rating of less than 50 percent when they were last measured.
3. Comparisons of performance are not being made for in-house staff and contractors.
4. Management typically assesses the conditions of the City's paved roads every two years, but a Pavement Condition Index (PCI) study has not been completed since 2016.

**Recommendations:**

1. Explore ways to increase capital budgets for roads with Finance staff to improve service levels.
2. Prepare a business case to make greater use of recycled asphalt to repair potholes.
3. Develop performance measures to enable comparisons of work of city crews and contractors.
4. Measure the PCI of paved roads every two years to determine current levels of service and ensure that budgets respond effectively to current road conditions.

**Management response:**

1. *A long-term financial plan for road infrastructure was prepared by KPMG for Council's consideration in 2012. In 2018, the overall City long-term financial plan was updated, including the long-term financial requirements for the City's road infrastructure. Management will continue to provide Council with the best available information for consideration in the annual budget process.*
2. *Management generally agrees that the state of road condition can affect the ability of the road maintenance division to perform repairs efficiently as required to meet minimum maintenance standards. Staff commenced a study of best practices in the field of road repair and, is collaborating with the Ministry of Transportation and other Cities in Northern Ontario to complete the study. It is understood that alternative pothole repair strategies and business practices will be incorporated as necessary and as budgets permit. Alternative paving systems and equipment will be evaluated within the scope of current studies. Any changes in service will be presented as a business case or incorporated into the capital prioritization process.*
3. *Staff will develop performance measures to enable comparisons between city crews and contractors.*
4. *In order to ensure that budgets respond effectively to current road conditions, a new vendor has been selected and plans are underway to evaluate the PCI of the paved roads in 2019. Management intend to continue to evaluate pavement condition generally every two years.*

**C. RISK MANAGEMENT**

Risks are uncertain events which can be measured by calculating the product of the likelihood and impact of these events. Most risks can be mitigated by purchasing insurance. Other mitigation techniques include applying controls related to the acquisition and application of human and contract resources; development and implementation of formal procedures; acquisition and utilization of plant, equipment and tools; and the collection and utilization of relevant information. Tables 5 and 6 on the next page identify the significant risks associated with winter maintenance programs for the City's roads.

**TABLE 5 – SUMMARY OF SIGNIFICANT RISKS**

Risk	No. of Risks	Risks Before Controls			Risks After Controls		
		High (15 to 25)	Med (9 to 14.99)	Low (1 to 8.99)	High (15 to 25)	Med (9 to 14.99)	Low (1 to 8.99)
Reputation (R)	1	1	-	-	-	1	-
Operational (O)	3	3	-	-	-	3	-
Financial (F)	2	2	-	-	1	1	-
Legal (L)	1	1	-	-	-	1	-
<b>TOTAL</b>	<b>7</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>6</b>	<b>0</b>

**TABLE 6 - SIGNIFICANT RISKS**

Risk	Risk Description	Risks Before Controls	Risks After Controls
F1	Capital budgets for roads may not be realistic/adequate	22.5	15.3
O1	The deployment model for winter maintenance may not be economical/efficient	20	13.6
F2	Operating budgets for winter maintenance may not be realistic or adequate	18	12.3
R1	Service levels for winter maintenance may not be communicated adequately, leading to public dissatisfaction.	16	12.3
O2	The deployment model for winter maintenance may not be effective	16	11.6
O3	Claims prevention processes for winter maintenance may not be effective	16	11.6
L1	Service levels for winter maintenance may not be met, leading to successful claims against the City	16	11.6

**Observations:**

Management has taken steps to mitigate significant risks within the winter maintenance programs for roads.

**Recommendation:**

Management should further mitigate risks after controls that are greater than 12 or accept these risks with the approval of Council following the completion of the annual enterprise risk assessment and core service review.

**Management response:**

*Management agrees and will continue to periodically review mitigation processes for all significant risks.*