



# **Fairfax County Internal Audit Office**

**Land Development Services  
Department of Information Technology  
Software Application Change Management Audit  
Final Report**

**October 2019**

***"promoting efficient & effective local government"***

# Executive Summary

Application change management controls are critical to the proper functioning of the county's software applications used in operations. The application change management process is implemented differently in various departments/agencies in the county depending on the size and number of agency specific applications that are used. The Internal Audit Office has developed a standardized audit plan to review the software application change management processes implemented for individual departments/agencies. This is the first in a series of these audits being planned and performed.

Land Development Services (LDS) utilizes various software applications to help them manage their business operations. Changes to these software applications are managed in a partnership between the agency and Department of Information Technology (DIT). The LDS IT Services Group reviews user application change requests and forwards the approved change requests to DIT. DIT discusses the details and requirements of change requests with key LDS users. DIT then designs, configures, develops and tests the changes. After LDS performs the User Acceptance Test (UAT) and approves the changes, DIT deploys the changes to production. DIT uses Enterprise System Management Portal (ESMP) to track the deployment of changes to production. Currently LDS is involved with the Electronic Plan Submission and Review Project (LDS) and the Planning and Land Use System (PLUS) information technology projects that will replace some of the departments major information systems. While some of the systems reviewed as part this audit are nearing the end of their useful life, ensuring strong internal controls over the IT change management process will reduce the risk of errors being introduced into the new systems through inappropriate changes.

Our audit focused on determining whether policies and procedures were established for software application change management for LDS. We also reviewed DIT policies and procedures as they related to their roles and responsibilities for application change management within LDS. We focused on determining whether both agencies had controls in place to ensure all software application change requests are processed in a controlled manner and reduced the likelihood of errors, fraud, and disruption of processing resulting from incorrect or unauthorized changes.

We noted that controls were in place to ensure change requests were evaluated, prioritized, and approved by authorized persons in the respective departments. We also noted that user acceptance testing was performed by LDS before DIT deployed changes into production. LDS was informed and DIT followed up after the changes were deployed to ensure no further issues existed. However, we have the following recommendations for LDS and DIT to strengthen internal control effectiveness:

## LDS:

- Update the **Change Request Policy** to reflect emergency changes request procedures, staff roles and responsibilities for user training when applicable, and department management approval of the policy and the policy effective date.

- Reinforce with the IT Services staff the **Change Request Policy** requirements to document key assessment results, approvals/rejections and milestones in the change request process. Consider periodic secondary review of Change Request Forms and LDS Smart Forms to ensure change requests are properly authorized. Additionally, rejection of change request should be explicitly noted on Change Request Forms instead of having an unchecked field be the only indicator that a request was rejected.

#### DIT:

- Reinforce with DIT staff the Procedural Memorandum No. 09, **Change Management for Production Systems** requirements and procedures of deploying changes to production to include the need to have EMSP change request tickets reviewed and approved before the deployment and completed after deployment.
- Update Procedural Memorandum No. 09, **Change Management for Production Systems** to:
  - Define the documentation that must be retained to evidence the performance, results, and approval of system change tests.
  - Reflect the Enterprise Management System Portal (EMSP) implementation.

DIT staff should be properly trained in the updated procedure requirements.

- Develop procedures to provide departments with the EMSP ticket number to aid in referencing change requests in communications between DIT and departments. In addition, consider adding requesting department change request tracking numbers to descriptions in ESMP to aid DIT in referencing the change request in its communication with departments.

## Scope and Objectives

This audit was performed as part of our fiscal year 2019 Annual Audit Plan and was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. This audit covered the period of July 1, 2017, through March 31, 2019, and our audit objectives were to determine whether:

- Policies and procedures were established for software application change management control processes.
- Authorizations for software application changes were documented and maintained.

- Changes to the application were tested and approved before moving to the production.
- Deployment of changes into the production environment were controlled and documented.
- Emergency changes were appropriately documented and approved.
- Software application changes were properly communicated, and staff receive sufficient training as needed.

## Methodology

Our audit approach included interviews of appropriate LDS and DIT staff to determine whether the controls were in place for software application change management processes. We reviewed the department policies to determine whether written policies and procedures were established for regular and emergency change requests. We sampled change requests from the scope period and performed tests to determine that change requests were reviewed, prioritized, authorized, and tested before deploying to the production.

The Fairfax County Internal Audit Office (IAO) is free from organizational impairments to independence in our reporting as defined by Government Auditing Standards. We report directly and are accountable to the County Executive. Organizationally, we are outside the staff or line management function of the units that we audit. We report the results of our audits to the County Executive and the Board of Supervisors, and IAO reports are available to the public.

## Findings, Recommendations, and Management Response

### Land Development Services

#### 1. Change Management Request

LDS developed a **Change Request Policy** that outlined the process for requesting and implementing system changes. However, the policy did not address procedures for emergency changes or user training responsibilities when changes affect the how the system is used. Additionally, the policy lacked an effective date and evidence of management approval.

An element of a good and mature internal control environment is that written procedures and internal controls that set forth the acceptable practices for staff to follow in managing department software application change management be properly authorized and reflect current operations. Procedural documentation provides clear guidance and accountability to staff to perform their job functions consistently.

The absence of formally documented policies and procedures increases the risk for inconsistent staff performance of procedures and controls and mismanagement of IT system changes. Additionally, the lack of written procedural guidelines can hinder management's ability to hold staff accountable for the performance of procedures. Finally, if procedures are not formally approved and dated, it increases the risk of unauthorized or outdated procedures circulating in the department.

**Recommendation:** LDS IT Services should update the **Change Request Policy** to include the following: 1) emergency change request procedures; 2) staff roles and responsibilities to train users when changes affect how they interact with the system; 3) department management approval of the policy; and 4) the policy effective date.

**Management Response:** LDS will update the **Change Request Policy** to document how emergency change requests will be reviewed, approved, and implemented with training best practices. The update will include details on staff roles and when staff will be trained. In addition, the **Change Request Policy** update will have a signature page, demonstrating approval by management, along with an effective date of the policy document. In the future, revisions to the **Change Request Policy** will be made as needed to ensure policies are always current. Staff will be advised of all revisions. The anticipated completion date is September 30, 2019.

## 2. Incomplete Change Request Authorization Documentation

We noted the following irregularities on 4 of the 5 change requests that we reviewed:

- The impact assessment performance was not evidenced or not performed for one change.
- Four of the change requests did not have LDS's approval of the change request documented on the *Change Request Form* as required.

The following chart shows the distribution of the irregularities among the 5 change requests sampled:

Sample	A	B	C	D	E
<b>Authorization Documentation</b>					
Impact Assessment	Y	Y	N	Y	Y
Priority Assessment	Y	Y	Y	Y	Y
Acceptance/Rejection noted on Change Request Form	Y	N	N	N	N
Accepted Change Request added to LDS SmartSheet	Y	Y	Y	Y	Y

Additionally, on the Change Request Form there is no explicit way to note a request has been rejected. Only approval of a change request can be noted on the form as currently designed.

The LDS **Change Request Policy** requires the staff to document the results of impact and priority assessment, approval/rejection, and completion of the change request on the Change Request Form and the LDS SmartSheet respectfully. Lack of documentation of change impact, authorization, and tracking increases the risk of improper changes being made to the system. Additionally, the historical record of the assessment and approval of system change was incomplete.

**Recommendation:** We recommend LDS reinforce with the IT Services staff the **Change Request Policy** requirements to document key assessment results, approvals/rejections and milestones in the change request process. Periodic secondary review of Change Request Forms and LDS Smart Forms should be done to ensure change requests are properly completed and authorized. Lastly, rejection of LDS change request should be explicitly documented on Change Request forms instead of having an unchecked field be the only indicator that a request was rejected.

**Management Response:** LDS will update the Change Request Forms and management will reinforce the importance of capturing all critical assessment results, approvals, rejections, and milestones as part of the change management process. An evaluation will be performed to make fields mandatory within our system change management system to ensure that key fields must be captured. Periodic reviews of the system change list will be performed to ensure that the change request is complete and accurate. Additionally, for the system change request form, a button to be used to signify system change requests that are rejected will be added, and the Send to “SmartSheet” checkbox will be updated to read as “Approved.” The anticipated completion date is September 30, 2019.

## **Department of Information Technology**

### **3. Unauthorized Changes**

Two of the change requests sampled were deployed to production without proper approval or authorization by the appropriate DIT staff. The change requests were entered into the ESMP and the change request ticket numbers were generated, however approval had not been noted in the system. Additionally, the change request tickets in the ESMP were not properly completed. The authorize, schedule, implement, review and closed information fields were not filled out in the ESMP.

DIT Procedural Memorandum No. 09, **Change Management for Production Systems C. Implementation Checklist** states: “Prior to movement to production, each change component will be reviewed by the IT Manager or designate to ensure that all changes were made in accordance with DIT or COTS vendor standards, and coordinate the movement of the approved changes to production.”

Improperly approved changes to a system increases the risk of a significant negative impact on security and overall data reliability. DIT Procedural Memorandum No. 09, **Change Management for Production Systems** was not properly followed and changes to a production system were deployed without required approvals.

**Recommendation:** We recommend Procedural Memorandum No. 09, **Change Management for Production Systems** requirements and procedures of moving changes to production be reinforced with DIT staff. Change request deployment should be reviewed and approved before being moved to production, and change request ticket should be closed in the ESMP after deployment. Open change requests in the ESMP should be regularly reviewed by DIT supervisors to ensure proper approval and completeness of information entered.

**Management Response:** DIT accepts this finding and will reinforce policies in PM-09 as requested. The anticipated completion date is ongoing but initially is October 31, 2019.

#### 4. Evidence of Test Approval

For three of the five sampled change requests (one was in progress and two were completed), DIT didn't retain the change request evidence of testing approval. For the change request in progress sampled, DIT didn't retain the change request test plan nor results documentation.

Per Procedural Memorandum No. 09, **Change Management for Production Systems**, DIT or COTS analysts and DIT project manager shall test and formally accept changes before movement to production for DIT supported systems. Programming or configuration and corresponding testing shall be in compliance with programming standards and procedures of DIT. According to best practice, a disciplined process for testing and approving new and modified systems before their implementation is essential and retaining the evidence and results of testing performed is key. DIT Procedural Memorandum No. 09, **Change Management for Production Systems** was silent regarding documentation that must be retained to support the testing performed.

Lack of proper documentation to evidence the appropriate testing of change requests reduces accountability and increases the risk that improper changes are introduced into the system through inadequate testing. The historical record of the testing of the system change was incomplete.

**Recommendation:** We recommend DIT update Procedural Memorandum No. 09, **Change Management for Production Systems** to define the documentation that must be retained to evidence the performance, results and approval of the testing of system changes. Staff performing the testing should be properly trained in these new procedure requirements.

**Management Response:** DIT accepts this finding and will revise PM-09 in Section C under “Testing” to note that approvals under this section shall be in writing. The anticipated completion date is October 31, 2019.

## 5. Change Management Policy

DIT Procedural Memorandum No. 09, ***Change Management for Production Systems*** was last revised in October 2018. However, the policy was not updated to reflect the December 2018 implementation of Enterprise Management System Portal (ESMP) DIT’s new change management system.

An element of a good and mature internal control environment is to have up to date written procedures and internal controls to clearly set forth the current acceptable practices for staff to follow in managing department software application change management. Procedural documentation provides clear guidance and accountability to staff to perform their job functions consistently.

Outdated formal documented policies and procedures can result in inconsistent staff performance of procedures and controls and poor handling and management of IT system changes. Additionally, the lack of current written procedural guidelines can hinder management’s ability to hold staff accountable for the performance of procedures.

**Recommendation:** We recommend DIT update the Procedural Memorandum No. 09, ***Change Management for Production Systems*** to reflect the ESMP implementation. Going forward DIT should ensure policy documents are updated periodically to reflect current operations.

**Management Response:** DIT accepts this finding and will revise PM-09 as requested by making a change in Section B-5 by removing outdated terminology and adding the current ESMP terminology. The anticipated completion date is October 31, 2019.

## 6. Change Management Process Improvement

During the review, we noted that DIT used ESMP system generated ticket numbers to track the deployment of change requests; and LDS used a separate self-generated number on their SmartSheet to track the change request submitted to DIT. Each department was using different unique numbers as a key identifier to track change requests; however, the numbers were not shared across departments to be able to reference the same transaction in the two tracking systems. The description or nature of the change request was used by the departments to reference the change request. Neither DIT nor LDS could enter each department’s key identifiers into their systems of records as they were not provided this information.

Establishing a key identifier to reference individual change requests across departments is critical. Without a unique identifier linking entries in the DIT system and department change request tracking system, the risk of error and miscommunication regarding changes increases. It could be hard for both departments to track the progress of change requests and ensure they are referencing the same request when communicating about similar requests.

**Recommendation:** We recommend DIT develop procedures to provide departments with the ESMP ticket number to aid the department in referencing the change request in communications with DIT. In addition, DIT should request department change request tracking numbers and add them to the description field in ESMP to be able to reference specific change requests in its communication with departments.

**Management Response:** DIT accepts this finding and will work with LDS to establish a process to implement. The anticipated completion date is ongoing but initially is December 31, 2019.