

A RECOMMENDATION FOR OPTIMIZING WORKFLOW PROCESS IN *WELLDEV* TEAM FOR ENHANCING PT. XYZ WORLD CLASS PERFORMANCE

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Abstract. *WellDev* is a team in PT XYZ which responsible to directly support oil production by preparing surface facilities for new wells. Since its roles play very important part to PT. XYZ reputation and performance, it is very important for *WellDev* Team to deliver the projects safely and timely. In general, surface facilities preparation works are divided into two major activities: preparing well pad location to accommodate drilling need and installing oil production facilities, such as piping and electrical facilities, so the newly drilled well can be put in production. *WellDev* Team's responsibilities starts from surveying new wells location as requested by AsDev team, designing new surface facilities, estimating and managing project cost, and managing execution of surface facilities construction. Major challenge this team face is the fluctuation of drilling schedule. This caused *WellDev* team must frequently shift its effort and priority in order to avoid costly drilling rig stand-by. Usually the team could fulfil this by preparing as many as possible well pad to be ready for drilling. However in the situation where resources are limited, this strategy might not be possible. This paper presents the recommendation for *WellDev* team to improve its performance in order to meet specified target set by company despite limited resources. Lean Sigma methodology is used to identify waste in the team's workflow process and identify the noise in current work practices. This paper will discuss deeply in Lean Sigma methodology conducted and improvement plan proposed by the initiative.

Keywords: Lean Six Sigma

Introduction

PT. XYZ is an oil and gas company which operates in Indonesia. Its operating areas are located in Riau Province, Sumatera Island. As oil and gas company, core activity in this company is to produce oil to meet target set by Indonesian Government and its parent company.

Oil producing activities involve many inter-related activities, start from exploration activities: to discover any new reservoir opportunity; production: to produce oil from known reservoir; processing: to process production fluid to become saleable crude oil; and transporting: to transport crude oil to customers. Each of the activities are managed by different departments in PT. XYZ. Each departments has its own roles and responsibilities to contribute to oil production.

WellDev is a team under Facilities Engineering Department in PT XYZ which responsible to directly support oil production by preparing surface facilities for new wells. In general, surface facilities preparation works are divided into two major activities: preparing well pad location to accommodate drilling need and installing oil production facilities, such as piping and electrical facilities, so the newly drilled wells can be put in production. *WellDev* Team's responsibilities starts from surveying new wells location as requested by AsDev team, designing new surface facilities, estimating and managing project cost, and managing execution of surface facilities

construction.

Since its roles play very important part to PT. XYZ reputation and performance, it is very important for *WellDev* Team to deliver the projects safely and timely. Major challenge this team face is the fluctuation of drilling schedule. This caused *WellDev* team must frequently shift its effort and priority in order to avoid costly drilling rig stand-by. Usually the team could fulfil this by preparing as many as possible well pad to be ready for drilling. However in the situation where resources are limited, this strategy might not be possible. This paper presents the recommendation for *WellDev* team to improve its performance in order to meet specified target set by company despite limited resources.

Conceptor Framework

Theoretical Foundation

Six Sigma is a philosophy and methods which are developed by Motorola in 1986. It is used by many companies such as General Electric and Motorola to eliminate defects in their products and processes¹. Defect is described as any component that doesn't meet with customer's specification limits. Six sigma improve the quality of process outputs by identifying and removing the causes of defects and minimizing variation. The term "six sigma process" comes from the notion that if one has six standard deviations between the process mean and the nearest specification limit, practically no items will fail to meet specifications.²

Six Sigma Methodology consists of systematic steps Define, Measure, Analysis, Improve, and Control (DMAIC). Detail explanation for each steps is shown in figure 1.



Fig. 1 Explanation of DMAIC Steps in Six Sigma Methodology

Lean Production is a method which focus on eliminating as much waste as possible. The basis of lean thinking came from Just-In-Time (JIT) production concepts developed by Toyota. Tools that are usually used in Lean methodology is Value Stream Mapping (VSM). It is a flowcharting tool used to visualize product flows through various processing steps. By this tool, team can determine if any activity has value added to whole process or not. Non value added activities can be eliminated to improve the whole process. Lean six sigma is combination of the implementation and quality control tools of Six Sigma with materials management concepts of *Lean Production*. The Lean Six Sigma methodology views lean manufacturing, which addresses process flow and waste issues, and Six Sigma, with its focus on variation and design, as complementary disciplines aimed at promoting "business and operational excellence"³

¹ Jacobs, F. Robert, et. Al. (2010). *Operations and Supply Chain Management*. US: McGraw-Hill Irwin

² Tennant, Geoff (2001). *SIX SIGMA: SPC and TQM in Manufacturing and Services*. Gower Publishing, Ltd.

³ Walshe, Kieran; Harvey, Gill; Jas, Pauline (15 November 2010). *Connecting Knowledge and Performance in Public Services: From Knowing to Doing*. Cambridge University Press.

1. Methodology

This study implements Lean Six Sigma methodology in order to improve *WellDev* Team performance. This study will cover D-M-A-I phase and provide recommendation as the output. Therefore, Control Phase will not be discussed in this paper.

3.1 Define

This phase was conducted by developing IPO diagram to visualize Input, Process, and Output. In order for *WellDev* Team to be able to perform its job, there are several aspects that required. Resources, Material, Machine, work flow and work process.

These aspects contribute much to *WellDev* Team performance which is measured as cycle time to provide well pad ready to drill and cycle time to put drilled well on production. IPO diagram is shown in fig. 2.

Work process in *WellDev* team are divided into two major activities:

- **WellPad Preparation:** The scope of this activity starts since *WellDev* Team receive notification from LandClear that the specific location has been encroached and ready to be constructed. This activity completed when “Ready for Drilling” notification was issued by ConstrMan Team to WellDrill Team. Most works on this activities are related with soil and earthworks.
- **Surface Facilities:** The scope of this activity consists of installing flow line and pipeline system, electrical & instrumentation system and finish when the flow line has been connected with well head and the well start producing oil (Put on Production).

Since many of *WellDev* activities are inter-related with other party, both internal of PT. XYZ or external (business partners - BP), it is very crucial to have clear work flow process to determine each party’s roles and responsibilities.

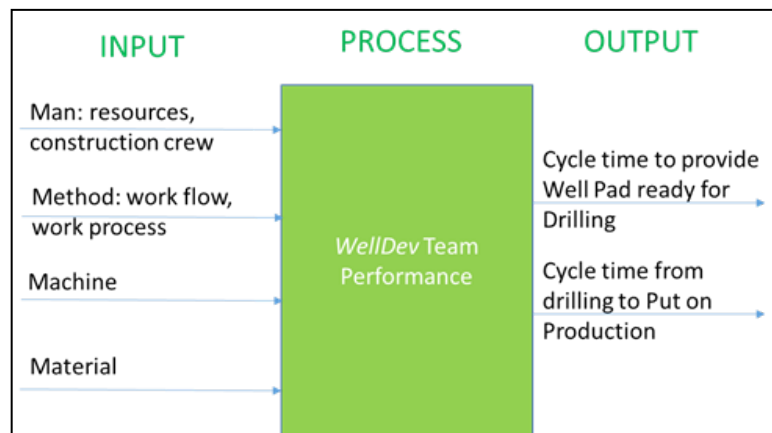


Fig. 2 IPO Diagram

3.2 Measure and Analyze

As a baseline, measurement was conducted by recording date of each activities for the last 6 months. Because of confidentiality concern, data shown here are not actual data, however still represent the actual condition. The duration data is part of Swim Lane diagram of both WellPad Preparation Activities and Surface Facilities Activities as shown in Figure 3 and 4 in yellow triangle symbol (duration in days).

As shown in Swim Lane Diagram, oil producing activities are conducted by many teams in PT. XYZ. Roles and responsibilities of each teams are as follow:

- AsDev Team – PT XYZ: responsible to determine new wells candidate. AsDev Team feeds this data to WellDrill Team and LandClear Team.
- WellDrill Team – PT XYZ: responsible to schedule drilling sequence for new wells as fed by AsDev Team. WellDrill also responsible on drilling process itself.
- LandClear Team – PT XYZ: responsible to indemnify or encroach the location in which the new wells will take place. Some of the location might be belong to public/communities, in which LandClear team to made purchase/payment or location which belong to PT XYZ but being utilized by surrounding people for palm plantation, housing, etc. In this case, LandClear Team will make compensation payment to this people.
- InitCompl Team – PT XYZ: responsible to conduct initial completion for drilled wells.
- Contract Team – PT XYZ: responsible to maintain contracts for survey, drafting and construction activities. Construction contractor resource allocation will based on this team's decision and assignment.
- ConstrMan Team – PT XYZ: responsible to manage construction work in the field.
- Contractor Survey – BP: responsible to conduct survey and create construction drawing for WellPad Preparation works.
- Contractor Drafting – BP: responsible to create construction drawing for Surface Facilities works.
- Supervision Contractor – BP: responsible to supervise construction work at field, supporting ConstrMan Team.
- Construction Contractor – BP: responsible to construct WellPad and Surface Facilities as ordered by PT XYZ thru construction drawings.

As mention in IPO diagram, *WellDev* Team performance is measured as cycle time to provide well pad ready to be drilled, and cycle time to put new well on production (measured since Land Clear Notification received).

Based on Swim Lane diagram in fig 3 and 4, the current cycle time to provide well pad ready to drill is 51-60 days and cycle time to put new well on production is 75-90 days.

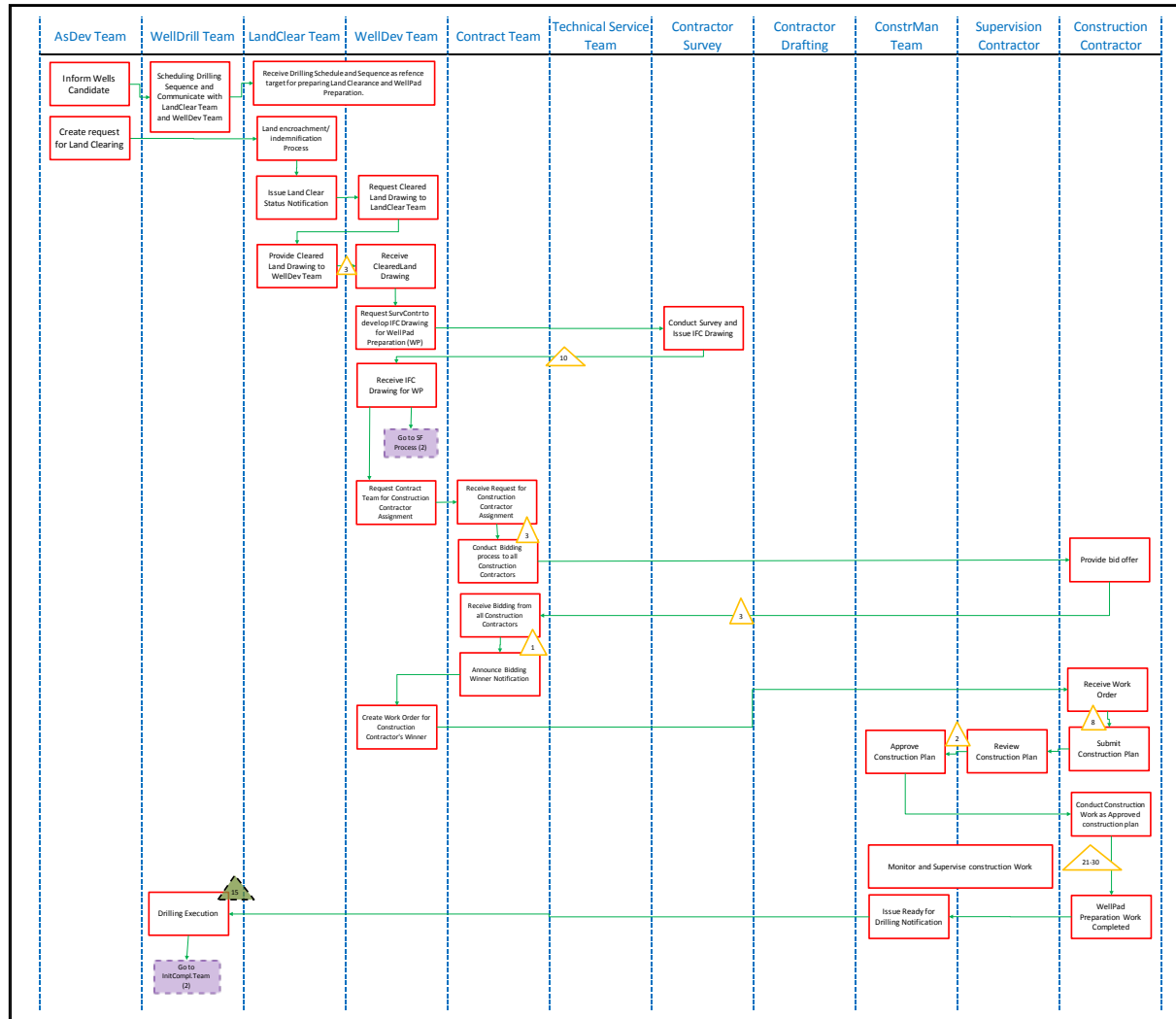


Fig. 3 Swim Lane Diagram WellPad Preparation Activities

From existing workflow, there are many possible improvement can be made to shorten the cycle time of both activities. Shorten cycle time leads to faster oil production and reduce the possibility of drilling rig stand by which can cause thousands of dollars per day.

In WellPad Preparation activities, it is indicated that there are some activities can be done in parallel, shorten in duration or even deleted from the work flow. Same cases exist for surface facilities activities.

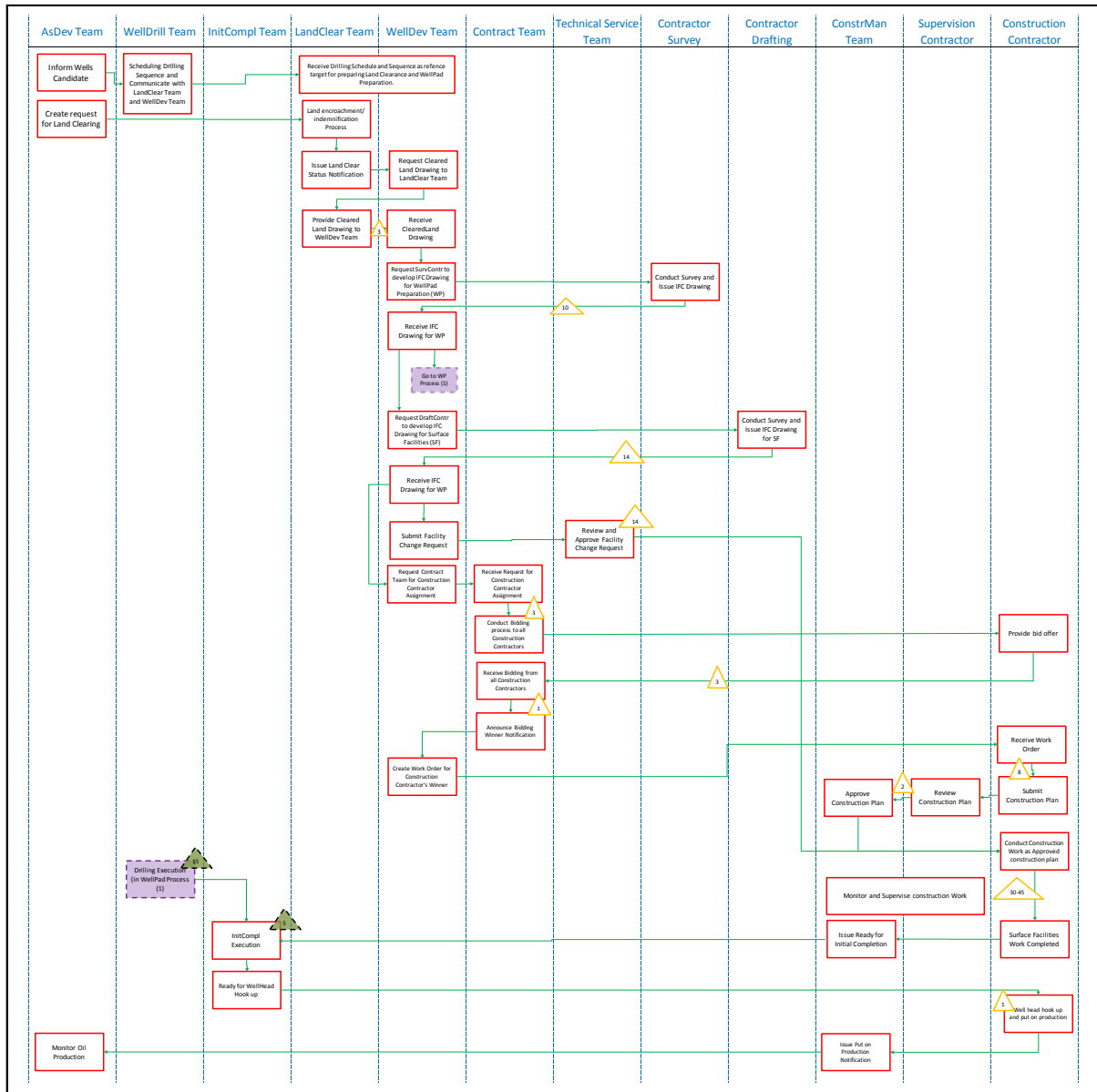


Fig. 4 Swim Lane Diagram of Surface Facilities Activities

3.3 Improve

In WellPad Preparation activities, below are potential improvements can be implemented to improve the workflow:

- Improve land clear notification by LandClear team to also provide cleared line drawing. This will remove 3 days waiting time for requesting and receiving cleared land drawing.
- Construction contractor can start preparing construction plan when WellDev Team issues request to contract team (parallel with bidding process by contract team). This will reduce 7 days waiting time for developing construction plan.

This improvement save 10 days on WellPad Preparation activities, thus WellPad Prepration activities can be done within 41-50 days only. New workflow based on this improvement can be seen in Fig. 5.

Improved process is shown in textured box.

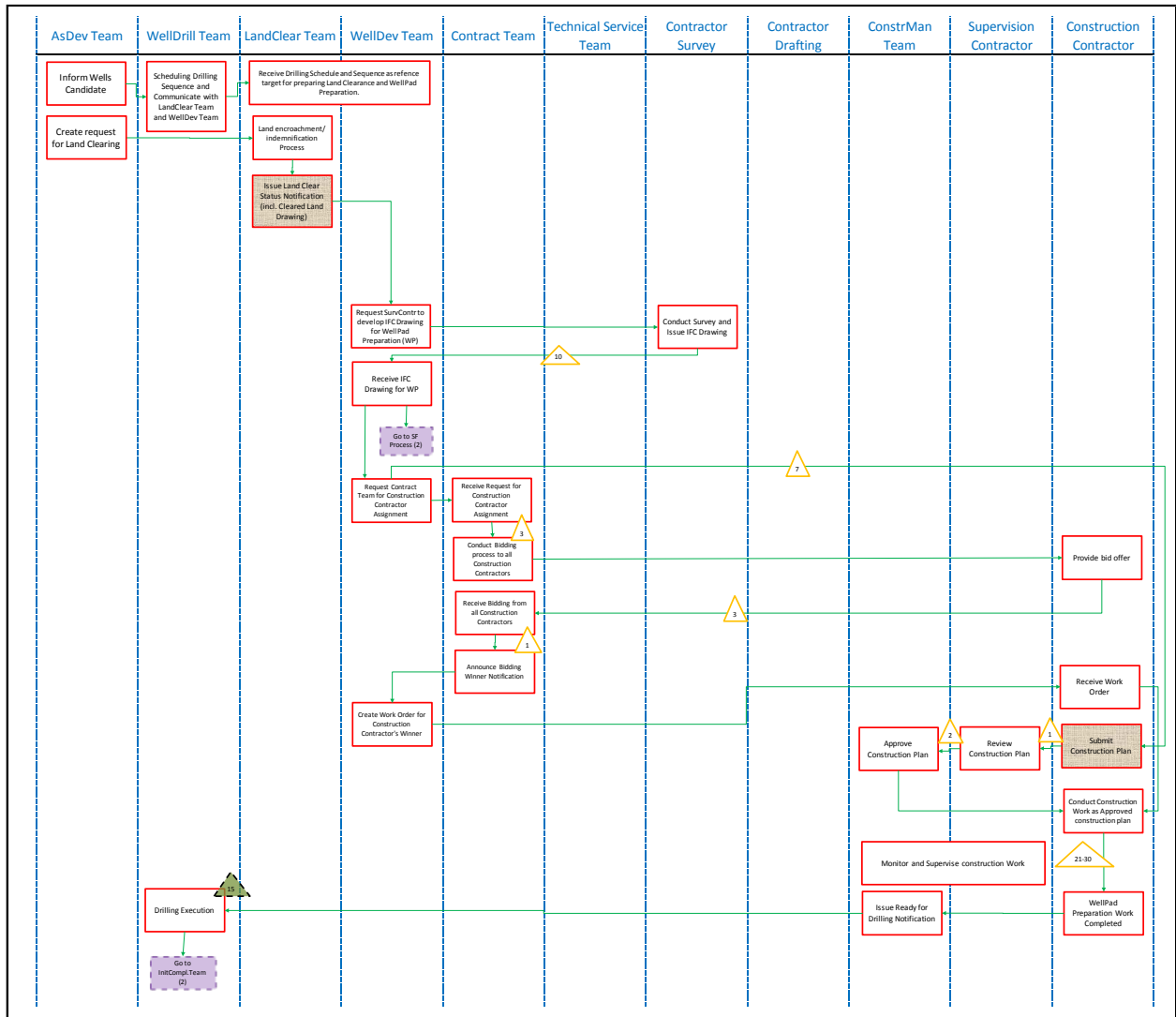


Fig. 5 Swim Lane of WellPad Preparation Activity – After Improvement

In Surface Facility activities, below are potential improvements can be implemented to improve the workflow:

- Improve land clear notification by LandClear team to also provide cleared line drawing. This will remove 3 days waiting time for requesting and receiving cleared land drawing.
- Contractor drafting can prepare construction work for Surface Facilities in parallel with Survey contractor. This will reduce 10 days for developing construction drawings.
- Construction contractor can start preparing construction plan when WellDev Team issues request to contract team (parallel with bidding process by contract team). This will reduce 7 days waiting time for developing construction plan.

This improvement save 20 days on WellPad Preparation activities, thus WellPad Preparation activities can be done within 55-70 days only. New workflow based on this improvement can be seen in Fig. 6. Improved process is shown in textured box.

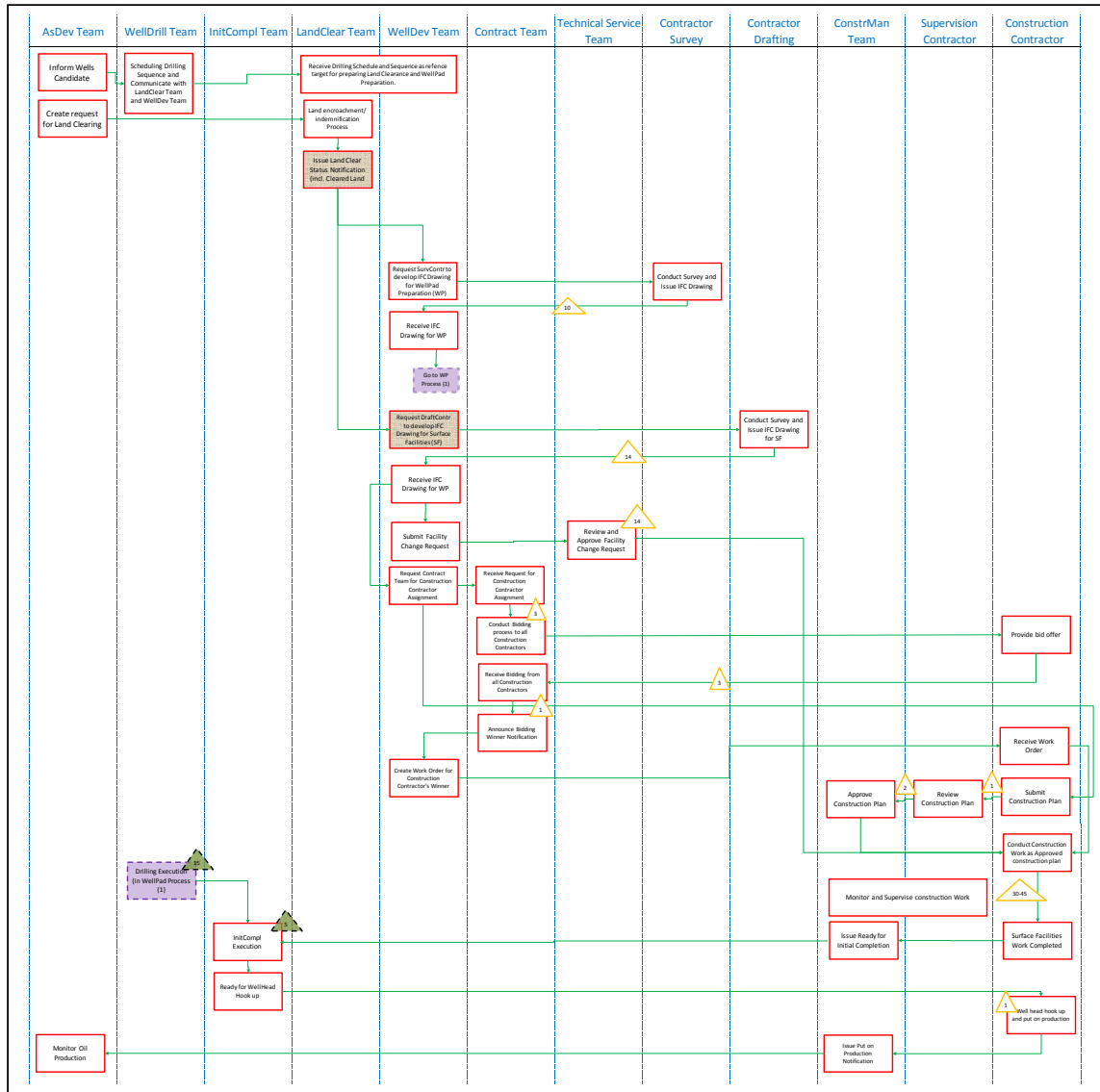


Fig. 6 Swim Lane Diagram of Surface Facility Activities – After Improvement

2. Discussion and Recommendation

Based on study conducted, there are some improvements can be implemented in workflow processes that relates to *WellDev* Team activities. Since *WellDev* work heavily connected to other team's work, clear and concise work flow is very crucial to achieve effective and efficient work in oil production effort.

The recommendations for WellDev team are as follow:

- Improving work flow process in WellPad Preparation activities which can reduce 10 days on WellPad Preparation activities (+/- 20%).
 - Improve land clear notification by LandClear team to also provide cleared line drawing;
 - Construction plan development parallel with bidding process.
- Improve work flow process in Surface Facility activities which can reduce 20 days on Surface Facility activities (+/- 27%).
 - Improve land clear notification by LandClear team to also provide cleared line drawing;
 - Construction drawings for Surface Facility activities is developed in parallel with WellPad Preparation drawings;
 - Construction plan development parallel with bidding process.

3. References

- [1] Jacobs, F. Robert, et. Al. (2010). *Operations and Supply Chain Management*. US: McGraw-Hill Irwin
- [2] Tennant, Geoff (2001). *SIX SIGMA: SPC and TQM in Manufacturing and Services*. Gower Publishing, Ltd.
- [3] Walshe, Kieran; Harvey, Gill; Jas, Pauline (15 November 2010). *Connecting Knowledge and Performance in Public Services: From Knowing to Doing*. Cambridge University Press.