





## PLANNING OF GEOTHERMAL PROJECTS IN KENYA

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#### **ABSTRACT**

The project cycle for the geothermal projects as implemented by KenGen comprises four phases and nine steps. The phases are resource exploration, resource assessment, plant construction and operation phases. The exploration phase is further subdivided to three development steps: existing data review, detailed surface exploration and exploration drilling. The resource assessment phase is divided into two steps: appraisal drilling and feasibility study. The construction phase comprise two steps; production drilling and construction of the steam gathering pipe network, power plant and transmission line construction. The work plans developed are used by the execution team as a road map to power plant commissioning which is the ultimate development objective and are also used for soliciting for funds from funding institutions. The planning entails scheduling of the various activities comprising the project activities and how they interrelate. The activities comprise the legal or regulatory requirements, procurement processes that include seeking for KenGen's and funding institution approvals, activities of the funding institutions leading to credit award and the actual site works. The planning aims at optimizing time, cost and procurement of human capacity not resident within KenGen's staff within the legal, regulatory and policy framework existing for each specific project. Project planning computer programs are used particularly Microsoft Project and the key planning outputs are Gantt charts, procurement plans, budgets, cash flow plans and progress reports.

#### 1. INTRODUCTION

## 1.1 Definitions of work plans

Work plans may be defined as a series of interrelated tasks and activities which when implemented successfully will realize the goals and objectives of a specific project.

#### 1.2 Why project plan

Project planning is an aspect of project management. Project management, a professional discipline, may be defined as "the overall planning, coordination and control of a project from inception to completion aimed at meeting a Client's requirements in order to produce a functionally and financially viable project that will be completed on time within authorized cost and to the required quality standard" (Pearson Education Limited, 1999).

The above definition is more applicable to perspective of the appointed project manager. However, the project plans serve various purposes to various parties involved with the project.

### 1.2.1 Project owner

Geothermal projects require colossal sums of money to implement. Very few individual institutions and third world governments can implement a sizable geothermal project from internal resource without resulting to soliciting for external funding. Therefore a project plan provides the owner with total project cost, project development period where the project will not make money, cash inflows and outflows and likely profitability. These data is very important for the owner as they approach prospective financiers.

### 1.2.2 Financiers

Banks are very willing to loan out funds. However, they are averse to adverse risk exposure. They will evaluate a long list of potential risks and in particular administration risks and projected profitability as a basis for servicing of the loan to be advanced. Often times, bilateral and multilateral financial agencies have required engagement of consultants to enhance project management functions. A well packaged project plan assures the banks of a capable project management team. The project plans also provides the banks with an instrument for economic and financial project evaluation. The work plans act as a basis for owner's contractual obligations with the bank and a reference for project progress evaluation and monitoring.

# 1.2.3 Project execution management team

To the execution team, the work plans are the road map for the project implementation. They capture the projects concepts, requirements, identifies what needs to be done, assigns responsibility to those who will do what needs to be done, defines how it will be done and identifies and assigns the requirements to enable the work to be done. In many times they also identify the authorities and approval to be sought in the process of the project implementation.

The work plans further highlights the milestones that must be achieved and thereby identify the critical aspects of the project. They also act as instruments of communication. In addition, they serve as instruments of performance measurement and control. Regularly the project implementation progress is assessed against the set out milestones in the work plan and where discrepancies occur adjustments are made. On the other hand costs are monitored to ensure that the project has sufficient funding and to address any budget overruns.

#### 1.2.4 Resource persons

They are a reference for level of performance requirement and additional departmental planning.

## 1.3 Project cycle

A project is time-bound, with definite start and a finish date. A project cycle can be thought as a sequence of logically linked activities in which each is necessary and is a prerequisite for the next stage in the cycle. Project generally grouped into five distinct categories (Figure 1).

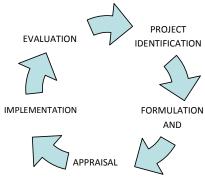


FIGURE 1: Project Cycle

### 1.3.1 Project identification

Identification is the very beginning of the project cycle. At this point the project is defined in very general terms. In many times, at this step, there more questions than answers.

### 1.3.2 Project formulation and preparation

This stage includes pre-feasibility and feasibility stages. It involves a consideration of all aspects namely; technical, financial, economic, social, cultural, managerial and political aspects. The basic rational of the project is thus examined at this stage especially to identify obvious reasons why the project may not or is unlikely to go on.

## 1.3.3 Appraisal

Appraisal stage is when detailed project is undertaken especially, where donors are involved, they will involved there technical team, internal staff or consultants, and the resulting plan will be implemented.

### 1.3.4 Implementation

This entails the execution of the agreed works plan.

#### 1.3.5 Evaluation

Where donors are involved, project evaluation is carried to identify lessons learned. In particular the evaluation will refer back to the project objectives and the work plans and establish whether the objectives were met and if the work plan were appropriate.

The work plans are a result of the work done during project formulation and preparation and the appraisal. It is prudent to note that the works plans provide value to the entire project phases.

## 1.4 Project parameters

During a projects life, management focuses three basic parameters; quality, cost and time (Figure 2). However, for those working in donor funded and government owned projects must addition factor in the law, policy, rule and

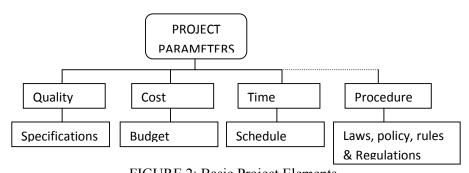


FIGURE 2: Basic Project Elements

regulations which can derail the project if not observed. These parameters must be specified in detail during the planning of the project and are to be adhered to during implementations. These parameters are addressed through specifications, budgets, time schedules and the various policies, rules and regulations applicable to a specific project.

## 1.5 Key project inputs

Projects use specific inputs (resources) to produce particular outputs over a specified time period in order to meet an identified development need of clearly identified target group. The key project

resources are people, equipment and materials. The work plans identify, plans for, costs and optimizes the use of each of the resources.

## 1.6 Planning process

The crucial phase involves the breaking down of the various activities and tasks required to complete the project along the three basic parameters while taking to consideration of the law, policy, rules and regulations. The steps involved in planning include:

- Establish the project objectives
- Choose a basic strategy for achievement of the objectives
- Break the project down into subunits of task and activities
- Determine the performance standards for each subunits
- Determine how much time is required to complete each subunit
- Determine the proper sequence for completing the subunits and aggregate this information into a schedule for the total project
- Determine the cost of each subunit and aggregate costs into the project budget
- Determine the staff organization, including the number and kind of position and the duties and responsibilities of each
- Determine what training, if any is required for project team members
- Identify the applicable laws, policy, rules and regulations

#### 2. REVIEW OF THE DEVELOPMENT PHASES

Mwangi (Mwangi, 2007) has reviewed the planning concept used in geothermal project planning in Kenya. The entire geothermal project cycle can be summarized as shown in Figure 3 (Price Water House Coopers, 2007). There are four major phases and nine key steps in the development of geothermal project.

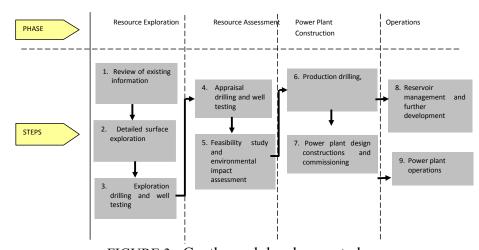


FIGURE 3: Geothermal development phases

#### PHASE 1: RESOURCE EXPLORATION

### **Step 1: Review of Existing Data**

**Objective:** The objective is to collate available data gathered overtime by various agencies

involved in studies and research with the aim of identifying gaps on the information

base and strategizing on further works.

Scope of work: This entails a desktop review and analysis of existing data by various disciplines of

earth sciences (geology, geophysics and geochemistry) and engineering (surface

heat measurement).

**Duration**: The duration for this step may only be a month. Various disciplines would be

involved.

Organization: KenGen has an in-house capacity and carries out this exercise

Output: An inception report would result detailing the information gap and the detailed

program for undertaking surface exploration.

Costs: The cost is negligible

## **Step 2: Detailed surface exploration**

**Objective:** The objective is to define the resource by its key system characteristic namely:

existence of a heat source in the form of hot magmatic body near earth surface, existence of hydrological system, its characteristics (i.e. flow direction) and

geological structures controlling it and area extent of the prospect.

Scope of works: This entails field measurements, sample collections, laboratory tests, studies and

analysis by various disciplines of earth sciences (geology, geophysics and geochemistry) and engineering (surface heat measurement). In addition, baseline

environmental studies are undertaken.

**Organization:** KenGen has internal capacity that carries out this step. It also engages consultants

to offer peer review services.

**Duration:** For most fields, surface works takes about three months.

Out Put: The main output from this step is a conceptual model of the geothermal system and

siting of the discovery (exploration) wells.

Cost: The budget for this step has been within US\$ 0.5 million per prospect.

## Step 3: Exploration drilling

**Objectives:** The main objective is to prove the resource inferred by the geoscientific studies by

drilling a discovery well at the best point according to the conceptual model and

confirm the results with one or two additional wells.

Scope of work: This step marks the beginning of the physical development on any prospect. The

key activities in this step include:

• Main access road and drill pad construction

• Establishment of drilling water and pumping installation. The pumping may be powered by diesel driven generators or electricity where economically accessible.

 Acquisition of land entry rights through negotiation for compensation or purchase

- Other logistical requirements e.g. accommodation, storage, security, offices etc.
- Drilling and testing of three exploration wells.
- Acquisition of environmental license.

**Organization:** For short distances of access roads, KenGen has internal capacity and undertake the

civil works. For long stretches of access road, KenGen contracts out the earth works. The water installation works are also contracted out except operating and maintenance of the plants, which is done in-house. The drilling works can either be contracted or carried out internally depending on rig availability. The application

for environmental clearance is done in-house.

However, KenGen engages consultants for peer review.

Output: Resource discovery by discharging wells and most importantly a go or no go

decision for further development.

**Duration:** One year is allowed to undertake the initial logistical requirements. These include

opening the area up by construction of roads, establish water supply system from surface sources or drilling of borehole and the related pipeline , pumping system

and power sources. The time allows acquisition of land access rights and the compensation processes. Drilling requires storage facilities and security systems e.g. fencing, store house or containerized storage. Within the same period, procurement of overseas materials is carried out and contracts for provision of local materials made. The materials may require some advance preparation e.g. slotting. Six months is allowed for the actual drilling.

Cost:

For the advance logistical requirements, a budget figure of US\$ 5.2 million is allowed. The well cost are estimated at US\$ 4.3 million per well using KenGen rigs. However, the actual cost for this step varies from one prospect to another.

#### PHASE 2: RESOURCE ASSESSMENT

## Step 4: Appraisal drilling and well testing

Objective: Appraisal drilling follows a successful drilling exploration program. It is aimed at:

- Sizing the resource in terms of possible output necessary for power plant sizing;
- Determining well productivity characteristics (average fluid output per well and steam fraction) necessary for determining cost of investments and drilling requirements.
- Determining the reservoir fluids characteristics in particular, pressure at the surface (wellhead), dissolved solids that may lead to deposition and dissolved gas content which impact power plant designs and performance.
- Proving a certain fraction of required steam for a plant as a precondition for funding

**Scope of work:** 

The standard practice for KenGen is to drill and test six appraisal wells and may increase this number to nine if necessary.

**Output:** All the

All the above data is obtained in preparation of feasibility study. Data and go or no

go decision

**Organization:** 

The drilling is carried out in-house if KenGen has an available rig but KenGen may contract a rig but manage the drilling process. KenGen has in recent past contracted drilling consultancy and supervision to beef up its capacity. The additional civil works are carried out in-house. Where earth moving equipment shortages are encountered, these are hired on short contracts.

**Duration:** 

The total duration takes about 15 months. Drilling takes about 12 months while testing of the last well is allowed 3months to heat up and be flow tested.

Costs:

The well costs is estimated at about US\$ 4.3 per well including the civil works. Testing is estimated at US\$ 40, 000 per well

#### **Step 5: Feasibility study**

**Objective**: The main objectives of the feasibility studies are:

- Matching existing power plant technologies to resource characteristics and establish a preliminary design
- Carrying out a financial and economic analysis to establish project viability
- Identifying resource management issues that will arise during exploitation and how to mitigate them
- Undertaking environmental impact study scoping

Scope of work:

This is mainly a desktop study. It essentially collates all the data so far accumulated and relates it to the proposed power project. One key aspects taken to consideration

is simulation studies establish sustainable resource exploitation and coming up with

the preliminary design parameters

Output: Bankable feasibility study which KenGen and funding institutions would use for

funding purpose. In addition the feasibility study proposes the appropriate

technology to be used to optimize the resource.

**Organization:** This step has been contracted to consultants especially because of the comfort of the

lending institutions. However, both KenGen's Board of Consultants and KenGen

staff would review the reports.

**Duration**: The feasibility study is allowed a six months period.

**Costs**: This may take up to US 2 million depending on the scope of the project.

#### PHASE 3: POWER PLANT DEVELOPMENT

### **Step 6: Production drilling**

**Objective**: At this stage of development, a decision to construct a plant is already made. The

drilling is therefore to provide sufficient steam to run the plant. Additional wells are drilled for reinjection purpose. One reinjection well is required for every 4

production wells.

Scope of works: There would be additional civil works to provide additional access roads and site

construction. Wells would be drilled to provide sufficient steam plus about 10% excess at start-up. The wells would be tested. Procurement activities would

continue in this step.

**Organization**: All civil works would be carried out in-house. Drilling would be carried out both

in-house and through contracts depending on rigs availability. Well testing would be carried out in-house. A drilling consultancy and supervision may be considered

to offer support to the existing drilling management staff.

**Duration:** Allows 60 days per well and is subject to the number of wells to be drilled. For

estimation purpose, we assume exploration will be 50% successful, appraisal 75% successful and production wells 90% successful. For 140 MW plant allowing 10% excess steam at start-up we require 25 production wells. The duration will be 4

years using one rig and 2yrs with two rigs.

Costs: The well costs is estimated at about US\$ 4.3 per well including the civil works.

Testing is estimated at US\$ 40, 000 per well.

## Step 7: Power plant design, construction and commissioning

Objective: Detailed design, procure and construct the steam gathering system, power plant

substation and transmission lines

Scope of works: Design, procure, construct, commission the plant and undertaking a comprehensive

environmental impact studies.

Organization: KenGen appoints a project team. The project team contracts a consultant to

supervise the construction contractor. KenGen and the consultants tender, shortlist and contract a contractor(s). The contractor designs, procures and install the plants

and its accessories. KenGen would carry out the full EIA.

**Duration**: It takes about 30 months to construct the power house, manufacture and ship the

turbine and their accessories. The steam field and the transmission lines will be

constructed in parallel.

**Cost**: The power plant including the power house and all that goes into the power plant

are estimated at US\$ 2.5 million per MW for plants less than 50 MW, US\$2.3 million those between 50 and 100 MW and US1.8 Million for plants size larger than 100 MW. The steam pipeline cost is estimated at US\$ 25 million for a 70 MW

plant and US\$ 37.5 million for a 140 MW plant.

## **Step 8: Reservoir management**

**Objectives**: Monitoring to ensure steam availability to the plant, monitor pressure drawdown

and scaling problems.

**Scope of Work:** Entails regular measurement of well productivity, wellhead pressure and chemical

composition of the well effluent. It may involve tracer injection and cold re-

injection activities.

**Organization**: This is carried out internally.

**Duration**: Will be carried out for the entire operation period of the plant. **Cost**: Will greatly vary. This is operations and maintenance cost.

## **Step 9: Operations**

**Objective:** This entails the operations and maintenances of the power plant to ensure

continuous generation.

**Scope of works:** This will include operation of the plant on a 24hr basis, regular maintenance and

scheduled overhauls over the plant life.

**Organization:** It is carried out internally. The staff requires to be trained for the plant operations.

**Duration:** Plant life

**Cost:** Operation and maintenance cost

### 3. LAW, RULES AND REGULATIONS

## 3.1 Geothermal Act, 1982

The act provides:

- For the purpose of exploration, the Minister of Energy authority in writing is required whose life is one year and may be renewable (Part II, Clauses 6).
- Reasonable notice of the intention to enter upon any land shall be given to the owner or occupier of the land.
- One needs to apply for geothermal license for the purpose of exploitation. The application to be accompanied by a fee. The life of the license is not greater than 30 years (Part II, Clause 7).
- The land owners shall be compensated for the losses incurred pursuant to geothermal development (Part IV, Clauses 18 23).

### 3.2 Environmental management and co-ordination act, 1999

The act provides:

- No project will commence without submission of a project report.
- The National Environmental Management Authority (NEMA) will evaluate the report and if in their opinion it will have major impact, the project owner will be required to carry out an environmental impact assessment study (EIA).
- The report is submitted back to NEMA with a fee.
- The Authority shall respond to the application within three months without which the applicant may proceed.
- Upon receipt of the EIA document, NEMA shall cause a notice to be published in the official government news print, the Kenya Gazette including a local newspaper.
- Nema will allow the public sixty days perusing and objecting to the proposed project. This period may be extended if an individual applies for extension.

• Only when the public and the Authority is satisfied, will the Authority issue an EIA licences

## 3.3 The public procurement and disposal act, 2005

(LEGAL NOTICE No. 174, Kenya Gazette Supplement No. 92, 29th December, 2006, Legislative Supplement No. 53)

This Act applies to any body in which the Government has a controlling interest. In summary the act requires that:

- All international tendering will be allowed 30 days to prepare tender. If one was to use prequalifications one has to allow at least 14 days to prepare the prequalification documents. This require advertisement in the local and where possible international journal etc.
- National tendering requires bidders to be allowed at least 21 days to prepare their bid. In addition if the projected cost is estimated over Kshs 6 million (US 0.75 million) for goods and works and US\$ 0.375 million for services will require to be advertised in the local newspapers.
- The tender documents are evaluated by a committee and approved by an official tender committee.
- The contract cannot be signed before 14 days after award to allow for complaints and appeal to the award.

# 3.4 Funding institution rules and regulations

# 3.4.1 Funding cycle

Receiving funding from donors follow a process that take about a year and may last longer. The process begins with project identification, formulation and appraisal. The funding for the project would then be presented for approval. The approving board meets once every about 4 to 6 months. After the approval, it still takes time to carry out financial negotiation

## 3.4.2 Procurement regulations

Prior to publication or invitation to pre-qualify or tender, the following documents are often time submitted to the funding institution for a approval without which the process may not be funded under the credit. These are:

- Invitation to tender
- Selection criteria for qualification (in detailed form)
- Tender documents, including specimen contract
- Draft notice specifying the fees for the purchase of the tender documents and their utilization, as well as list of the media in which the notice is to be published

In processes with pre-qualification, the following documents have to be submitted to the funding institution for comment prior to the invitation to tender:

- The evaluation report of the qualification, including the certificate or opinion of the consultant
- The recommendation on the list of bidders to be invited to tender

In processes with post-qualification, the following documents have to be submitted to funding institution for comment prior to the opening of the bids:

• The evaluation report of the qualification, including the certificate or opinion of the consultant

• The recommendation on the list of bidders whose financial bids are to be opened.

Prior to the award of the contract, the following documents are to submitted the funding institution for comment:

- The signed record of the bid opening
- The evaluation report
- The recommendation on the award
- The certificate or opinion of the consultant on the recommendation of the award
- If applicable, an explanation why the binding period could not be observed
- At the request of funding institution, if applicable, all or specific bids.

In addition the funding institutions require that the bidders be allowed at least 30 days to prepare prequalification bids and at least about 45 days to prepare actual bids.

#### 3.5 The water act

The water act provides that authority is required for abstraction of water whether from surface bodies or underground. Geothermal projects require water for the drilling process and also the mining of the geothermal fluids falls within this categorization. This process requires an application to be made. A regional board would then consider the application and grant approval. This can take over six months.

#### 4. SCHEDULING

As stated above a project has a specific start and finish date. The above information is generic and needs to be customized for a specific project. This activity is called scheduling. The steps involved in scheduling are:

- Enter the project phases, milestones and tasks into table on a paper, white board, a spreadsheet, or word processor. You may also enter the data into a Gantt chart or network diagram
- The next aspects is to calculate dates, start and finish for each activity and enter them in the table
- Link tasks with their appropriate relationships to one another. Note that some tasks cannot begin until certain previous undertaken task has been completed. Again certain tasks compete for resources hence a certain task may not begin until a limited resource is available.
- Review the program so as to take care of any deadlines and other date constraints
- Assign resources to the various tasks and optimize the resources so as not to over allocate resource thereby creating conflict or under allocate resources which leads to higher project costs
- Establish the budget for the project;
- It is increasing becoming a requirement to have a separate procurement plan. Hence one would extract the aspects of procurement from the main plan.

For a simple project, working with a paper or white board may be adequate. However, geothermal projects take many years and have very many interrelated tasks. In addition, optimization of the project plan requires working forward and backwards and can be very taxing. Several computer programs exist that aid the planners in the optimization of the work plans. The programs in particular aid the planners to:

- Calculate the start and finish dates
- Indicate whether assigned resources are actually available

- Inform you if the assigned resources are under allocated or overworked
- Alert you if you have an upcoming deadline
- Calculated the budget for you once the cost have been included in the program
- Help you to manage and control the project by highlighting activities that have not started after their start date and those that are delayed
- The programs enable the planners to get customized reports in different views e.g. Gantt, network diagram and table

Examples of the project planning computer programs are:

- Microsoft project
- Primavera
- Smart Draw

There are many others that could be found in the internet. In KenGen, Microsoft Project Software is widely use and in limited cases Primavera. The key outputs of interest to KenGen have been Gantt charts, procurement plans, budgets, cash flow plan and progress reports. A typical plan is shown in the appendix.

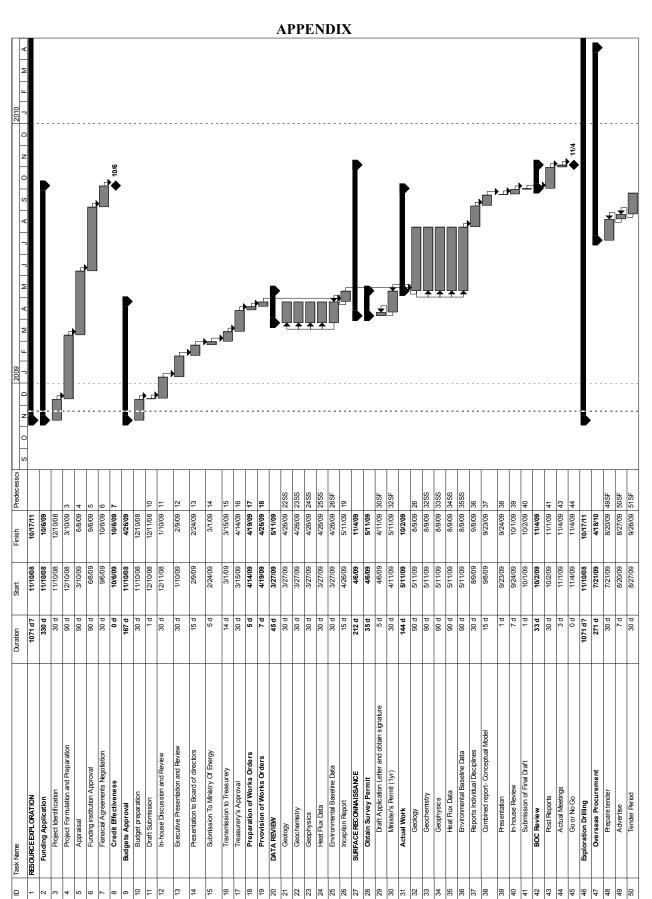
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<u> </u>	lask Name	Dalation	Sidil	2		
51	Evaluation	5d	60/56/06	10/1/09	52SF	
25	Approval	P9	10/1/09	10/6/09	53SF	···
53	Aw ard & Appeal Period	14 d	10/6/09	10/20/09 8	80	
25	Delivery	180 d	10/20/09	4/18/10	53	
22	BA Licens e acquisition	167 d?	1/1/10	6/17/10		
26	Pepartion of Project Report	15 d	1/1/10	1/16/10	57SF	
22	Submission of Project report	1 d?	1/16/10	1/17/10	58SF	
28	Review By NEWA	9 OE	1/17/10	2/16/10 59SF	59SF	
26	Undertake EA	45 d	2/16/10	4/2/10	60SF	
09	Submit	1 d?	4/2/10	4/3/10	61SF	
61	Advertise	14 d	4/3/10	4/17/10 62SF	62SF	
62	Public Review	p 09	4/17/10	6/16/10	63SF	
63	Obtain Licence	1 d?	6/16/10	6/17/10 83SF	83SF	
26	Acquisition of Land Rights	225 d	11/4/09	6/17/10		
99	Identification of Owners	15 d	11/4/09	11/19/09	45	
99	Approaching the Owners	15 d	11/19/09	12/4/09 65	92	
29	Engage Owners into negotiations	P 06	12/4/09	3/4/10	99	
89	Apply for approval	90 P	3/4/10	4/3/10	29	
69	Enter into agreements	45 d	4/3/10	5/18/10	89	
02	Pay Compensations	90 Q	5/18/10	6/17/10 69	69	
71	Water Abstraction License	125 d	11/4/09	3/9/10		
	Comile Application	1	11/4/09		45	<b>&gt;</b>
1 62	Paviau hy WaterManagement Board	0 0	11/9/09		2 2	
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74	Obtain License	P 0E	2/7/10	3/9/10	73	
75	Contract Earth Works	297 d	12/22/09	10/15/10		
9/	Prepare tender	30 d	12/22/09	1/21/10	77SF	
77	Advertise	p.2	1/21/10		78SF	
8/	lender Penod	30 d	1/28/10	2/27/10	79SF	
2 8	Evaluation	D .	01/12/2	3/4/10	9101	
08 3	Approval	50	3/4/10	3/9/10	81SF	
50	Award & Appeal Period	14 d	3/9/10		4/	
82	Wblitzation	21 d	3/23/10	4/13/10	81	
83	Road and Site Costruction	p 06	6/17/10	9/15/10 82,70	82,70	
\$	Construct storage facilities and temporary offices	P 06	1/12/10	10/15/10	83SS+30 d	
82	Establish Water Supply System	2p 689	11/10/08	9/30/10		
98	Survey Sources of Water	15 d	11/10/08	11/25/08		
87	Water Abstraction License	125 d	11/25/08	3/30/09		
88	Compile Application	2q	11/25/08	11/30/08	98	<u> </u>
68	Review by WaterManagement Board	P 06	11/30/08	2/28/09 88	88	
06	Obtain License	90 g	5/28/09	3/30/09	88	
91	Drilling Of Water Bore holes	293 d?	6/16/09	4/5/10		
95	Prepare tender	90 g	6/16/09	2/16/09	93SF	
93	Advertise	P.2	2/16/09	2/23/09	94SF	
8	Tender Period	90 g	2/23/09	8/22/09	95SF	
96	Evaluation	P9	8/22/09	8/27/09	96SF	•
96	Approval	P9	8/27/09	8/1/08	97SF	
26	Aw ard & Appeal Period	14 d	9/1/09	9/15/09	98SF	
86	Mbbilization	21 d	8/12/09	10/6/09	99SF	
66	Actual Drilling	p 06	10/6/09	1/4/10	8'06	
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are Request for Approval 1726/10 1/26/10 2011/2011/		Compile Application	1 d?	12/25/09		104SF	- <del>-</del>
17 d   1/25/10   2/14/10		Assessment	90 g	12/26/09	1/25/10	105SF	
11 d   21/110   218/110		Quotation	p 2	1/25/10	2/1/10	107SF	
Section		Payment	17 d	2/1/10			
rent         5 d         26/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         21/11/10         3/2/2/10         3/2/2/10         3/2/2/10         3/2/2/		Prepare Request for Approval	2 d	2/1/10	2/6/10	108SF	
Section		Approval	2 d	2/6/10	2/11/10	109SF	
Action		payment	p 2	2/11/10	2/18/10	110SF	
rt Line		Design & Costruction	45 d	2/18/10	4/4/10	IOUSF	
202 d         1/31/10         8/21/10           30 d         1/31/10         3/21/10           30 d         3/21/10         3/21/10           30 d         3/21/10         3/21/10           30 d         3/21/10         3/21/10           5 d         4/13/10         4/13/10           6 d         4/13/10         4/13/10           6 d         4/13/10         4/13/10           6 d         4/13/10         4/13/10           1 d         4/13/10         4/13/10           1 d         4/13/10         4/13/10           1 d         4/13/10         4/13/10           2 d         3/14/10         3/14/10           3 d         3/14/10         3/14/10           4 d         3/14/10         3/14/10           5 d         3/14/10         3/14/10           4 d         3/14/10         3/14/10           5 d         3/14/10         3/14/10           6 d         3/14/10	Layi	ng Of Water Line	45 d	8/16/10	9/30/10	p 09+SSE	
sate bender         30           1/31/10         3/21/10           eritise         7 d         3/21/10         3/21/10         3/21/10           der Pender         30 d         3/21/10         3/21/10         3/21/10         3/21/10           der Pender         5 d         4/48/10         4/13/10         4/13/10         3/21/10         3/21/10           and Norks         14 d         4/13/10         4/13/10         4/13/10         4/13/10         4/13/10           and S Appeal Period         5 d         4/13/10         4/13/10         4/13/10         4/13/10         4/13/10           and S Appeal Period         5 d         4/13/10         4/13/10         4/13/10         4/13/10         4/13/10         4/13/10           and Ender         5 d         4/13/10         4/13/1	Slotting	of Liners	202 d	1/31/10	8/21/10		
ter Period der Feriod der Feriod der Feriod der Feriod der Feriod and & Appeal Period der Feriod and & Appeal Period der Feriod der Feriod and & Appeal Period der Feriod and & Appeal Period der Feriod and & Appeal Period and & Appeal Period and & Appeal Period der Feriod and & Appeal Period and & Appeal P	Prep	are tender	90 P	1/31/10	3/2/10	14SF	
Ger Period         30 d         39/10         44/8/10           Indition         5 d         48/10         4/13/10           Involved         5 d         4/13/10         4/13/10           Increased Appeal Period         14 d         4/18/10         5/23/10           Increased Ender         21 d         5/23/10         5/23/10           Increased Ender         30 d         4/13/10         5/23/10           Increased Ender         30 d         3/11/10         3/11/10           Increased Ender         30 d         3	Adv	ertise	P 2	3/2/10	3/9/10	15SF	
Marca   Marc	Tenc	ler Period	90 P	3/9/10	4/8/10	16SF	
and & Appeal Period fire and an array of the fire and are lender for an array of the fire and array o	Eval	nation	P 9	4/8/10	4/13/10	17SF	
and 8 A peal Period literation li	App.	oval	P9	4/13/10	4/18/10	18SF	
Leg	Awa	ird & Appeal Period	14 d	4/18/10	5/2/10	4	
10   10   10   10   10   10   10   10	Mobi	lization	21 d	5/2/10	5/23/10	18	
rich Bulk Cement & Diesel Fuel         91 d         77/110         930010           pare lender         30 d         77/110         73/110         73/110           certise         7 d         7/31/10         87/110         87/110           leation         30 d         87/110         87/110         87/110           rowal         14 d         91/8/10         91/8/11         91/8/11           rowal         146 d         41/7/10         91/8/11         91/8/11           set bridger         146 d         41/7/10         91/8/11         91/8/11           set bridger         146 d         91/8/11         91/8/11         91/8/11           der Period         147 d         91/8/11         91/8/11         91/8/11           der Period         147 d         91/8/11         91/8/11         91/8/11           der Period         17	Actu	al Works	P 06	5/23/10	8/21/10	119	
sate bridger         30 d         7/1/1/10         7/3/1/10         7/3/1/10         7/3/1/10         7/3/1/10         7/3/1/10         7/3/1/10         8/7/10	Contract	for Bulk Cement & Diesel Fuel	91 d	7/1/10	9/30/10		
Particular   Particular   Particular   Particular							, [
Value   Valu	He	are tender	30 d	01/1//		Z3SF	
ter Fetrod 30 d 87710 98710 retribution of the fetrod 50 d 97110 987010 9870110 987011 987	Adv	ertise	P.Z	7/31/10	8/1/10	Z4SF	
Desiron	Tenc	ler Period	30 d	8/7/10		25SF	
Community Services	Eval	uation	2 d	9/6/10		26SF	**
recommenting Services         14 d         91/61/10         93001/10           t Commenting Services         166 d         417710         93001/10           ender ender         7 d         417710         9301/10           ender ender         7 d         477710         57/710           der Period         7 d         57/710         57/710           der Period         45 d         57/2410         7/78/10           noval         7 d         7/78/10         7/78/10           noval         8 d         7/78/10         7/78/10           Noval         8 d         7/78/10         7/78/10           Actual Drilling         8 d         7/73/10         7/73/10           Actual Drilling         8 d         7/73/10         7/73/11           Actual Drilling         8 d         7/73/11         7/73/11           Actual Drilling         8 d         7/73/11         7/73/11           Actual	App	oval	P 9	9/11/10		127SF	
Commenting Services         166 d         417710         93040           Sale bender         30 d         417710         517710           Sale bender         7 d         517710         577710           Ber Feloci         45 d         572410         718710           Sec Annel         5 d         718710         771871           Incition         5 d         7718710         771871           Incition         5 d         771871         771871           Incition         5 d         771871         771871           Incition         5 d         792071         1222910           Incition         5 d         7228710         17271           Incition         5 d         71271         33471           Regular         5 d         71271         33471           Incition         5 d         71271         33471           Regular         712871         52871	Awa	ırd & Appeal Period	14 d	9/16/10		138SF	
refise ender 30 d 4/17/10 5/17/10 ender ender 7d 5/17/10 5/17/10 ender Period 6/17/10 6/17/10 ender Period 6/17/10 6/17/10 6/17/10 ender Period 6/17/10 6/17/10 6/17/10 ender A 4 6 5/17/10 6/17/10 6/17/10 ender A 4 6 7/17/10 7/17/10 7/17/10 ender A 4 6 7/17/10 7/17/10 6/17/10 ender A 4 6 7/17/10 6/17/10 6/17/10 ender A 4 6 7/17/10 6/17/10 6/17/10 ender A 4 6 7/17/10 6/17/10 ender A 4 6 7/17/10 6/17/10 ender A 4 6 7/17/10 ender A 4 7/17/10 ender A 4 6 7/17/10 ende	Contract	Cementing Services	166 d	4/17/10	9/30/10		
der Felicid         7 d         5/17/10         5/24/10         7/84/10           Lettorn         5 d         7/13/10         7/18/10         7/18/10         7/18/10           Lettorn         5 d         7/13/10         7/13/10         7/13/10         7/13/10           ard & Appeal Period         60 d         8/1/10         8/1/10         8/1/10         8/1/10           ilication         60 d         8/1/10         8/1/10         8/1/10         8/1/10           Ilication         30 d         9/30/10         8/1/10         8/1/10           Ilication         30 d         9/30/10         8/1/10         8/1/10           Ilication         30 d         9/30/10         1/2/28/10         1/3/11           Reg Mobilization         60 d         1/2/28/10         1/3/11         3/4/11           Reg Mobilization         60 d         1/3/11         3/4/11         3/4/11           Reg Mobilization         60 d         1/3/11         3/4/11         3/4/11           Regology         60 d         1/3/20/10         1/3/11         3/4/11           Regology         60 d         3/3/11         5/8/11         5/8/11           Geology         60 d         10/3/20/10 <td>Prep</td> <td>are tender</td> <td>P 06</td> <td>4/17/10</td> <td>5/17/10</td> <td>130SF</td> <td></td>	Prep	are tender	P 06	4/17/10	5/17/10	130SF	
der Period         45 d         5/24/10         7/18/10           Lietton         5 d         7/18/10         7/18/10           rowal         14 d         7/18/10         7/18/10           rowal         14 d         7/18/10         8/1/10           ilization         80 d         8/1/10         8/1/10           ilization         30 d         9/30/10         8/6/11           Fig Mobilization         80 d         1/20/20/10         1/2/20/10           ILZ         Actual Drilling         60 d         1/2/20/10         1/2/20/10           Rg Mobilization         60 d         1/2/20/10         1/2/20/10         1/2/20/10           ILZ         Actual Drilling         60 d         1/2/20/10         1/2/20/10           Actual Drilling         60 d         1/2/20/10         1/2/20/10         1/2/20/10           Rg Mobilization         5 d         1/2/20/10         1/2/20/10         1/2/20/10           Rg Mobilization         60 d         1/2/20/10         1/2/20/10         1/2/20/10           Rg Mobilization         5 d         1/2/20/10         1/2/20/10         1/2/20/10           Rg Mobilization         60 d         1/2/20/10         1/2/20/10         1/2/20/10	Adv	artise	P 2	5/17/10	5/24/10	131SF	
rowal         Fd         77810         771310           rowal         14 d         771810         771810           and 8 Appeal Period         14 d         771810         771810           instation         50 d         87110         871710         871710           Instanton         310 d         973010         86171         86171           Reg Mobilization         60 d         1073010         122941         122941           Actual Drilling         60 d         1073010         172911         172911           Reg Mobilization         60 d         173711         34711         34711           Reg Mobilization         60 d         173711         34711         36811           Reg Mobilization         60 d         1073010         35911         5811           Reg Mobilization         60 d         1073010         322911         5811           Reg Mobilization         60 d         1073010         322911	Ten	ler Period	45 d	5/24/10		132SF	
Second   S	Eval	uation	2 d	2/8/10	7/13/10	33SF	
14   7/1810   8/1/10	App	oval	2 d	7/13/10	7/18/10	34SF	
11   200   201/10	Awa	ırd & Appeal Period	14 d	7/18/10	8/1/10	35SF	•
11   310 d   9130110   84611     Pig Mobilization   30 d   9130110   1229110     Rig Mobilization   50 d   10130110   11229110     Rig Mobilization   50 d   10130110   11229110     Rig Mobilization   50 d   11229110   112111     Rig Mobilization   50 d   11311   34411     Rig Mobilization   50 d   11311   34411     Rig Mobilization   50 d   3411   31911     Rig Mobilization   50 d   3411   31911     Rig Mobilization   50 d   3411   31911     Rig Mobilization   50 d   31911   51911     Rig Mobilization   50 d   31911   51911     Rig Mobilization   60 d   31911   51911     Rig Mobilization   60 d   31911   51911     Rig Mobilization   60 d   31011   51911   51911     Rig Mobilization   60 d   31011   51911   51911   51911   51911   51911     Rig Mobilization   60 d   31011   51911   51911   51911   5191	Mob	lization	P 09	8/1/10		138SF	
Mobilization   39d   9/30/10   12/29/10	Drilling		310 d	9/30/10	8/6/11		) 
Mobilization         30 d         9/30/10         10/30/10           Lual Drilling         66 d         10/30/10         12/29/10         12/29/10           Mobilization         5 d         12/23/10         3/4/11         3/4/11           Mabilization         66 d         1/3/11         3/4/11         3/4/11           Mobilization         67 d         1/3/11         3/4/11         3/4/11           Usal Drilling         67 d         3/4/11         5/8/11           II         10         3/4/11         5/8/11           III         280 d         3/4/11         5/8/11           III         10/30/10         3/3/11         5/8/11           Geodogy         60 d         10/30/10         3/3/11           Geodogy         60 d         10/30/10         12/29/10           Accompensity         10/30/10         10/30/10         12/29/10           Accompensity         10/30/10         10/30/10         12/29/11	Wel	-	P 06	9/30/10	12/29/10		
Usa Drilling         60 d         10/30/10         12/29/10           Mobilization         65 d         12/29/10         3/4/11           Mobilization         60 d         1/2/29/10         1/3/11           Mobilization         66 d         3/4/11         5/8/11           Mobilization         66 d         3/4/11         5/8/11           Mobilization         5 d         3/4/11         5/8/11           In all Drilling         280 d         3/9/11         5/8/11           In all Drilling         280 d         10/30/10         8/6/11           Geology         60 d         10/30/10         3/23/11           Geology         60 d         10/30/10         12/29/10           Hearing         100/10         10/30/10         12/29/10		Rig Mobilization	90 P	9/30/10	10/30/10	20,111,83,	
Mobilization   66 d   12/29/10   3/4/11     Uad Dhilling   66 d   1/2/29/10   1/3/11     Mobilization   66 d   3/4/11   3/4/11     Mobilization   66 d   3/4/11   3/9/11     Uad Dhilling   66 d   3/4/11   3/9/11     Uad Dhilling   66 d   3/9/11   5/9/11     Uad Chilling   66 d   10/30/10   3/29/11     Uad Chilling   66 d   10/30/10   2/29/11     Uad Chilling   66 d   10/30/10   1/2/29/11     Uad Chilling   66 d   10/30/10   1/2/29/11     Uad Chilling   66 d   1/2/29/11     Uad Chilling		Actual Drilling	P 09	10/30/10	12/29/10	88	
Mebilization         5 d         1/2/28/10         1/3/11         3/4/11         3	Wel	12	929 p g	12/29/10	3/4/11		
Load Drilling         60 d         1/3/11         3/4/11         5/		Rig Mobilization	P9	12/29/10		30	
Mobilization         65 d         3/4/11         5/8		Actual Drilling	P 09	1/3/11	3/4/11	141	
Abolitation         5 d         34/11         3/9/11           al Drifting         60 d         3/9/11         5/9/11         5/9/11           1         10 d         10/30/10         3/9/11         5/9/11           2         3/9/11         3/9/11         5/9/11         5/9/11           3         4/11         3/9/11         5/9/11         5/9/11           4         4/11         4/11         3/9/11         5/9/11           5         4/11         4/11         3/9/11         5/9/11           6         4/11         4/11         3/9/11         5/9/11           6         4/11         4/11         1/11         3/9/11           6         4/11         4/11         1/11         1/11           8         4/11         4/11         1/11         1/11           8         4/11         4/11         1/11         1/11           8         4/11         4/11         1/11         1/11           9         4/11         4/11         1/11         1/11           9         4/11         4/11         1/11         1/11           9         4/11         4/11         1/11         1/11 </td <td>Wel</td> <td>13</td> <td>92 q</td> <td>3/4/11</td> <td>5/8/11</td> <td></td> <td></td>	Wel	13	92 q	3/4/11	5/8/11		
Apriling   Columbia		Rig Mobilization	P9	3/4/11		42	
1909   1909		Actual Drilling	P 09	3/9/11		4	
1   150 d   10/30/10   3/29/11     Geology   60 d   10/30/10   12/29/10     East in   10/30/10   2/27/11     East in   10/30/10   2/27/11     East in   10/30/10   12/27/11     East in   10/30/10     East in   10/30/1	Tes	ting	280 d	10/30/10	8/6/11		
60 d 10/30/10 1228/10 1228/10 120/11 120/10 227/11 30 d 12/20/10 12/20/11		Well 1	150 d	10/30/10	3/29/11		
120 d 10/30/10 2/27/11		Geology	P 09	10/30/10	12/29/10	39SS	
30.4		Geochemistry	120 d	10/30/10		39SS, 151F	
30.0		Heat up	30 d	12/20/10		6	

Planning, Kenya 15 Ngugi

₽	Task Name	Duration	Start	Finish	Predecessor	2012 A M A M A M A M A M A M A M A M A M A
151	Flow testing	90 q	1/28/11	2/27/11	150	
152	Reports	90 P	2/27/11	3/29/11	151	
153	Well 2	150 d	1/3/11	6/2/11		
154	Geology	p 09	1/3/11		142SS	
155	Geochemistry	120 d	1/3/11		142SS	
156	Heat up	90 g	3/4/11		142	
157	How testing	90 g	4/3/11		156	
158	Reports	90 g	5/3/11		157	
159	Well 3	150 d	3/9/11	8/6/11		
160	Æology	p 09	3/9/11		145SS	
161	Geochemistry	120 d	3/9/11	7/7/11	145SS	
791	Heat up	30 g	11/8/0		041 041	
163	How testing	30 d	6/7/11		162	
164	Reports	30 d	7/7/11	8/6/11	163 93CC 163EE	
188	In-house Boulous	- E	110017		1000,100	<u>k</u>
167	Collation of data and renorts	5000	7/22/14		16455+15 d	
100	Devices initial Connect of Model	30 d	112211	0/5/11	167	
100	Possibilitia Conceptual Model	150	0/5/11		160	
9 6	H es entation	)B.	9/5/11		100	
171	MOG Review	D 7	9/0/11	10/12/11	60	
142	Doting of popular	3 8	21,010	_	027	
173	Posting of reports	00 g	30.13/11		170	
27.	Acuta liberings	t c	10,10,1		172	
175	OD OI NO GO	00	11/1/11	10/1/11	2	, Link
1/3	RESOURCE ASSESSIMENT	1104 G	01/22/21	51/05/21		
1/6	Appraisal Program	946 d	12/22/10	7/25/13	Ī	
177	Rig Hre	445 d	12/22/10	3/11/12		
178	Pre-Qualification	p 86	12/22/10			
179	Repation of Expression of Interest	2 d	12/22/10	12/27/10	180SF	
180	Obtain Banks No objection	7 d	12	1/3/11	181SF	•
181	Advertise (local media and international)	21 d	1/3/11	1/24/11	182SF	
182	Bidding Period	90 g	1/24/11	2/23/11	183SF	
183	Evaluation & Shortlist Report Preparation	P 2	2/23/11	3/2/11	184SF	
184	KenGen's Approval	p 2	3/2/11	3/9/11	185SF	
185	Obtain Banks No objection	21 d	3/9/11	3/30/11	187SF	
186	Tendering	347 d	3/30/11	3/11/12		
187	Preparation of bidding Documents	90 q	3/30/11	4/29/11	188SF	
188	Obtain Banks' no objection	21 d	4/29/11	5/20/11	189SF	
189	Issue bid documents + tendering	45 d	5/20/11	7/4/11	191SF	
190	Technical Evaluation	35 d	7/4/11	8/8/11		<b>I</b>
191	Evaluation	p 2	1/4/11	11/11/1	192SF	
192	KenGen Approval	p 2	7/11/11	7/18/11	193SF	
193	Obtain Bank's no objection	21 d	7/18/11	8/8/11	195SF	
194	Commercial Evaluation	D 07	8/8/11	10/17/11		
195	hvite bidders for tender openining	21 d	8/8/11	8/29/11	196SF	
196	Evaluation	p 2	8/29/11		197SF	
197	KenGen Approval & Appeal	21 d	9/5/11		198SF	
198	Obtain Bank's no objection	21 d	9/26/11		200SF	
199	Contract Negotaition	26 d	10/17/11			
200	Invite bidders for Negotiation	21 d	10/17/11	11/2/11	174	

Ngugi 16 Planning, Kenya

2003 N O S A I I I I I I I I I I I I I I I I I I																																																
Predecessor F M A M		251		252	254		249SS	249SS	249	260	261		251SS	252SS	252	266	267		255SS	255SS	255	272	273		274	276				255	281		282	284		285	287			282SS	282SS	282	293	294		285SS	285SS	
Finish	5/16/12 249		9/18/12	7/20/12		12/17/12	5/11/12	7/10/12	6/10/12	7/10/12	8/9/12	10/13/12	7/10/12 251SS	9/13/12	8/14/12	9/13/12	10/13/12 267	12/17/12	9/18/12 255SS	11/17/12	10/18/12	11/17/12	12/17/12	1/17/13	1/16/13	1/17/13 276	7/25/13	4/26/13	12/17/12	10/18/12	12/17/12 281	2/20/13	12/22/12		4/26/13	2/25/13 285		7/25/13	3/17/13	12/17/12	2/15/13	1/16/13	2/15/13 293	3/17/13 2	5/21/13	2/20/13	4/21/13	
Start	5/11/12	5/16/12	7/15/12	7/15/12	7/20/12	3/12/12	3/12/12	3/12/12	5/11/12	6/10/12	7/10/12	5/11/12	5/11/12	5/16/12	7/15/12	8/14/12	9/13/12	7/20/12	7/20/12	7/20/12	9/18/12	10/18/12	11/17/12	12/17/12	12/17/12	1/16/13	9/18/12	9/18/12	9/18/12	9/18/12	10/18/12	12/17/12	12/17/12	12/22/12	2/20/13	2/20/13	2/25/13	10/18/12	10/18/12	10/18/12	10/18/12	12/17/12	1/16/13	2/15/13	12/22/12	12/22/12	12/22/12	
Duration	2 d	p 09	92 d	2 d	p 09	280 d	p 061	120 d	90 g	90 q	90 g	155 d	P 09	120 d	90 p	30 d	90 q	120 d	p 09	120 d	90 g	90 g	9 OE	31 d	90 g	1 d	310 d	220 d	p 06	90 g	p 09	92 d	2 d	p 09	9 d	2 d	p 09	280 d	150 d	p 09	120 d	30 d	p 06	30 d	150 d	p 09	120 d	
Task Name	Rìg Mobilization	Actual Drilling	Well 6	Rg Mbhilization	Actual Drilling	Testing First Three wells	Geology	Geocherristry	Heat up	How testing	Reports	Well 5	Geology	Geocherristry	Heat up	How testing	Reports	Well 6	Geology	Geocherristry	Heat up	Flow testing	Reports	Exploration Strategy review	Data Collation	Presentation and Review	Drilling of Remaining Three wells	Drilling	Well 7	Rig Mobilization	Actual Drilling	Well 8	Rig Mobilization	Actual Drilling	Well 9	Rig Mbbilization	Actual Drilling	lesting Kemaining I hree wells	Well 7	Geology	Geocherristry	Heat up	Flow testing	Reports	Well 8	Geology	Geocherristry	
D Ta	251	252	253	254	255	256	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	587	730	291	292	293	294	295	296	297	298	

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M A M I I A C O N D I E M A M I A C O N D I E M										•	• <u>•</u>																												411129				1230								
Finish Predecessor	5/21/13 300	7/25/13	4/26/13 288SS	6/25/13 288SS	5/26/13 288	6/25/13 305	7/25/13 306	12/30/13	5/3/13	8/19/12	5/18/12 312SF	5/25/12 313SF	6/15/12 314SF	7/15/12 315SF	7/22/12 316SF	7/29/12 317SF	8/19/12 319SF	5/3/13	9/18/12 320SF	10/9/12 321SF	11/23/12 323SF	12/28/12	11/30/12 324SF	12/7/12 325SF	12/28/12 327SF	3/8/13	1/18/13 328SF	1/25/13   329SF	2/15/13 330SF	3/8/13 332SF	5/3/13	3/29/13 333SF	4/5/13 334SF	4/26/13 335SF	5/3/13 288	11/29/13	6/2/13 335	11/29/13 337	11/29/13 338	12/30/13	12/29/13 339	12/30/13 341	12/30/13 342	6/8/18	1/29/14	4/4/13 347SF	7/3/13 348SF	10/1/13 349SF	12/30/13 350SF	1/29/14 343	
Start	4/21/13	2/25/13	2/25/13	2/25/13	4/26/13	5/26/13	6/25/13	5/13/12	5/13/12	5/13/12	5/13/12	5/18/12	5/25/12	6/15/12	7/15/12	7/22/12	7/29/12	8/19/12	8/19/12	9/18/12	10/9/12	11/23/12	11/23/12	11/30/12	12/7/12	12/28/12	12/28/12	1/18/13	1/25/13	2/15/13	3/8/13	3/8/13	3/29/13	4/5/13	4/26/13	5/3/13	5/3/13	6/2/13	11/29/13	11/29/13	11/29/13	12/29/13	12/30/13	3/5/13	3/5/13	3/5/13	4/4/13	7/3/13	10/1/13	12/30/13	
Duration	30 d	150 d	p 09	120 d	90 g	90 g	90 P	p 965	355 d	p 86	2 d	P 2	21 d	P 0E	p 2	p 2	21 d	257 d	90 g	21 d	45 d	35 d	p 2	P 2	21 d	P 02	21 d	p 2	21 d	21 d	26 d	21 d	p 2	21 d	P 2	210d	90 g	180 d	P0	31 d	90 g	1 9	P0	1921 d	330 d	90 g	p 06	P 06	p 06	90 g	
Task Name	Reports	Well 9	Geology	Geochemistry	Heat up	Flow testing	Reports	Feasibility Study	Hire of Consultants	Pre-Qualification	Prepation of Expression of Interest	Obtain Banks No objection	Advertise (local media and international)	Bidding Period	Evaluation & Shortlist Report Preparation	KenGen's Approval	Obtain Banks No objection	Tendering	Preparation of bidding Documents	Obtain Banks' no objection	Issue bid documents + tendering	Te chnical Evaluation	Evaluation	KenGen Approval	Obtain Bank's no objection	Commercial Evaluation	Invite bidders for tender openining	Evaluation	KenGen Approval & Appeal	Obtain Bank's no objection	Contract Negotaition	Invite bidders for Negotiation	Negotiation & Drafting of contract	Obtain Bank's no objection	Signing of contracts	Contract Performance	Advance Payment	Study	Submission of Bankable report	BOC Review Meeting	Data Collation	Presentation and Review	Go or No Go	CONSTRUCTION PHASE	Funding Application	Project Identification	Poject Formulation and Preparation	Appraisal	Funding institution Approval	Hanacial Agreements Negotiation	
٥	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	320	

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<u> </u>	Task Name	Duration	Start	Finish Pre	Predecessor	2015
351	Credit Effectiveness	PO	1/29/14	1/29/14 350	V	-
352	Production Drilling	745 d	9/25/13	10/10/15		
353	Overseas Procurement	271 d	11/13/13	8/11/14		
354	Prepare tender	90 g	11/13/13	12/13/13 355SF		
355	Advertise	p 2	12/13/13	12/20/13 356SF		
356	Tender Period	90 g	12/20/13	1/19/14 357SF		
357	Evaluation	2 q	1/19/14	1/24/14 358SF	<u></u>	
358	Approval	2 d	1/24/14	1/29/14 359SF		
328	Award & Appeal Period	14 d	1/29/14	2/12/14 351		
360	Delivery	180 d	2/12/14	8/11/14 359		
361	Slotting of Liners	202 d	5/26/14	12/14/14		
362	Prepare tender	90 g	5/26/14	6/25/14 363SF		
363	Advertise	p 2	6/25/14	7/2/14 364SF		
364	Tender Period	90 g	7/2/14	8/1/14 365SF		
365	Evaluation	2 d	8/1/14	8/6/14 366SF		
366	Approval	2 d	8/6/14	8/11/14 367SF		
367	Award & Appeal Period	14 d	8/11/14	8/25/14 360		
368	Mobilization	21 d	8/25/14	9/15/14 367		
369	Actual Works	p 06	9/15/14	12/14/14 368		
370	Contract for Bulk Cement & Diesel Fuel	9 6	9/14/14	12/14/14		
371	Penare fender	5 08	9/14/14	10/14/14 372SF		
37.0	Advertise	3 7	10/14/14	10/21/14 373SE		
373	Auvel use Tender Brind	7 00	10/14/14			
212		3 4	14,000,44	44105114		
3/4	Evaluation	D C	11/20/14	11/25/14 3/55		
3/5	Approval	200	11/25/14	11/30/14 3/6SF	<b>*</b>	
3/6	Award & Appeal Period	14 d	11/30/14	12/14/14 416SF		
377	Contract Cementing Services	166 d	7/1/14	12/14/14		
378	Prepare tender	30 d	7/1/14	7/31/14 379SF		
379	Advertise	p 2	7/31/14	8/7/14 380SF	<b>-</b>	
380	Tender Period	45 d	8/7/14	9/21/14 381SF		
381	Evaluation	2 d	9/21/14	9/26/14 382SF		
382	Approval	2 d	9/26/14	10/1/14 383SF		
383	Award & Appeal Period	14 d	10/1/14	10/15/14 384SF		
384	Mobilization	p 09	10/15/14	12/14/14 416SF		
382	Hre of Second Rig	445 d	9/25/13	12/14/14		
386	Pre-Qualification	p 86	9/25/13	1/1/14		
387	Prepation of Expression of Interest	2 d	9/25/13	9/30/13 388SF		
388	Obtain Banks No objection	p 2	9/30/13	10/7/13 389SF		
389	Advertise (local media and international)	21 d	10/7/13			
390	Bidding Period	90 g	10/28/13	11/27/13 391SF		
391	Evaluation & Shortlist Report Preparation	p 2	11/27/13	12/4/13 392SF		
392	KenGen's Approval	p 2	12/4/13	12/11/13 393SF		
393	Obtain Banks No objection	21 d	12/11/13	1/1/14 395SF		
394	Tendering	347 d	1/1/14	12/14/14		
395	Preparation of bidding Documents	90 q	1/1/14	1/31/14 396SF		
396	Obtain Banks' no objection	21 d	1/31/14	2/21/14 397SF		
397	Issue bid documents + tendering	45 d	2/21/14	4/7/14 399SF		
398	Te chnical Evaluation	35 d	4/1/14	5/12/14		
339	Evaluation	p 2	4/7/14	4/14/14 400SF		
400	KenGen Approval	p 2	4/14/14	4/21/14 401SF		

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Ω	Task Name	Duration	Start	Finish	Predecessor	2014
401	Obtain Bank's no objection	21 d	4/21/14	5/12/14 40	403SF	
402	Commercial Evaluation	P 0.2	5/12/14	7/21/14		
403	Invite bidders for tender openining	21 d	5/12/14	6/2/14 404SF	404SF	
404	Evaluation	PZ	6/2/14	6/9/14 405SF	405SF	
405	KenGen Approval & Appeal	21 d	6/9/14	6/30/14 406SF	406SF	
406	Obtain Bank's no objection	21 d	6/30/14	7/21/14 408SF	408SF	
407	Contract Negotaition	26 d	7/21/14	9/15/14		
408	Invite bidders for Negotiation	21 d	7/21/14	8/11/14 409SF	409SF	
409	Negotiation & Drafting of contract	P.2	8/11/14	8/18/14 410SF	410SF	
410	Obtain Bank's no objection	21 d	8/18/14	9/8/14 411SF	411SF	
411	Signing of contracts	P.2	9/8/14	9/15/14 41	413SF	
412	Contract Performance	P 06	9/15/14	12/14/14		
413	Advance Payment	90g	9/15/14	10/15/14 414SF	414SF	
414	Mobilization	P 09	10/15/14	12/14/14 415SF	415SF	
415	Onsite	P0	12/14/14	12/14/14 416SF	416SF	<u></u>
416	Drilling and Testing	900E	12/14/14	10/10/15 369	369	
417	Custruction Phase	1766 d	8/7/13	6/8/18		
418	Interfacing with KPLC	31 d	8/7/13	9/7/13		<b>T</b>
419	Contact KPLC	14	8/7/13	8/8/13 420SF	420SF	
420	Obtain counterpart Staff	P 08	8/8/13	9/7/13 423SF	423SF	
421	Power Plant Construction and Commissioning	1707 d	9/7/13	5/11/18		
422	Procure Consultants	255 d	9/7/13	5/20/14		
423	Prepare expression of interest	14 d	9/7/13	9/21/13 424SF	424SF	
424	Advertise	10 d	9/21/13	10/1/13 425SF	425SF	
425	Tender period	42 d	10/1/13	11/12/13 426SF	426SF	
426	Pre-qualify Consultants	14 d	11/12/13	11/26/13 427SF	427SF	
427	Tender Documents	P 09	11/26/13	1/25/14 428SF	428SF	
428	Tendering Process		1/25/14	3/8/14 429SF	429SF	
429	Complete Tender Evaluation and Approval (two enve		3/8/14	4/8/14 430SF	430SF	
430	Complete Award, Negotion and Contract signing	21 d	4/8/14	4/29/14 431SF	431SF	
431	Advance Payment and LC	21 d	4/29/14	5/20/14 43	433SF	
432	Procure Contractor	388 d	5/20/14	6/12/15		
433	Prepare expression of interest	14 d	5/20/14	6/3/14 434SF	434SF	
434	Advertise	10 d	6/3/14	6/13/14	435SF	
435	Tender period	42 d	6/13/14	7/25/14 436SF	436SF	
436	Pre-qualify Contractors	20 d	7/25/14	8/14/14 437SF	437SF	
437	Tender Documents and Conceptual design	P 09	8/14/14	10/13/14 438SF	438SF	
438	Tendering Process	P 06	10/13/14	1/11/15 439SF	439SF	
439	Complete Tender Evaluation and Approval	P 09	1/11/15	3/12/15 440SF	440SF	
440	Complete Award, Negotion and Contract signing	90 g	3/12/15	4/11/15 441SF	441SF	
441	Advance Payment and LC	62 d	4/11/15	6/12/15 45	451SF	
442	Construct Service Power line	270 d	9/15/14	6/12/15		
443	Make Application	PZ	11/7/14	11/14/14 445SF	445SF	
444	KPLC quotation Period	p 09	9/15/14	11/14/14	445SF	
445	Make payment	9 O C	11/14/14	12/14/14 446SF	446SF	
446	Line Construction	180 d	12/14/14	6/12/15	451SF	

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