Implementing Project Management and Reporting into a Project Alliance – A Case Study

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Abstract

The current drought (2001 – 2008) throughout Australia has highlighted the vulnerability of South Eastern Queensland's water resources. The combined capacity of the Wivenhoe, Somerset and North Pine dams as at the beginning of May 2007 had fallen below 19.5% and is expected to fall even further during 2007/8.

To put further strain on water supplies, South Eastern Queensland is also Australia's fastest growing metropolitan region and is predicted to continue to grow strongly from its 2006 population of 2.7 million to a 2026 population of 4.0 million and 5.1 million in 2051

The State Government has announced a range of initiatives to secure water supply in South Eastern Queensland in the long-term as it faces the worst drought in more than 100 years, the prospect of continuing irregular rainfall due to natural climate variability and long-term climate change and the rapid population growth,

These initiatives, include the Western Corridor Recycle Water Project, as well the construction of a water grid, including the Southern Regional Water Pipeline, the Northern Inter-connector and the Eastern Inter-connector

This paper will describe how the project was established as a Project Alliance Agreement with multiple partners who included the client (the Queensland State Government) and how the initial project planning was developed and the use of multiple planning packages to deliver the required project reporting.

Introduction

Drought has always had a major impact in Queensland as back as the early 1900's Queensland suffered terrible droughts as evinced in the exhibit 1 below. As a result of the long drought, global warming and the

Exhibit 1 Deadly drought in Queensland, early 1900s

ever decreasing amount of water in storage caused the government of Premier Peter Beattie in February 2006 to proposed a recycled pipeline to reduce the demand for drinking water by industry in the burgeoning western corridor of the State's south-east to be fast-tracked to be up and running next year.

The project was named the Western Corridor Recycled Water Project In building a water supply network for South East Queensland; and would deliver world class technologies using sustainable principles.

The WCRW Project involves constructing a network of about 200km of underground pipelines to link six existing wastewater treatment plants (WWTPs) to the three advanced water treatment plants. After further filtration, the purified recycled water will be piped to power stations, industry and agriculture, and to the Wivenhoe Dam system to supplement water supplies.

At a total cost of $AUD 2.39 billion, the WCRW Project is Australia's largest recycled water project and the third largest advanced water treatment project in the world. Upon completion in December 2008, the project will supply up to 232 megalitres per day of purified recycled water with the capacity to increase to 310 megalitres per day when more wastewater becomes available

. One of the major drivers of the project was to reduce pressure on existing water supplies by piping purified recycled water to power stations and industry, and using it to supplement water supplies in Wivenhoe Dam, the region's major water supply. The project was also to contribute substantially to sustainable water management in South East Queensland. The two major power stations in the region consumed as much as 120 Megalitres of drinking water each day, and as the drought deepened each day this use of water became unsustainable.

The size of the proposed project was such that it had to be broken into five major elements, and was to be constructed by five Alliances [1] and draw upon local and international engineering, water treatment and construction expertise. To allow progressive delivery of water, the project was to be built over the three stages outlined as shown below.

Stage 1A

To be Completed in 31st July 2007
To supply up to 20 megalitres per day of purified recycled water to Swanbank power station

Stage 1B

To be completed in 30th April 2008
In combination with Stage 1A, Stage 1B is designed to supply up to 66 megalitres per day of purified recycled water to Swanbank and Tarong power stations

Stage 2

To be completed 31st December 2008
Is designed to supply up to 116 megalitres per day of purified recycled water to further supplement power station supplies, add drinking water supplies to Wivenhoe Dam and for possible agricultural use

Proposed Future upgrade

To be completed December 2008
Is designed to supply an additional 50 megalitres per day of purified recycled water to supplement drinking water supplies to Wivenhoe Dam

To ensure that the project met its required construction dates, the Queensland Government passed emergency legislation which defined the completion dates as shown above for each of the three stages.

Thus before a project plan was even put into place, the end date had been imposed. These date impositions were initially declared to be sacrosanct and a great deal of effort was placed in maintaining then in all the iterations of the initial Project Programme

Project Scope & Objectives

The WCRW project has been stated as an important part of the Queensland Government's $9 billion Brisbane and South East Queensland Water Grid as the largest urban drought response in Australia.

Its prime objective is to ensure the security of the supply of water through:-

1. Adding to the available water supplies that are less dependent on climate trends
2. Providing a system to supply purified recycled water to power stations, industry and agriculture and to replenish drinking water reserves
3. Establishing a sustainable commercial basis for the ongoing operations of the infrastructure developed as part of the Project
4. Delivering in accordance with the community's expected best practice

The project scope of the construction involves laying more than 200km of pipeline by excavating trenches and tunneling; the construction of three advanced water treatment plants, six storage tanks and nine pumping stations.

Due to the scale of this construction work, it was established that an Alliance style of construction management should be the method chosen to control the total project. This resulted in the development of five Alliances to deliver the major project components, including:

1. The Luggage Point Advanced Water Treatment Plant
2. The Gibson Island Advanced Water Treatment Plant
3. The Bundamba Advanced Water Treatment Plant
4. The Eastern Pipeline
5. The Western Pipeline

The five alliances were named as follows;-

- Bundamba Alliance
- Eastern Alliance (for whom I worked for)
- Gibson Island Alliance
- Luggage Point Alliance
- Western Alliance

Project Overview

The Eastern Pipeline was to be built by the Eastern Pipeline Alliance, and was 104 km in length and was to link existing wastewater treatment plants with the new advanced water treatment plants, and to transfer purified recycled water produced at the advanced water treatment plants to end users.

Due to the number of road / rail and river crossings involved in the construction of the pipeline it was constructed in two distinct sections, Oxley to Bundamba and Luggage Point to Bundamba.

The Oxley to Bundamba pipeline linked existing wastewater treatment plants at Oxley, Wacol and Goodna to the Bundamba Advanced Water Treatment Plant. Construction was plan to begin in March 2007 and was due for completion in June 2008. It is 46 km in length and up to 1.1m in diameter and involves 15 underground road and rail crossings Includes three pumping stations at Goodna, Oxley and Wacol and three parallel pipes between Bundamba and Goodna to carry different types of treated water; Exhibit two shows part of the pipeline, which consists of :-

1. secondary treated wastewater for treatment at Bundamba
2. reverse osmosis discharge from Bundamba
3. purified recycled water to Swanbank and Tarong power stations and Wivenhoe Dam

Exhibit 2: Section of the Oxley to Bundamba Pipeline

The pipeline starts at the existing Oxley WWTP and extends west to the Bundamba AWTP via existing WWTPs at Wacol and Goodna. It will pipe treated wastewater from these WWTPs to the Bundamba AWTP, where it will be further treated using the Reverse Osmosis process to produce purified recycled water (refer to the water recycling fact sheet for more information).

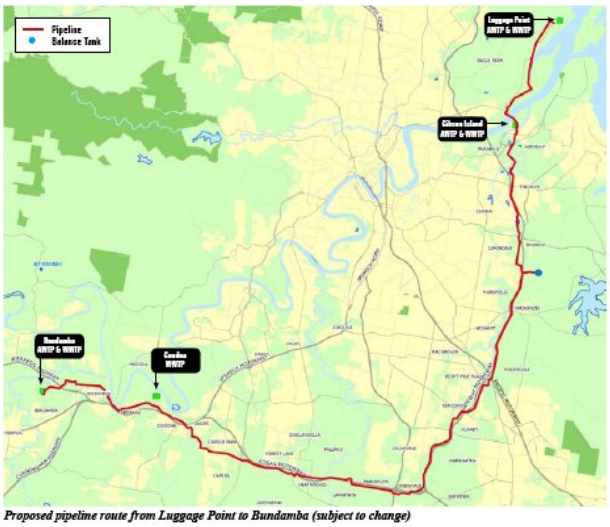
The pipeline consists of:

1086OD Mild Steel Epoxy Lined (MSEL) pipe between the Oxley WWTP and Wacol WWTP
1086OD MSEL pipe between the Wacol WWTP and Goodna WWTP
1086OD Mild Steel Cement Lined (MSCL) pipe between the Goodna WWTP and the Bundamba AWTP

An existing WWTP at Bundamba will also be linked to Bundamba's new AWTP. A pipeline connecting the two facilities will be laid during construction of the Bundamba AWTP.

The Luggage Point to Bundamba pipeline linked the Luggage Point and Gibson Island Advanced Water Treatment Plants to the Bundamba Advanced Water Treatment Plant Construction was planned to begin in October 2007 and is due for completion in October 2008 Is 58km in length and 1.1m in diameter. Exhibit 3 shows the location of the Eastern Pipeline across the City of Brisbane.

It Involves 35 underground road and rail crossings and two major crossings of the Brisbane River and Aquarium Passage within Bulimba Creek using horizontal directional drilling. It was originally intended to



Proposed pipeline route from Luggage Point to Bundamba (subject to change)

Exhibit 3 Location Plan of Eastern Pipeline

use Micro Tunnelling techniques to bore across the Brisbane River, however due to the size of the shafts and the depth necessary to comply with environmental requirements, horizontal directional drilling was deemed to be more appropriate. The pipeline also includes two pumping stations at Gibson Island and Luggage Point, and a balance tank at Mt Petrie.

Initial Project Plan

The initial project plan was created in Micro Planner X-Pert for Windows and was later processed using Primavera 3.1 It was decomposed into the three stages, a)TCE1A - Early Works and Stage 1A, b)TCE1B - Stage 1B and c) TCE2 -Stage 2, each stage are represented as Micro Planner sub projects, these were :-

1. The Master ALT Overall Schedule showing 'Progressed" high level Hammocks and Milestones and certain tasks. This model was been limited to approximately 150 tasks as per the Programme Management Group Report Specification.
2. Engineering Sub Project for Stage 1A
3. Goodna – Bundamba Pipeline – Stage 1A
4. Early Works Stage1A
5. Road Crossings Stage 1A
   - Railway 1 Crossing
   - Warrego Highway Crossing
   - Weedman / Railway Crossing
   - Railway 2 Crossing
   - River Road Crossing
   - Archer Street Crossing
   - Monash Road
6. Goodna Pump Station Stage 1A

7. Bundamba Pump Station Stage 1A
8. Dinmore Pump Station Stage 1A
9. Engineering Sub Project for Stage 1B
10. Wacol Pump Station Stage 1B
11. Oxley Pump Station Stage 1B
12. River Crossings Stage 1B and Stage 2
    - Priors Pocket – Wacol - River Crossing Stage 1B
    - Priors Pocket – Goodna - River Crossing Stage 1B
    - Gibson Island – River Crossing Stage 2
    - Aquarium Passage Crossing Stage 2
    - Bulimba Creek Crossing Stage 2

Reporting to Project Management in February 2007 there were still Stage 2 sub projects to be created, which were awaiting the design detail.

Sub Projects which were created are :-

13. Oxley – Goodna Pipeline Stage 1B network (currently awaiting design data)
14. GHD Engineering Sub Project for Stage 2
15. Luggage Point to Goodna Pipeline Stage 2
16. Pump Stations for Stage 2
    - Luggage Point
    - Mt Petrie (Tanks only)
    - Gibson Island)

Each of the 28 sub project had its own Critical Path computed. When all the data for all stages has been entered the programme will be changed to use the total project critical path process.

Once all the task and milestones data had been entered in to the project plan, it was ready to run resource scheduling. This meant identification of resource crews, sub contractors and in house trades and the like. The work load was defined in the Senior Planner and Schedulers duties which are shown as Appendix 1.

Having performed resource scheduling on the project plan, the next stage was to enter the cost information required to produce the Earned Value curves.

So as can be seen the number of critical path networks that was created was quite considerable.

These networks were then rolled up into the three major management Total Cost Estimates packages, for each stage. The three overview critical path networks were used to provide rapid response to project management queries with regard to the delivery dates. Exhibit 4 illustrates one of TCE sub projects.

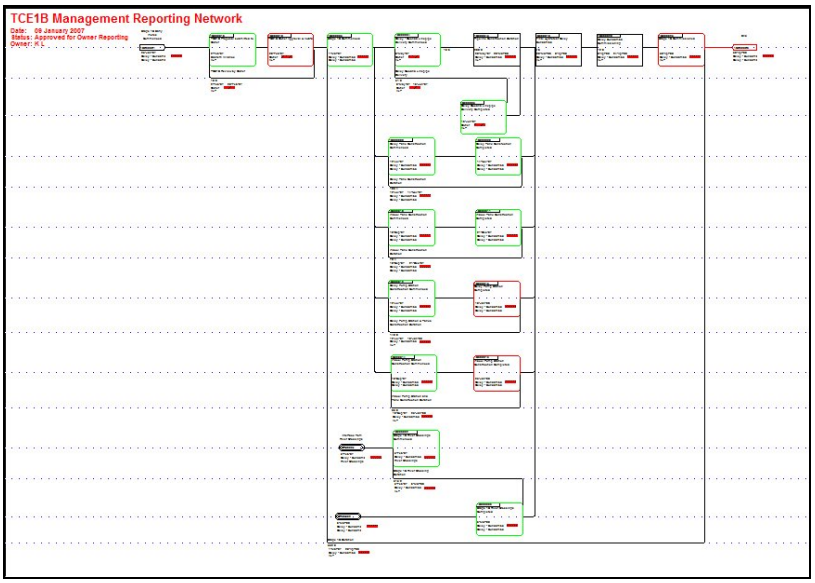


Exhibit 4 Total Cost Estimate 1B sub project

Each of the stages was examined to develop as many standard templates for each of the major areas within the stage. For example the Road Crossings were found to fall into two basic formats and thus two templates were produced. Exhibit 5 shows one of the Road Crossing sub projects using the template for each of the various crossings designed in Micro Planner X-Pert for Windows

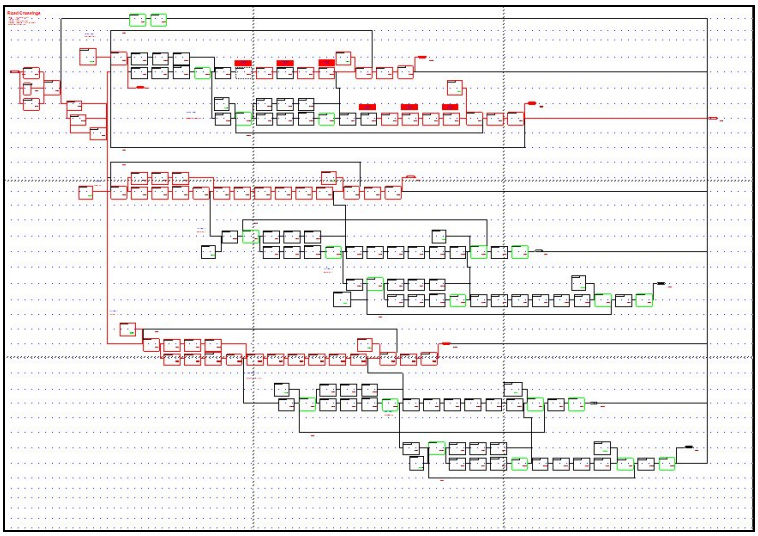
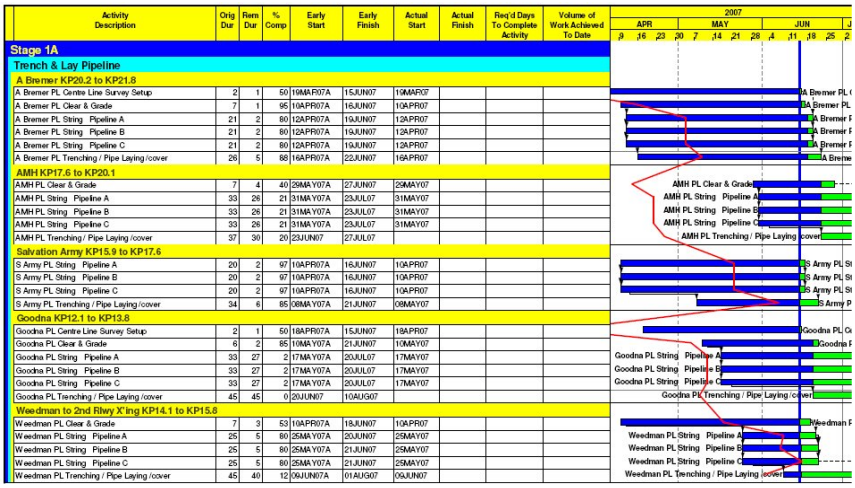


Exhibit 5 Major Road Crossings showing use of template

The road crossings were divided into packages depending on the type of boring machine used to drill under the road, As well as drilling machines some road crossings were trenched where this was possible, always bearing in mind the environmental impact that trenching can cause. Environmental studies and authorizations took place constantly and had to be considered carefully as the whole process of approvals could take up to seventy business days. So we produce a series of specific environmental critical path networks for major environmental areas, especially close to the rivers which also had to be crossed. Each

week a three weekly lookahead report for each of the sub projects was produced and distributed to all of the various alliance managers who then arranged for the report to be marked up with the progress made for the preceding week



Activity Description	Orig Dur	Rem Dur	% Comp	Early Start	Early Finish	Actual Start	Actual Finish	Req'd Days To Complete Activity	Volume of Work Achieved To Date
Stage 1A									
Trench & Lay Pipeline									
A Bremer KP20.2 to KP21.8									
A Bremer PL Centre Line Survey Setup	2	1	50	19MAR07A	15JUN07	19MAR07			
A Bremer PL Clear & Grade	7	1	95	10APR07A	16JUN07	10APR07			
A Bremer PL String Pipeline A	21	2	80	12APR07A	19JUN07	12APR07			
A Bremer PL String Pipeline B	21	2	80	12APR07A	19JUN07	12APR07			
A Bremer PL String Pipeline C	21	2	80	12APR07A	19JUN07	12APR07			
A Bremer PL Trenching / Pipe Laying /cover	26	5	88	16APR07A	22JUN07	16APR07			
AMH KP17.6 to KP20.1									
AMH PL Clear & Grade	7	4	40	29MAY07A	27JUN07	29MAY07			
AMH PL String Pipeline A	33	26	21	31MAY07A	23JUL07	31MAY07			
AMH PL String Pipeline B	33	26	21	31MAY07A	23JUL07	31MAY07			
AMH PL String Pipeline C	33	26	21	31MAY07A	23JUL07	31MAY07			
AMH PL Trenching / Pipe Laying /cover	37	30	20	23JUN07	27JUL07				
Salvation Army KP15.9 to KP17.6									
S Army PL String Pipeline A	20	2	97	10APR07A	16JUN07	10APR07			
S Army PL String Pipeline B	20	2	97	10APR07A	16JUN07	10APR07			
S Army PL String Pipeline C	20	2	97	10APR07A	16JUN07	10APR07			
S Army PL Trenching / Pipe Laying /cover	34	6	85	08MAY07A	21JUN07	08MAY07			
Goodna KP12.1 to KP13.8									
Goodna PL Centre Line Survey Setup	2	1	50	18APR07A	15JUN07	18APR07			
Goodna PL Clear & Grade	6	2	85	10MAY07A	21JUN07	10MAY07			
Goodna PL String Pipeline A	33	27	2	17MAY07A	20JUL07	17MAY07			
Goodna PL String Pipeline B	33	27	2	17MAY07A	20JUL07	17MAY07			
Goodna PL String Pipeline C	33	27	2	17MAY07A	20JUL07	17MAY07			
Goodna PL Trenching / Pipe Laying /cover	45	45	0	20JUN07	10AUG07				
Weedman to 2nd Riwy X'ing KP14.1 to KP15.8									
Weedman PL Clear & Grade	7	3	53	10APR07A	18JUN07	10APR07			
Weedman PL String Pipeline A	25	5	80	25MAY07A	20JUN07	25MAY07			
Weedman PL String Pipeline B	25	5	80	25MAY07A	21JUN07	25MAY07			
Weedman PL String Pipeline C	25	5	80	25MAY07A	21JUN07	25MAY07			
Weedman PL Trenching / Pipe Laying /cover	45	40	12	09JUN07A	01AUG07	09JUN07			

Exhibit 6 – Major Road Crossings 3 Weeks Lookahead

March Charts

In addition to the normal critical path networks, "March" charts were produced to show exactly how the pipeline progress was coming along. Longitudinal projects such as pipelines, railway lines and freeways are never built in a linear fashion and most often are constructed in many sections throughout the length and can often have some sections missed and thus the March chart shows how the linear progress matches the schedule progress of construction. Exhibit 7 below shows each of the pipe lines and its relative linear position within the construction.

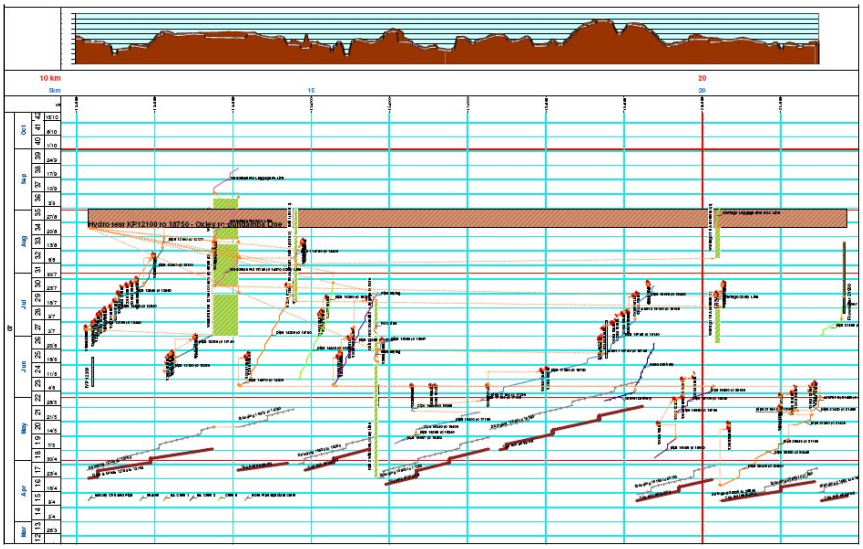


Exhibit 7 March Chart for Stage 1A

What is an Alliance?

A project alliance is a commercial legal framework between a government agency or department as the project 'owner' and one or more private sector parties as 'service providers' for delivering capital works projects.
Project alliances are characterised by: risk and reward sharing a no fault, no blame, no dispute culture unanimous principle-based decision making on key issues.
In a project alliance an integrated project team is selected on the basis of the best person for each position.

The Eastern Alliance

AJ Lucas, Transfield Services, GHD and SunWater are working together to design and construct the Eastern Pipeline between Luggage Point and Bundamba advanced water treatment plants.

AJ Lucas

AJ Lucas is an infrastructure and pipeline specialist and the largest directional drilling company in the Asia-Pacific region and a major world innovator in this advanced technology for infrastructure installation.

Transfield Services

Transfield Services is a leading international provider of operations, maintenance, asset management and project management services.

GHD

GHD is an international professional services company that serves the global market sectors of infrastructure, mining & industry, defence, property and buildings and the environment.

SunWater

SunWater is a leading company providing water infrastructure and supply solutions throughout Queensland, Australia and internationally.

Acknowledgment

My thanks to the Eastern Alliance Project Management team for their support in the preparation of this paper.

Appendix 1
The Senior Planner & Scheduler's Duties

- Planning, directing and coordinating all aspects of the use of "Micro Planner X-Pert and / or Primavera P3 for Windows" project management service delivery in relation to alliance proposals and construction contracts.
- Scheduling and management of the Micro Planner X-Pert for Windows and / or Primavera P3 service delivery program across all planned Eastern Alliance contracts, including resource scheduling and Earned Value Performance Measurement (cost control)
- Establish project charter, baseline budget and baseline schedule

- Establish and maintain Forecasting, tracking and reporting of scope, risk, schedule and cost issue register and status reports for all Eastern Alliance construction service delivery activities.
- Provide revised forecast of budget and schedule against baseline
- Assign work priorities, establish and manage the critical path
- Manage and gain approval of variations to scope, schedule and budget
- Ensure adherence to quality and auditable processes
- Close projects upon completion
- Identify and manage risks, issues, assumptions and dependencies
- Ensure that service delivery is planned and conducted so as to achieve Eastern Alliance's commercial objectives as well as the owners' requirements.
- Management of all scheduler and planner's relationships with respect to service delivery and service quality assurance.
- Management of relationships with employees, sub-contractors and suppliers involved in project management service delivery.
- Project management tasks including reporting, governance, risk management, issue resolution and budget management Formulating project, business and work plans, budgets and exercise decision making for the work area
- Assisting in the delivery of business benefits associated with these projects
- Developing organizational capability to lead and manage projects through the development of junior staff for future bids
- Building and maintaining strong relationships across Eastern Alliance, with relevant boards and committees, and other third parties
- Monitoring, reviewing and evaluating project delivery with a view to continuous improvement, strategic alignment and compliance with CLERP9 and Sarbanes-Oxley regulations
- Complete project governance & reports
- Contributing to the development and promulgation of a strong project management framework for use in the Eastern Alliance for future bids
- Actively review and contribute to project management and development methodology and framework definition.