Innovated Erosion & Sediment Control Planning in Pipeline Execution

2021 IPLOCA CSR Award

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1. COMPANY PROFILE

Bonatti is an EPC **International General Contractor providing services to Oil & Gas and Power industry**.
Our activities range from **engineering**, to **construction** and to **operation & maintenance** of **plants** and **pipelines**.
Bonatti's experience is **over 70 years** in challenging projects, **performed** under the **most critical environmental and logistical conditions** in **remote locations**, combining **innovative technologies and methodologies.**

Bonatti is "loop cycle service company", providing:

- **Engineering**
  Our engineering capabilities are applied to a wide range of works and delivery methods: from EPC projects to maintenance services. Leveraging on field experience we inject top class engineering solutions into all activities.
- **Construction**
  We review project processes since pre-construction phase. The effective integration of construction knowledge into planning activities, design and field operations allow us to achieve the overall project objectives in compliance with deadlines, accuracy and HS&E requirements. Our experience in construction is a wealth of knowledge developed over decades executing challenging projects all over the world. Due to our experience in all disciplines we commit full reliability performance to our clients: this is our main goal.
- **Operation & Maintenance**
  Our multi-years' experience in global operation & maintenance services allows us to integrate client's operational capabilities. The goals are production efficiency and optimized overall project lifecycle costs.

Bonatti's operations are deployed in **4 Continents** with **10,000 people** working with us.

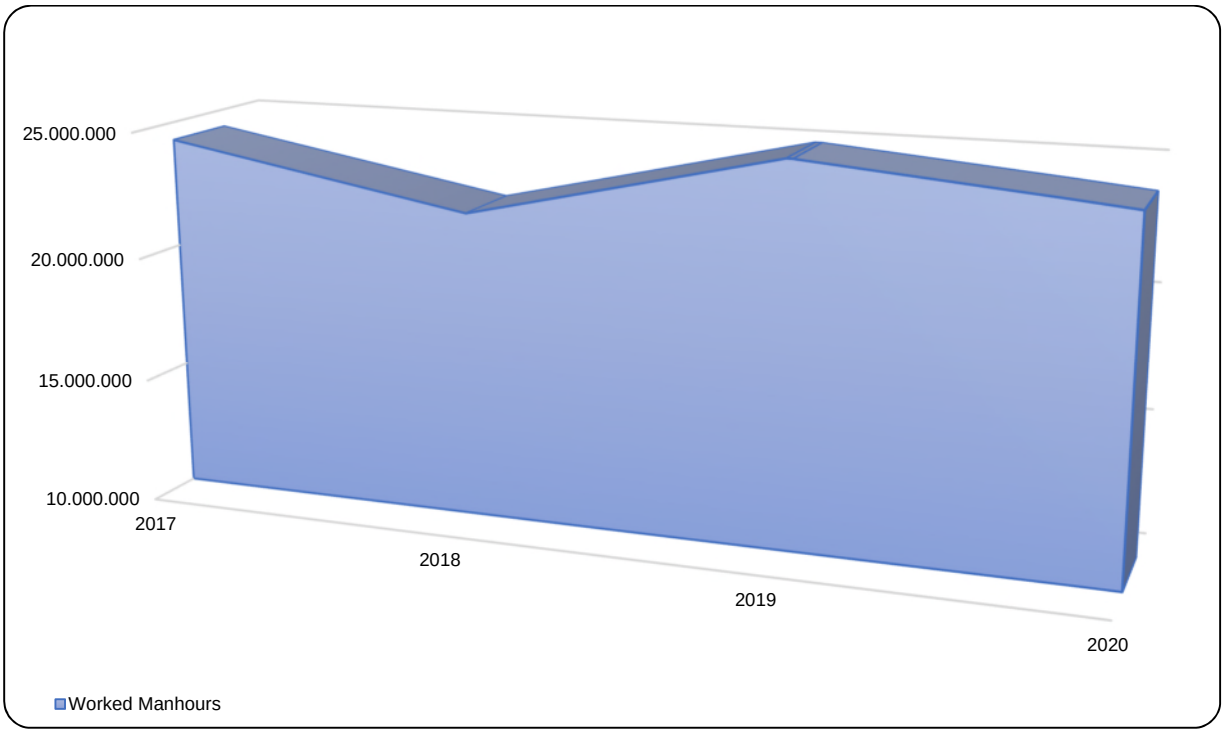


Figure 1 – Worked Man-hours

2.COMPANY COMMITMENT

Bonatti management team is fully committed to proactively managing environmental protection and acting in an ethical and socially responsible manner, in line with stakeholders' expectations. Our priority is to minimize the environmental impacts associated with our activities, to assure positive effects and contribute to sustainable economic development.

The Bonatti environmental policy is founded on the following key principles and forms the foundation of the Bonatti's management system for pipeline construction projects. Bonatti will undertake the following:

Accountability

The Bonatti leadership team is accountable for systematically managing environmental risks, opportunities and impacts as an integral part of its business. All employees, subcontractors and suppliers will be held accountable for understanding and incorporating environmental responsibilities into daily work activities and meeting applicable environmental requirements.

Performance

Set challenging goals and assess performance to continually improve environmental management systems and results that contribute to the

successful completion of the Project. We will work with our subcontractors, suppliers and partners to continually improve our environmental performance.

Standards

Comply with internal company standards and all applicable laws and regulations. Strategic relationships will be developed to promote sound environmental practices.

Communication

Implement a comprehensive communications systems to foster open dialogue and informed decision making through meaningful and regular communication of information with management, employees, subcontractors and the public.

3. INTRODUCTION

Pipeline construction will modify natural slopes and disturb vegetative cover along the pipeline route and at infrastructure sites. These activities can lead to increased surface water and groundwater runoff and soil erosion. Appropriate planning, design and responsible construction practices allow to minimize these effects and protect surface water, ground water and environmentally sensitive features and receptors.

Drainage, Erosion, and Sediment Control (DESC) planning is an integral part of pipeline execution. Properly planned, implemented and maintained, erosion control devices(ECDs) ensure that the ROW is maintained for construction access as well as protecting adjacent sensitive environmental receptors such as watercourses and wetlands.

Depending on topography and regional climates this can be fairly simple to achieve, or extremely challenging to achieve. In Burns Lake, British Columbia, Canada, the latter is certainly true. Heavy precipitation events, highly mobile soils combined with extensive sensitive receptors and stringent regulatory oversight, it's one of the most challenging climates in which one could imagine executing a major pipeline project.

ECDs will be designed, installed and monitored during all phases of pipeline and infrastructure construction, such as between clearing and grading, or between grading and pipe stringing to backfilling; including machine clean up prior to spring freshet and during final cleanup and reclamation.

As pipeline construction is a dynamic process and various construction phases may occur in different seasons, there may be weeks or even months between phases when the construction right-of-way (ROW) and infrastructure sites are exposed to the elements, and vulnerable to erosion and sedimentation. Planning, design and installation of ECDs will be critical for regulatory compliance and success of the Project.

Our novel solutions are many and varied. They range from adjusting civil methodologies, pre-planning, new technologies, and creative field deployment. This also means finding the best cost and execution efficiencies.

Our 'Finish-As-You-Go' construction philosophy will be used in all phases of construction to proactively ensure adequate controls are in place as crews progress each work front. Intrinsic to our Finish-as-you-go philosophy is that implementation of DESC is carried out concurrently with active work fronts as they progress within their respective activities during the construction phase. Permanent DESC planning will be developed to be incorporated into the final clean-up of the project. Such planning will include use of Best Management Practices (BMPs) or the preparation of Site Specific Erosion Control Plans (SSECP) that will be prepared at what are determined in the field as "high risk site". High risk sites being defined as those sites where surface drainage and erosion could impact sensitive environmental features or receptors such as watercourses and wetlands. Finish as you go work will utilize additional heavy equipment at work-fronts to establish controls during civil works.

3.1 SITE SPECIFIC EROSION CONTROL PLANS (SSECPS)

SSECPs are prepared for locations where the risk is assessed as high or very high based on a risk matrix. These plans are subject to reassessment should site conditions change. Additional plans may be added or deleted depending on site conditions during various phases of construction activity. Changes to the list will be tracked.

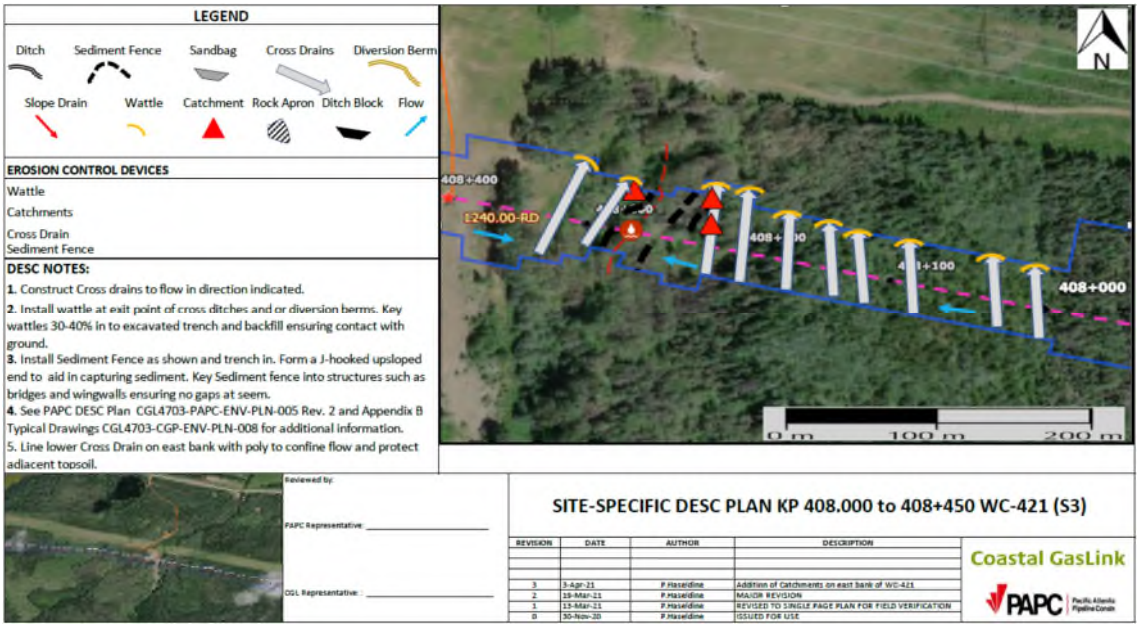
Initial assessment for SSECPs is primarily performed from desktop with field verification routinely conducted with added consideration allocated to areas having complex terrain such as steep longitudinal and side slopes. Updates to the SSECP's can be made when site conditions unfavorably change and current DESC mitigation is rendered inadequate.

4. DESCRIPTION

Executing a successful DESC program on a large-scale pipeline project in this region requires plans that are uncomplicated, simple to execute and provide for 'fit-for purpose' solutions. It is impractical to provide engineered design drawings for longitudinal and cross-slopes for more than 1,300 watercourse crossings and to amend these plans at each stage of mainline construction activities.

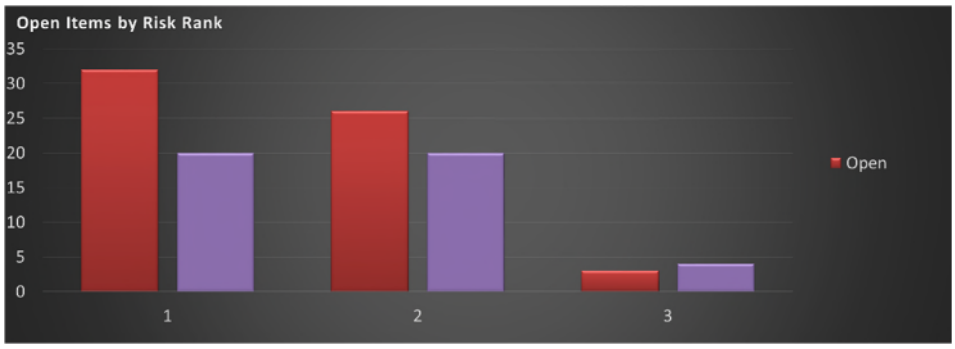
To tackle this challenge we take a gated approach to plan development and implementation which includes the following:

- Pre-planning with geospatial tools and information (terrain mapping, LiDAR, feature mapping)
- Cross-disciplinary site inspection and planning
- Anticipating down-schedule activities
- Continuous measurement and performance improvement for DESC measures and processes



4.1 PLANNING

Successful DESC planning begins when developing the appropriate method statements for construction in concert with reviewing construction March Charts and/or schedules. This will allow for understanding the local geography, soil types, environmental features and receptors and planned activities which are integral to ensuring the least amount of maintenance and rework. Utilizing geospatial tools, mapping required control features and implementing agile tracking systems are all needed prior to beginning civil works.



Understanding, in real time what the maintenance needs of the project are, crews can be managed for optimum efficiency and effectiveness. This also improves the effectiveness of client and regulatory reporting, which serves to best align the

client, contractor, environmental regulators on how priorities are determined and work is executed.

4.2 IMPLEMENTATION

Civil crews utilize DESC plans to properly resource and install ECD's where needed to facilitate right of way access. Once that stage has been completed, maintenance of the feature is undertaken by a dedicated DESC crews that ensure the features are working effectively.

During this phase, the next stage of plan development is already underway for the next activities – grading and then mainline construction. Each change in activity presents different challenges to DESC management. A wider right of way results in more exposed soils and an increase in risk to environmental receptors and features. Each stage of construction requires new, fit-for-purpose solutions.

Environmentally friendly flocculant is used throughout the project to assist in settling out sediment from right of way and ancillary drainage. Mobile tubes are utilized during right of way pumping as they are easy to transport and install where ever they are needed to dewater temporary sumps, settling ponds and catchments. The reusable tubes can be recharged with new flocculant cubes and redeployed as needed.

4.3 ACHIEVEMENTS

Utilizing the daily environmental reports, DESC Action logs, and ECD inspection forms 'trends' can be identified regarding DESC issues and concerns which can provide valuable information in the preparation of 'Environmental Field Bulletins' that can be distributed to both the construction and environmental teams (attached to tailgates) for discussion and/or to make decisions on DESC resourcing and materials and improve training sessions.

Similarly, data generated from the above will be used to support formal Lessons Learned that will combine cross-functional learnings across our plan framework. Conclusions from Lessons Learned sessions may result in process or plan updates. Revised plans will be submitted, as required, via document control, and process changes shared with personnel via onboarding sessions, internal draining, as well as updated field resources such as the DESC Field Binder.

Performance from DESC monitoring and tracking is measured by our compliance record. Because of past learnings we have become the top DESC performer on the project. As more right of way becomes opened up our processes and controls will ensure a high compliance record.

5. CHALLENGES AND CONSTRAINTS

The ever-changing conditions of the right of way combined with the progressing construction activities and high rainfall continue to test the DESC measures in place as well as the deployment strategies. This means remaining highly committed to nimble continuous improvement methodologies.

Appropriate planning, design and responsible construction practices are important to minimize these effects and protect surface water, ground water and environmentally sensitive receptors and features.

6. LONG TERM PLANNING

Pipeline construction is a dynamic process and various construction phases may occur in different seasons, there may be weeks or even months between phases when the construction ROW and infrastructure sites are exposed to the elements, and vulnerable to erosion and sedimentation. Planning, design and installation of effective ECDs will be critical for regulatory compliance and the overall success of the Project.

Continuous improvement is the foundation of our DESC program. Each new metre of open grade presents a new learning and each failure a success. It drives

our team to continuously seek novel product solutions and deployment strategies. Our learnings are tracked and applied to cross-disciplinary planning in at site and implemented into corporate documentation and plans for future projects.

Mobile tracking and reporting systems are also being developed to streamline communication and data-flow between inspection, planning, and maintenance. The goal is that this will enhance reporting functionality and labour efficiency.