



WORLDWIDE EPC SOLUTIONS FOR OIL & GAS SINCE 1962



*29-31 MAY 2024, PIACENZA (ITALY)*

# Coastal GasLink Project – Section 8 West Overcoming Design and Construction Challenges

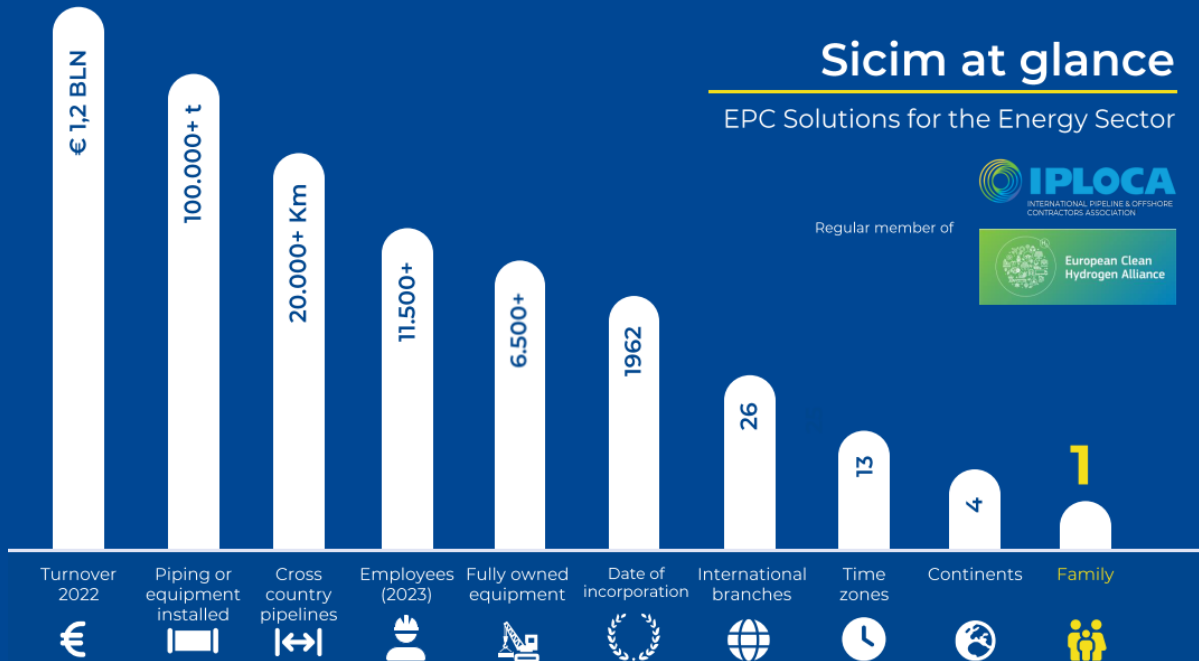


# SICIM Business Profile

We are a leading Worldwide Contractor providing **E**ngineering, **P**rocurement and **C**onstruction services to the **Energy Industry**. With over 62 years experience, our main activity is Pipeline and Plants construction. Our mission is to provide our Clients with the best possible EPC solutions by full commitment to continuous improvement in People, Equipment and Innovation through a sustainable business.

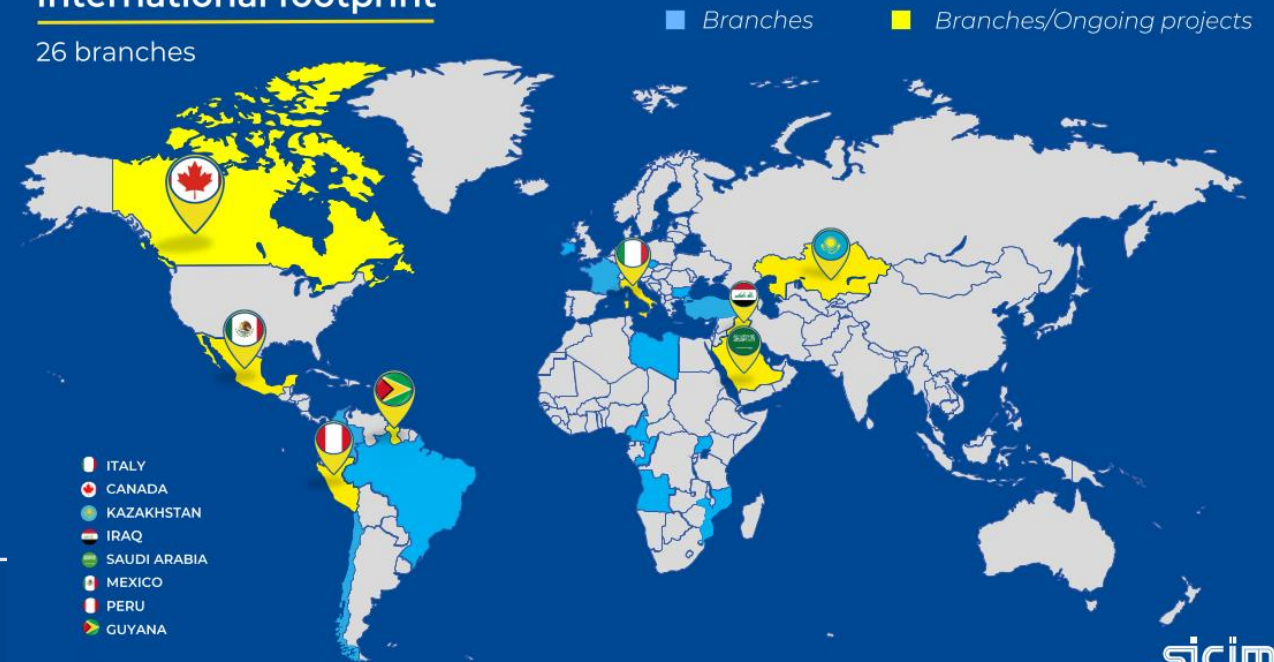
Range of services:

- Project Management;
- Engineering and Procurement services for EPC projects (approx. 250.000 hr/year);
- Pipelines and Flowlines to transport fossils and non fossils fluids (e.g. CH<sub>4</sub>, H<sub>2</sub>, CO<sub>2</sub>, NH<sub>3</sub>, etc.);
- Oil/gas plants & facilities;
- Energy transition projects (CCS/CCUS; H<sub>2</sub> production, Solar plants, Biogas & Biomethane plants)



### International footprint

26 branches



# Coastal GasLink Project (CGL) (Section 8 West)



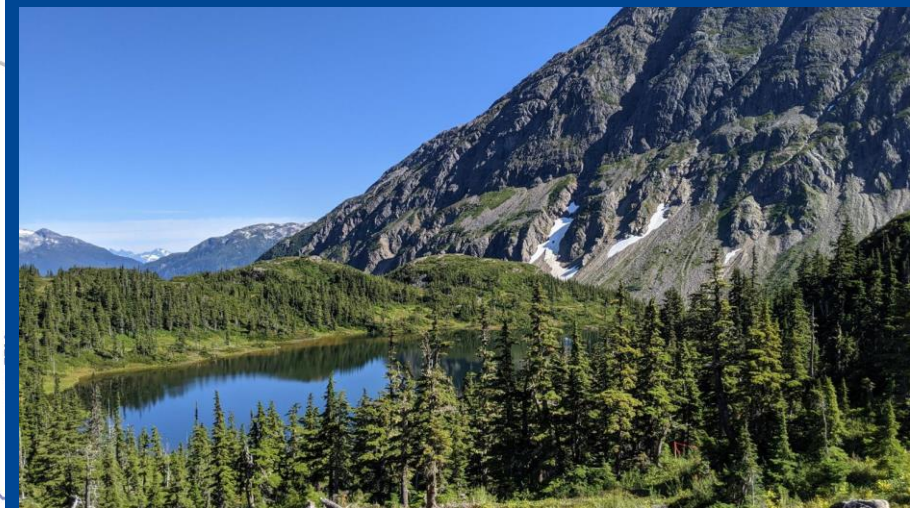
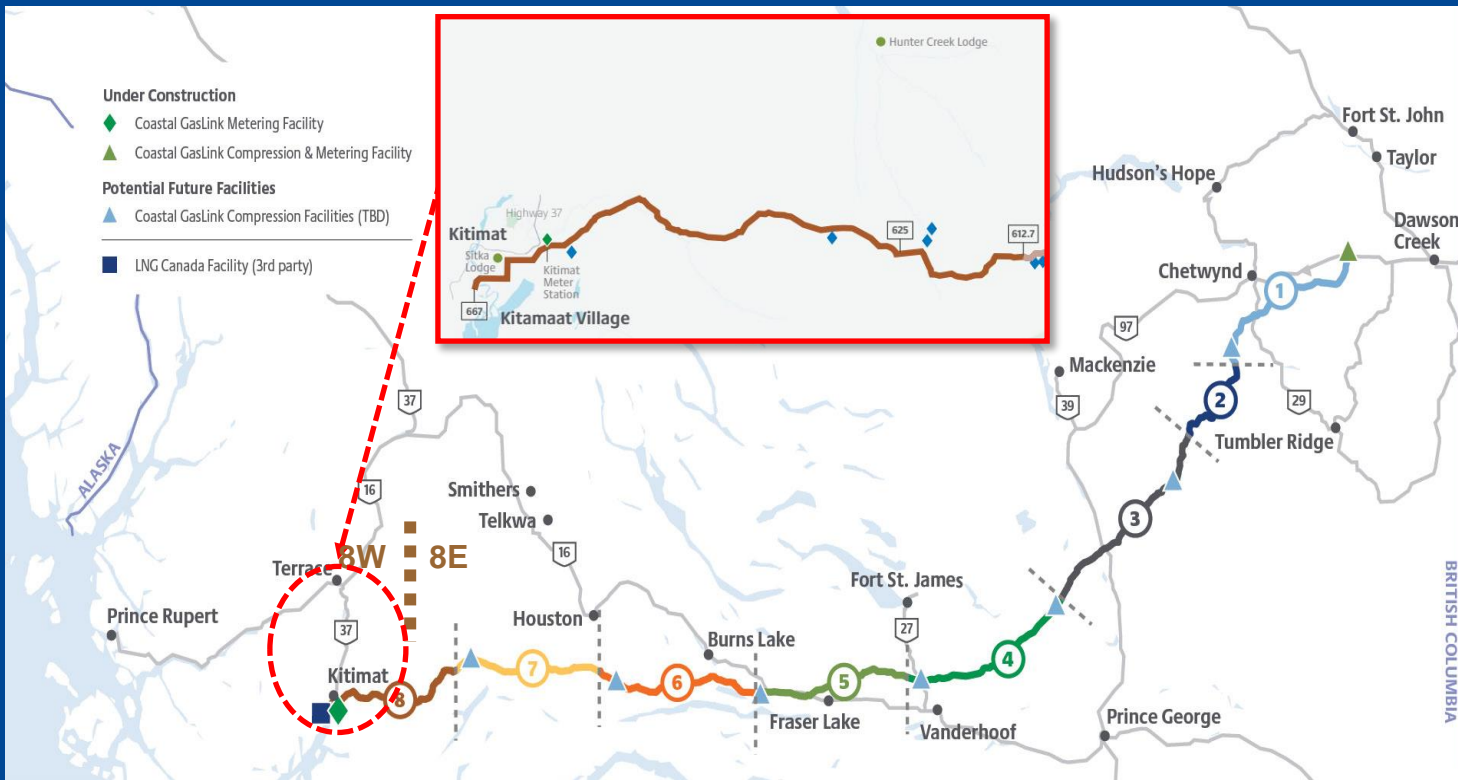
## Project overview

The Coastal GasLink Project is a 670-kilometre DN48" pipeline that delivers natural gas from northeastern B.C. to the LNG Canada facility in Kitimat, B.C.

Sicim, in partnership with the Canadian group Ledcor, successfully performed the installation of Section 8 West, consisting of 55 Km of 48", which was considered the most technically challenging portion of the entire project due to its geographical complexities through the Coastal Mountains.

## KEY QUANTITIES

- ✓ Total Welds = 3.399
- ✓ Tie In Welds = 37% of total welds (1.263)
- ✓ ~63% of all pipe required bending
- ✓ Project Labor Hours = + 6,8 MLN
- ✓ Sheet pile Installation =  $\approx 6.000\text{m}$
- ✓ Grade =  $1.083.090\text{m}^3$ 
  - ✓ Blast Rock =  $443.649\text{m}^3$
  - ✓ Ditch Rock Blast =  $20.088\text{m}$
- ✓ Aggregate Crushed =  $493.416\text{m}^3$
- ✓ Watercourse Installed = 238
- ✓ Trenchless Crossings = 11 (860m)
- ✓ Glaciomarine Clay =  $1.120\text{m}$
- ✓ Steep Slopes Installed =  $4.163\text{m}$





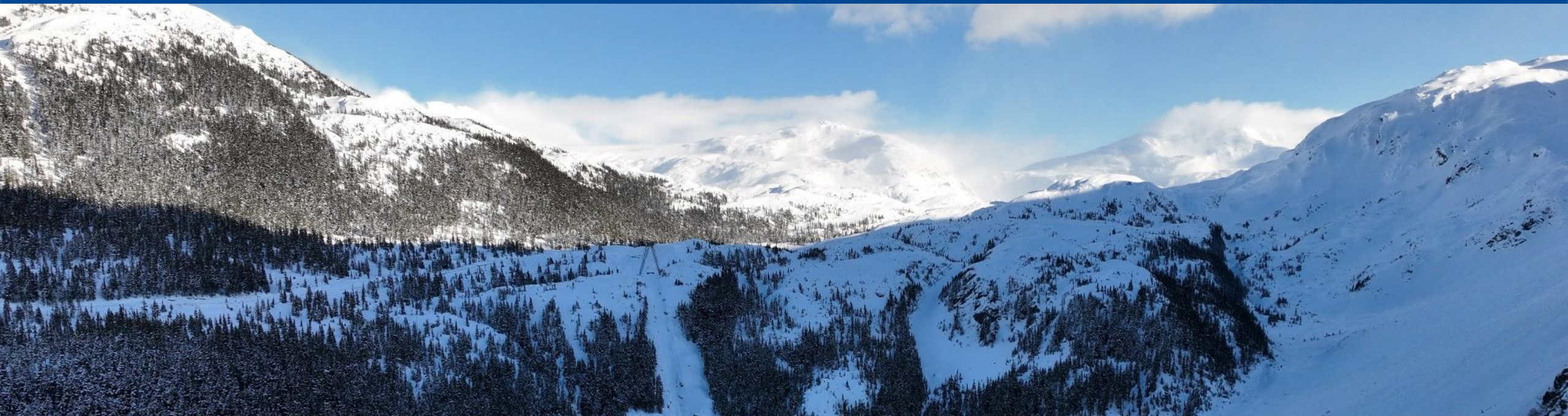
# Coastal GasLink Project (CGL) (Section 8 West)

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## Findings

Section 8 West was considered as the most complex section of CGL project due to:

- ✓ Route orography, 22 steep slope sections were identified along the route; most of them requiring unique installation procedures;
- ✓ Height difference between start and ending points of the section was more than 1,500 m over the 55 km;
- ✓ Remoteness of the area with the relevant logistic issues;
- ✓ Extreme weather conditions that were limiting the yearly working window to 6 months;
- ✓ Geological conditions, a large variety of different soil conditions were present along the route varying from large quantity of metamorphic rock to glacial marine clay;
- ✓ Strict environmental limits imposed by the regulator on water quality;
- ✓ Shortage of personnel skilled on pipeline installation in steep slope sections;





# Coastal GasLink Project (CGL) (Section 8 West)

## Solutions

To face these construction challenges, Sicim had to implement several unconventional solutions for pipeline installation to mitigate the numerous risks involved when laying pipes on the challenging steep slopes typical of Coastal Mountains:

- ✓ **Cable crane:** two steep slope sections (7 & 10), with slopes up to 45 degrees, required the use of cable crane systems for pipeline installation;
- ✓ **Raise bore:** steep slope section 3 required the use of this technology in consideration of the short weather window and limited access;
- ✓ Installation and operation of 2 camps to accommodate the construction crews;
- ✓ Early planning and installation of a dedicated access road system;
- ✓ **Construction planning:** the varied seasonal weather conditions presented additional challenges for this multi-year project dictating the implementation of a detailed schedule to properly make full use of the restricted weather window that was limiting most of the construction activities from June to November. Installation of a customized lighting system to daylight the steep slope part of the critical path of the project to increase the daily working hours;
- ✓ Development of dedicated grading plans to minimize the cut and fill quantities, extensive use of the drill and blast;
- ✓ Development of detailed erosion and sediment control plans specific for each section prepared by environmental consultants approved by the regulator;
- ✓ Use of specialized expat personnel with large experience on mountain pipeline projects around the world. Implementation of a mentorship program to protect the green hands brought on a pipeline site for first time.



# Coastal GasLink Project (CGL) (Section 8 West)

## Steep slope 7 – Cable crane (length : 1.532 m / difference in height : approx. 1.000 m / max slope 58°)

The **open cut installation** along this slope was performed with the support of a **5 towers double line cable crane system**. The **challenges** associated with this slope were the **quantity and hardness of the rock**, the **reduced weather window for the construction activities** and the **water management** together with the **erosion and sediment control**.

**Sicim**, to take advantage of the different snow conditions along the slope through the year (the elevation difference between the top and the bottom of the slope is 1.000 m approximately), **implemented an unconventional construction technique and sequence that combined the pipeline installation inside the trench, in alternate up hill and downhill direction**. The top section was installed downhill, after snow melting, while the bottom section was installed uphill as not affected by the snow. No simultaneous operations were allowed. In order to help the schedule, a night shift was implemented with by an extensive lighting system.

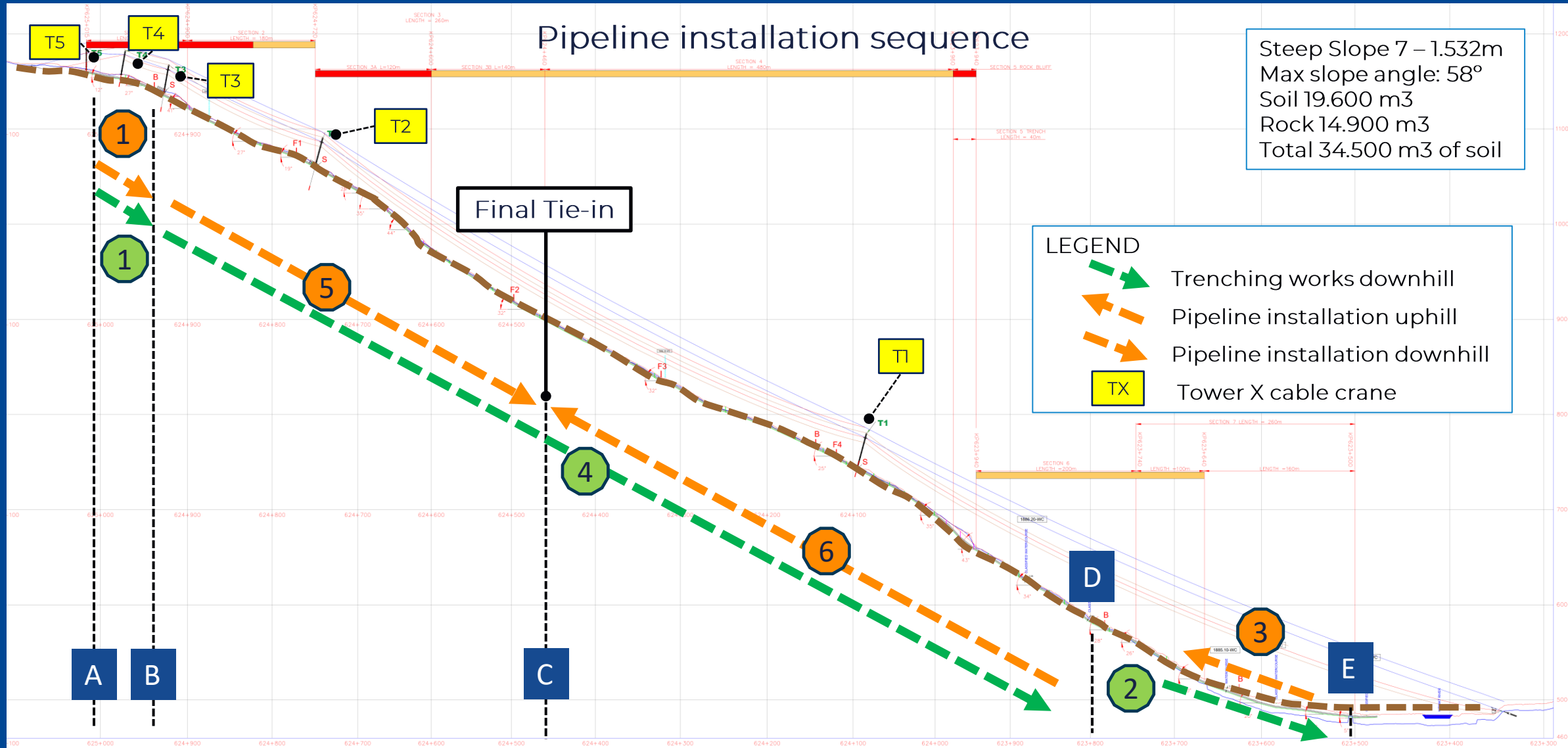


*The cable crane installation was completed during summer and fall 2021. The system was commissioned and entered in operation during November 2021 just before the winter break.*



# Coastal GasLink Project (CGL) (Section 8 West)

## Steep slope 7 – Cable crane



# Coastal GasLink Project (CGL) (Section 8 West)

Steep slope 7 – Cable crane



18 months

Works completed ahead of schedule  
with 0 LTIs!!



#SEQUENCE	Section	Activity	2022												2023											
			J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1	A => B	Trenching works				█																				
1	A => B	Pipeline installation					█																			
2	D => E	Trenching works					█																			
3	E => D	Pipeline installation						█																		
4	B => D	Trenching works							█	█	█	█	█	█	█	█										
5	B => C	Pipeline installation									█	█														
6	D => C	Pipeline installation														█	█	█	█	█	█					

Mechanical Completion



# Coastal GasLink Project (CGL) (Section 8 West)



**Excellence in Performance!!**

## Steep slope 7 – Cable crane

Each member of the crew that installed the pipeline along this slope received from the President of Coastal GasLink the **Extraordinary Legacy Award**, a recognition for the crew impeccable preparation, planning and execution allowing to complete the work outside of the prescribed working season, and ahead of schedule, all while remaining focused on safety, resulting in zero accidents.

**Coastal GasLink**  
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September 18, 2023

Dear Luigi Quarta,


It is my absolute pleasure and honour to award you the Extraordinary Legacy Award for **Excellence in Performance**.

The Extraordinary Legacy Awards were created to recognize individuals, initiatives and teams that best exemplify the values of our Extraordinary Legacy Initiative (ELI) and have delivered incredible results for our project, our communities and our company by living out these values.

While everything you do each day makes an impact, it was your team's ability to manage the technically challenging scope of work at Cable Crane Hill that stood out as an extraordinary effort. Your impeccable crew preparation, planning and execution allowed the team to complete the work outside of the prescribed working season, and ahead of schedule, all while remaining focused on safety, resulting in zero incidents.

Your team, and all of us here at Coastal GasLink, have recognized your efforts to go above and beyond to help bring this project across the finish line. As we approach project completion, it is people like you who are leaving a positive mark that will have an impact today and into the future of our business in B.C. and beyond.

Congratulations and thank you for your continued efforts in helping us bring our project home.

  
Bevin Wirzba, President, Coastal GasLink



**Coastal GasLink**

## Extraordinary Legacy Award

Excellence in Performance  
Category

**Angelo Alfano**  
Name of recipient

The **Extraordinary Legacy Award** has been presented to Angelo Alfano in recognition of your role in building an extraordinary legacy on the Coastal GasLink Project. We are grateful for your commitment to our core value of safety and respect for all people, communities and the environment. You have been an integral part of building a legacy we can all be proud of today, and for decades to come.

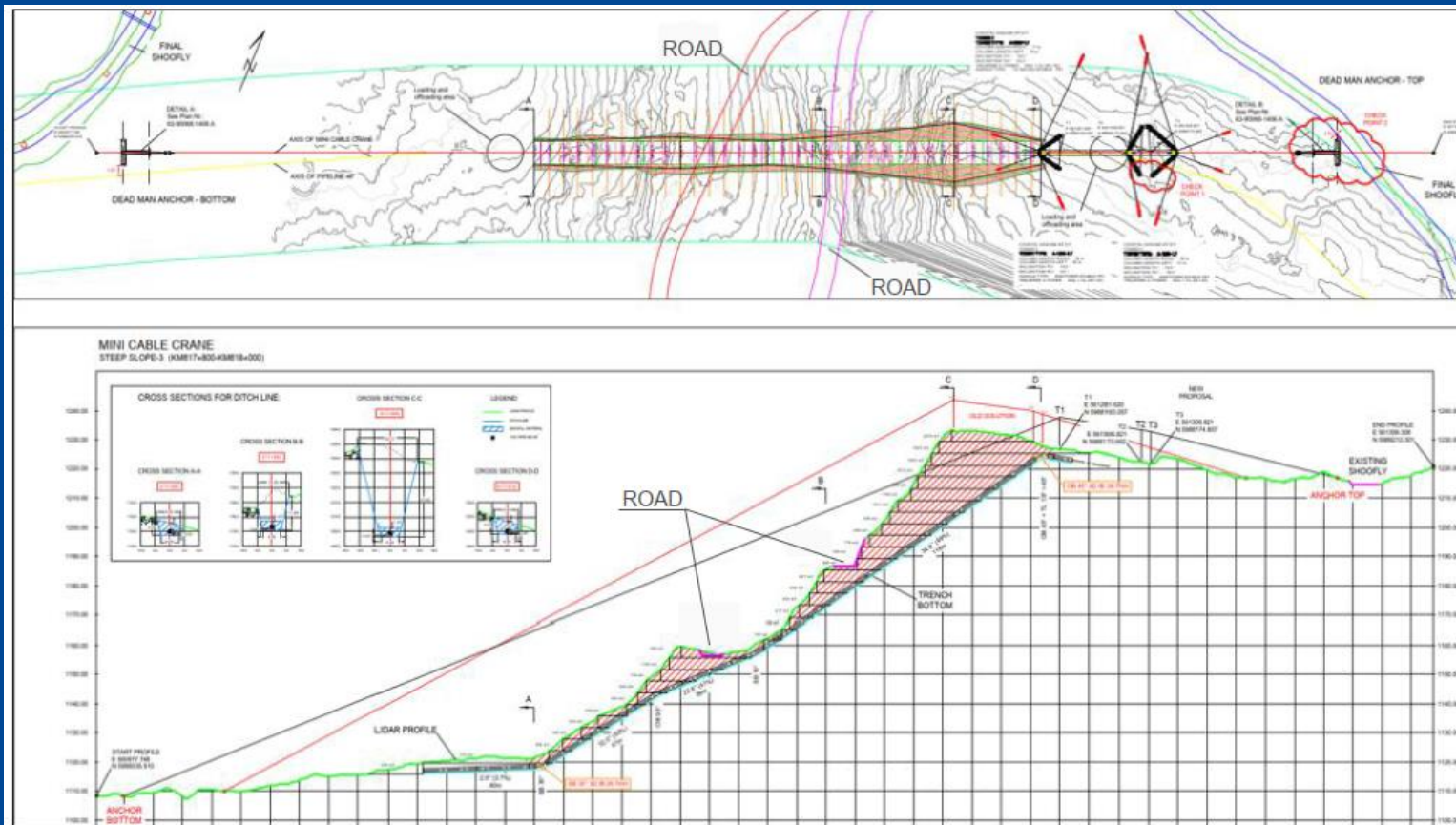
9/18/23  
Date

  
Bevin Wirzba, President, Coastal GasLink

# Coastal GasLink Project (CGL) (Section 8 West)

## Steep slope 3 – Raise bore

- ✓ Icy Pass, the **highest point** in the project had significant terrain complications and access limitations;
- ✓ Steep slope : Length 213m, **max slope angle 62°**;
- ✓ **An open cut** pipeline installation methodology was initially planned for this slope with the support of a cable crane system;
- ✓ **21.150 m<sup>3</sup> of rock** for grade & trench excavation were estimated.





# Coastal GasLink Project (CGL) (Section 8 West)

## Steep slope 3 – Raise bore

- ✓ The initial plan was to built an access road crossing the slope. This to allow all construction equipment to reach the east end of this pipeline section. The access road was built as part of the early works by a different contractor.



- ✓ It was then determined that this point would have created a serious risk for the traffic when activities would have to be carried out north to the interference point; it was assessed that a rerouting was needed to remove the risks associated thereof.



- ✓ Timing for obtaining reroute approval by the regulator was inconsistent with the construction schedule. This required to come up with a different solution.



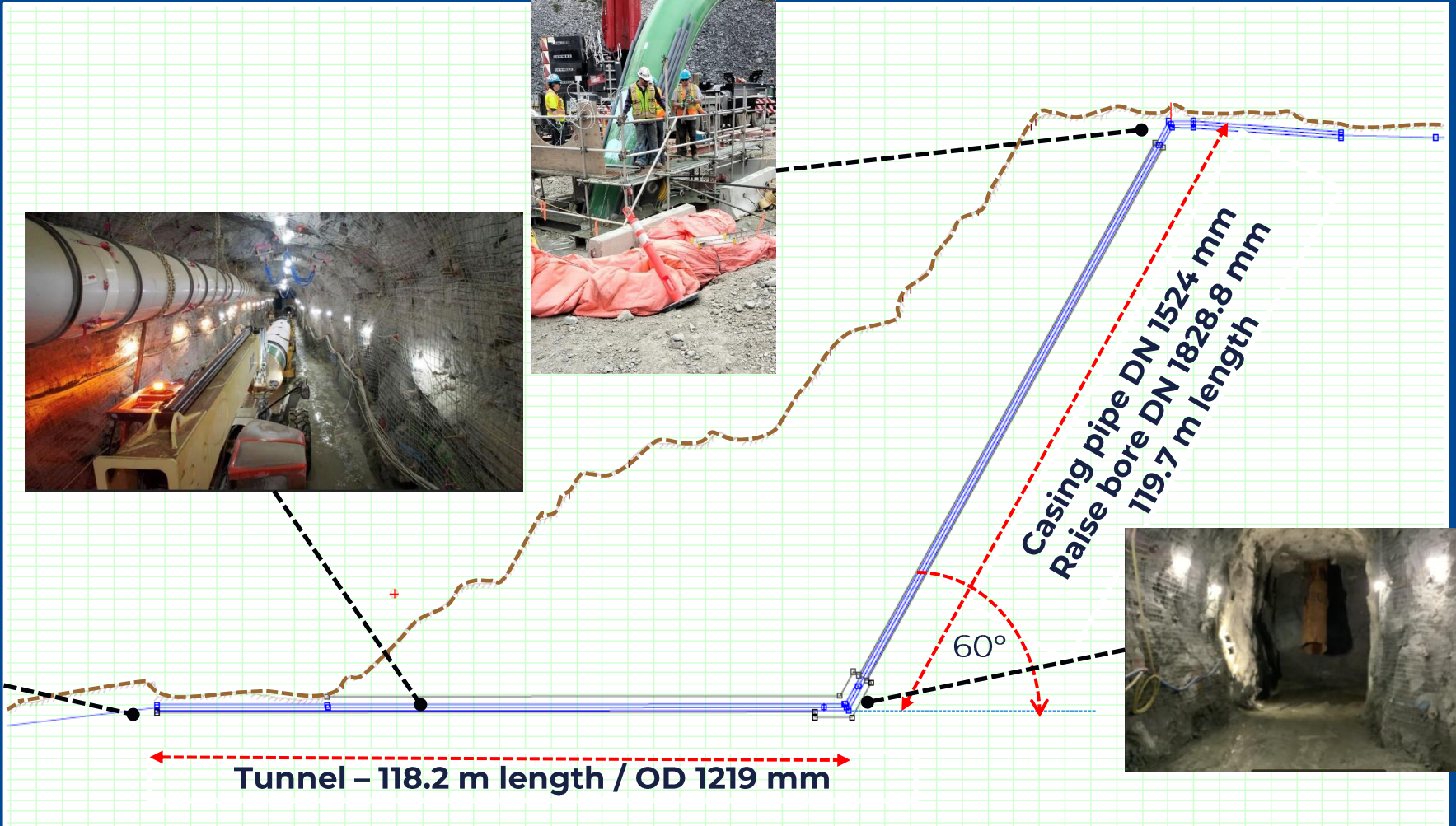
# Coastal GasLink Project (CGL) (Section 8 West)

## Steep slope 3 – Raise bore



Sicim project team determined that a trenchless installation method would be the most suitable – the steep slope raised bore.

It was the first time the raised bore method was used in Canada!





# Coastal GasLink Project (CGL) (Section 8 West)

## Steep slope 3 – Raise bore

By using the raise bore technique, a 100 m long vertical shaft was built on Steep Slope 3 to a horizontal tunnel at the bottom of the vertical shaft. Once the drilling activities were concluded, crews safely completed the installation of the 48" product pipe ahead of schedule.

### Main advantages:

- ✓ Traditionally, steep slope installations require open-cut excavations and increase safety risks for workers. By using the raised bore method, Sicim reduced risk by keeping workers out of steep slope trenches;
- ✓ The pioneering approach improved the quality of pipe installation with welding and coating completed on a level surface;
- ✓ Raise bore pipeline installation minimize surface disturbance leading significant reduction in reinstatement efforts during the clean up stages;
- ✓ Reduced risk of potential delays due to hazard working conditions;
- ✓ Smaller ecological footprint;



# Coastal GasLink Project (CGL) (Section 8 West)

Steep slope 3 – Raise bore



14 months



*Works completed ahead of schedule with 0 LTIs!!*

Activity	2022								2023								
	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S
<b>Raise bore</b>																	
Mobilization & Setup			■														
Drilling				■	■												
Pipe installation				■	■	■	■	■	■	■	■	■	■	■			
Backfilling															■	■	
<b>Tunnel</b>																	
Mobilization & Setup			■														
Drilling				■	■												
Pipe installation													■	■	■	■	
Concrete Block, Backfill, & Cleanup																■	■





# Coastal GasLink Project (CGL) (Section 8 West)

Steep slope 3 – Raise bore





# Coastal GasLink Project (CGL) (Section 8 West)

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## Achievements

- ✓ Mitigation of the numerous risks involved in Coastal GasLink's steep slope pipeline installation in the Coastal Mountains,
- ✓ Extremely challenging conditions that required cutting edge solutions;
- ✓ Achieved a Safety enhancement, increased productivity and put environmental responsibility at the front plan;
- ✓ Notable cost saving compared with "conventional" pipeline construction solutions;
- ✓ High level technical preparation and planning capabilities allowed to complete the works in line with the available seasons and ahead of schedule, all while remained focused on safety & sustainability;
- ✓ Widespread dissemination of a culture based on respect for all people and communities;
- ✓ Attitude to pushing boundaries and driving positive change in our industry;
- ✓ Client recognition of our strong commitment to delivering a world-class project that will provide economic benefits for Indigenous communities, British Columbians and Canadians for future generations.
- ✓ Established innovation solutions for future projects in similar terrains



# Coastal GasLink Project (CGL) (Section 8 West)



Learn more about the project watching this video

