

Scott Pearson and Claude Lewis

Optimising Water Treatment Plant Commissioning: Strategies for Successful Integration

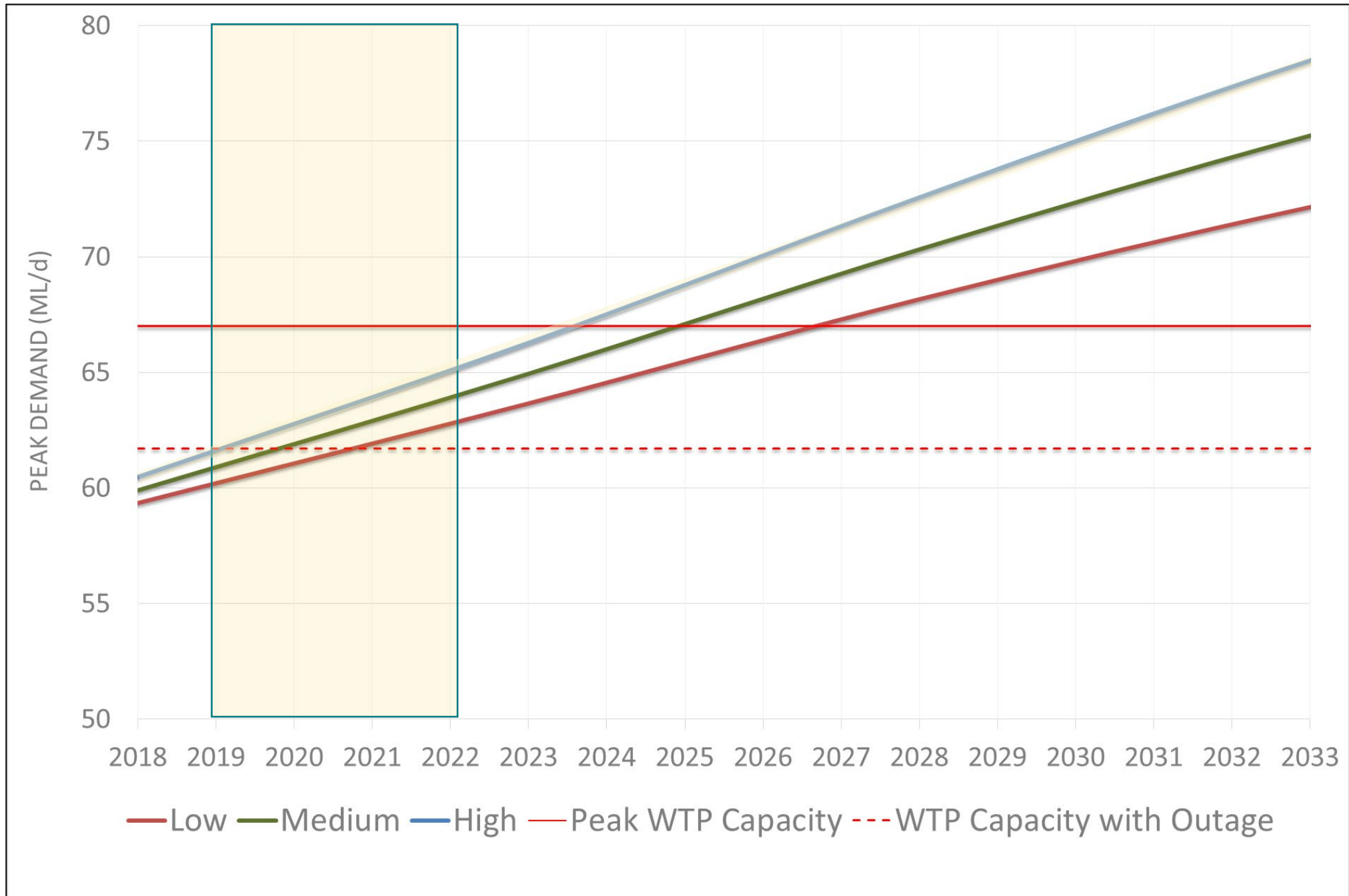


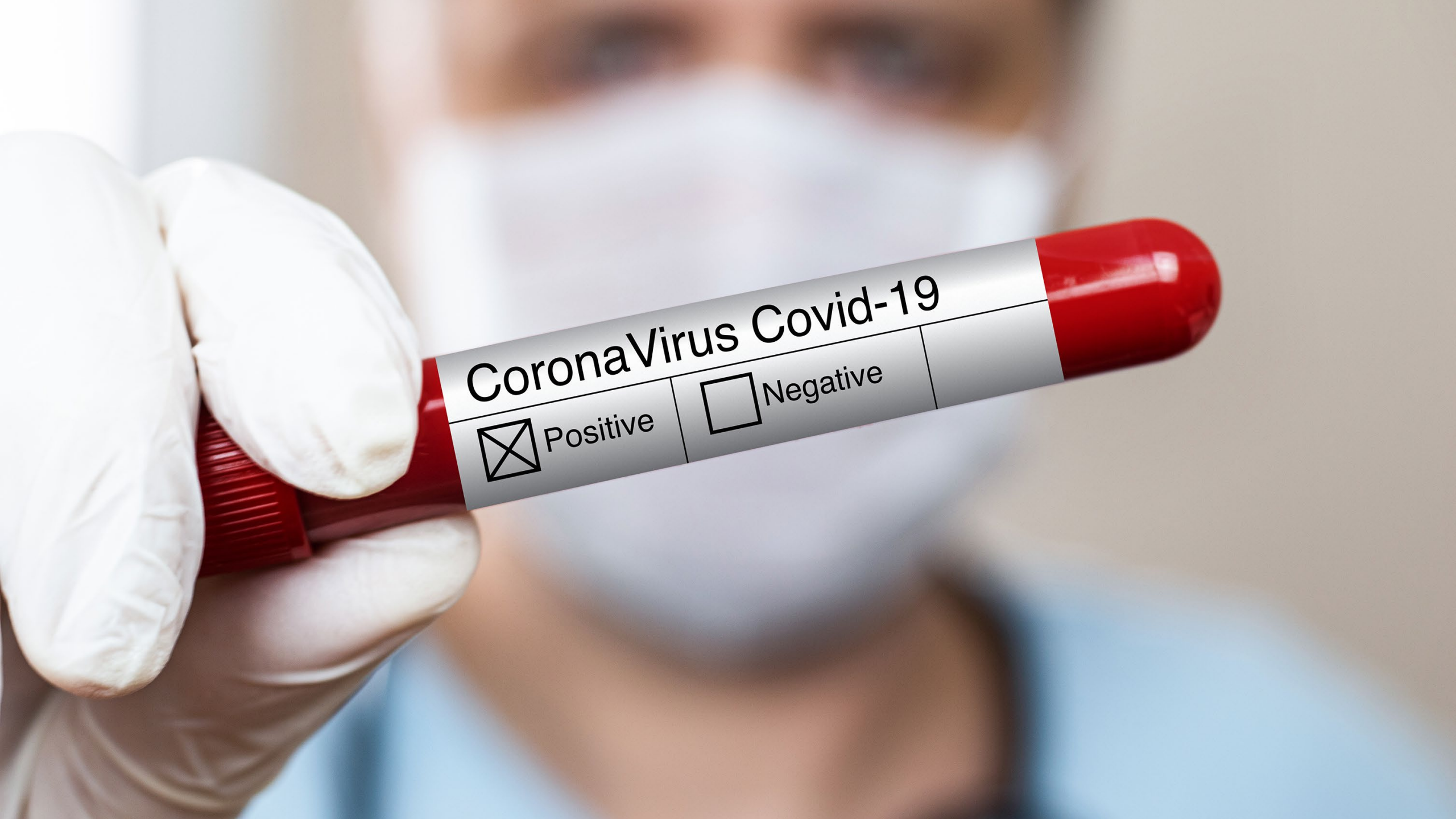
water
NEW ZEALAND
CONFERENCE & EXPO
17-19 OCTOBER 2023
Tākina, Te Whanganui-a-Tara Wellington

Commissioning

Gerund Verb

The part of the project where the start date is most likely to be delayed with no change to the end date...





CoronaVirus Covid-19



Positive



Negative



**RISK OF DELAYED
COMPLETION**



**RISK OF
STRINGENT
RESTRICTIONS**



Project Summary



 **Beca**



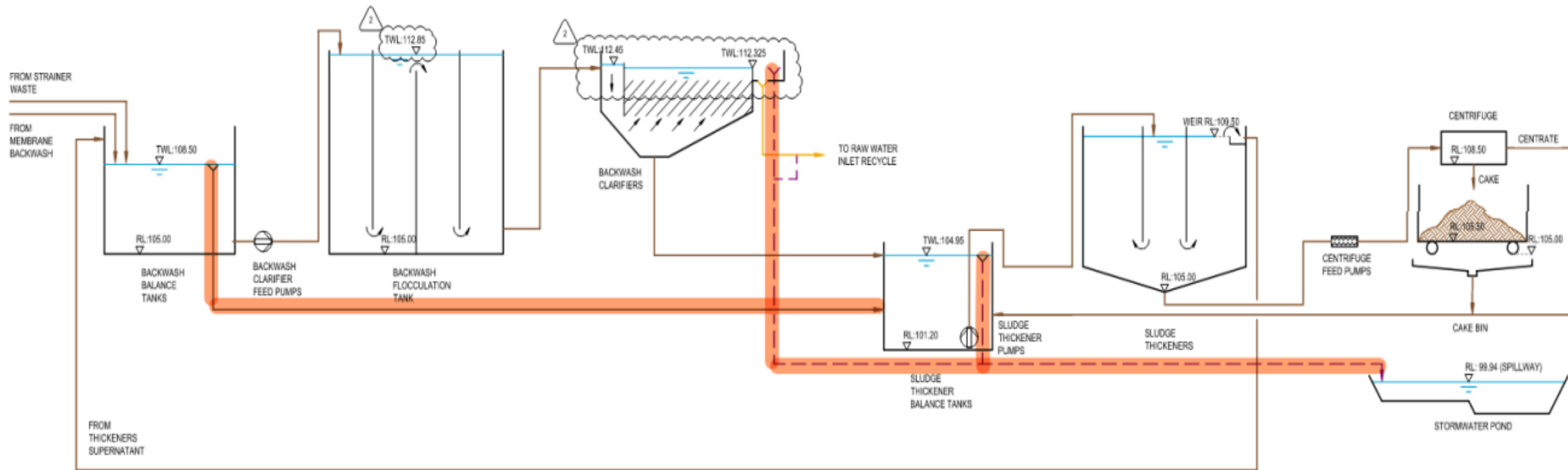
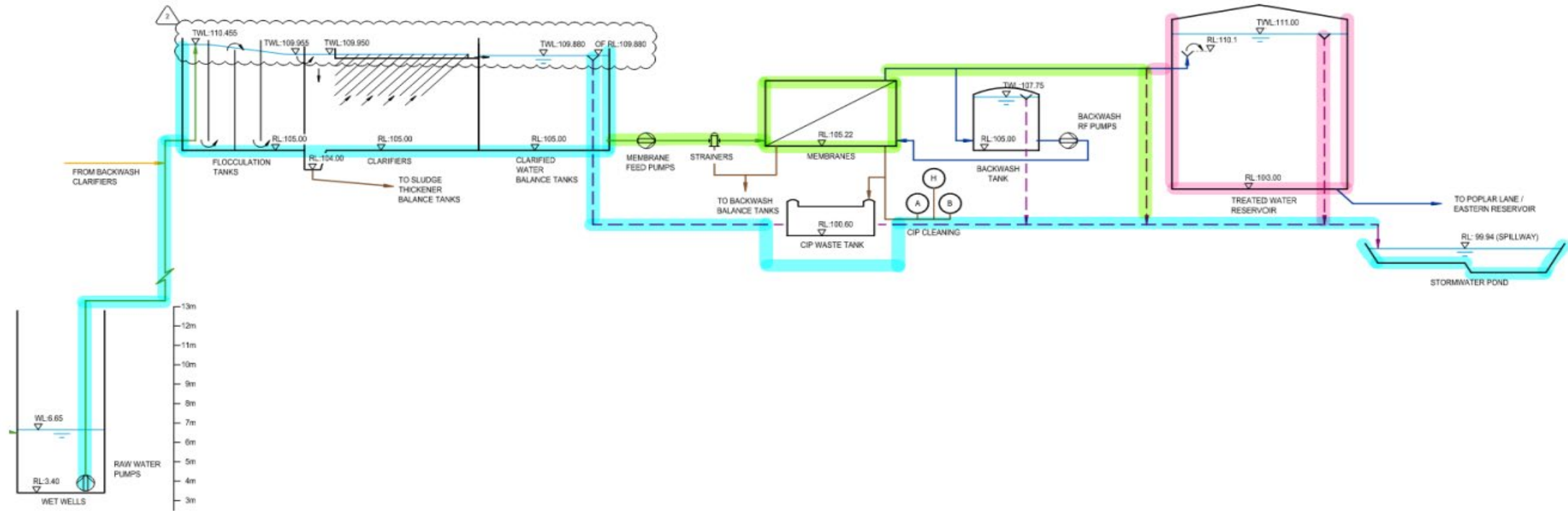
Contractual Structure



Target
Date



Know what's possible



Understand your Risk Profile

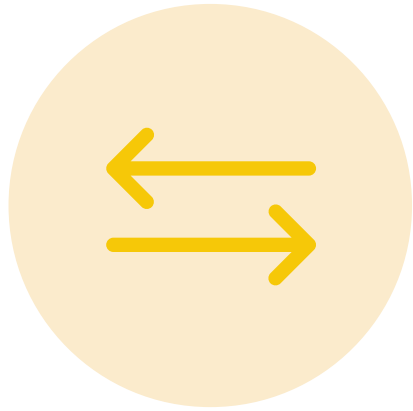


Risk and Mitigation

Identified Risks	Possible Contingencies
Mechanical equipment delivery	<ul style="list-style-type: none">• Run without redundancy• Bypass it and commission it later
Control system parts, Instrumentation and electrical equipment	<ul style="list-style-type: none">• Order spares ASAP• Beg, borrow and steal from others• Move equipment around from the site
Reservoir completion	<ul style="list-style-type: none">• Leak test early• Disinfect with pipeline
General delays from illness and other challenges	<ul style="list-style-type: none">• Open communications, adopt a different approach...

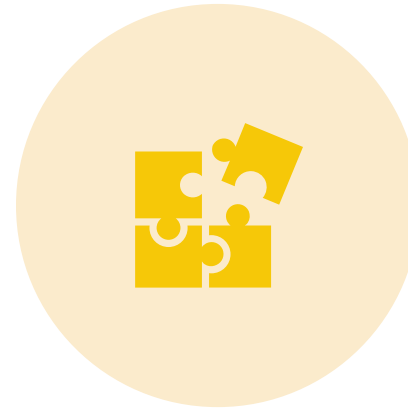


Identify and Assess Options



ADJUST PRACTICAL COMPLETION REQUIREMENTS

- Giving practical completion only on all items required for the plant operation
- Defer landscaping and office areas
- No significant contractual change
- Simpler ongoing management
- Risk of any other delays affecting programme



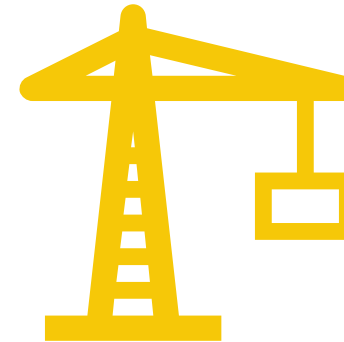
INTEGRATE COMMISSIONING

- Commission areas as they are completed prior to PC.
- Work with the construction programme
- Flexibility of starting commissioning of plant areas
- Higher construction management

Decision

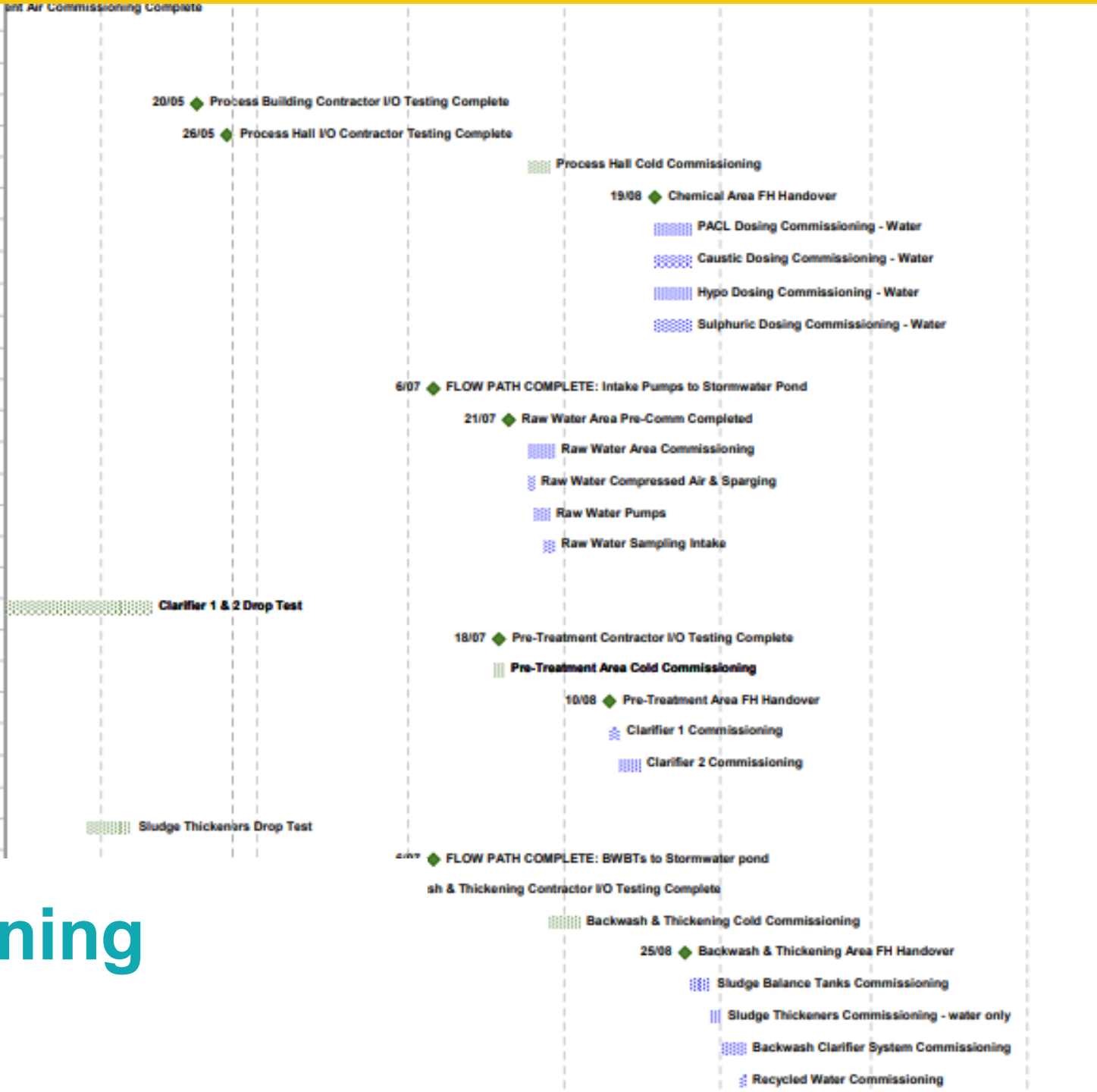


Simplified contract management
and accepting risks to programme



Ability to adapt to risks and changes
in a tight construction programme

2	Instrument Air Commissioning Complete	0%	0 days	Thu 31/03/22	Thu 31/03/22
4	3 Temporary Service Water System Setup	0%			
8					
9	4 Process Building Contractor I/O Testing Complete	0%	0 days?	Fri 20/05/22	Fri 20/05/22
10	5 Process Hall I/O Contractor Testing Complete	0%	0 days	Thu 26/05/22	Thu 26/05/22
11	6 Process Hall Cold Commissioning	0%	4 days?	Mon 25/07/22	Thu 28/07/22
12	7 Chemical Area FH Handover	0%	0 days	Fri 19/08/22	Fri 19/08/22
13	8 PACL Dosing Commissioning - Water	0%			
17	9 Caustic Dosing Commissioning - Water	0%			
21	10 Hypo Dosing Commissioning - Water	0%			
25	11 Sulphuric Dosing Commissioning - Water	0%			
28					
29	12 FLOW PATH COMPLETE: Intake Pumps to Stormwater Pond	0%	0 days	Wed 6/07/22	Wed 6/07/22
30	13 Raw Water Area Pre-Comm Completed	0%	0 days	Thu 21/07/22	Thu 21/07/22
31	14 Raw Water Area Commissioning	0%			
32	14.1 Raw Water Compressed Air & Sparging	0%	1 day	Mon 25/07/22	Mon 25/07/22
33	14.2 Raw Water Pumps	0%	3 days	Tue 26/07/22	Thu 28/07/22
34	14.3 Raw Water Sampling Intake	0%	2 days	Thu 28/07/22	Fri 29/07/22
35					
36	15 Clarifier 1 & 2 Drop Test	0%	26 days?	Tue 5/04/22	Tue 10/05/22
37	16 Pre-Treatment Contractor I/O Testing Complete	0%	0 days	Mon 18/07/22	Mon 18/07/22
38	17 Pre-Treatment Area Cold Commissioning	0%	2 days?	Mon 18/07/22	Tue 19/07/22
39	18 Pre-Treatment Area FH Handover	0%	0 days	Wed 10/08/22	Wed 10/08/22
40	19 Clarifier 1 Commissioning	0%			
46	20 Clarifier 2 Commissioning	0%			
52					
53	21 Sludge Thickeners Drop Test	0%	7 days?	Thu 28/04/22	Fri 6/05/22
54	22 FLOW PATH COMPLETE: BWBTs to Stormwater pond	0%	0 days	Wed 6/07/22	Wed 6/07/22



Integrated Commissioning (Agreed approach)

Contractual



Variation for early occupation



Warranty management



H&S

Handover
Other works
Work plans and approvals



Liquidated Damages protection

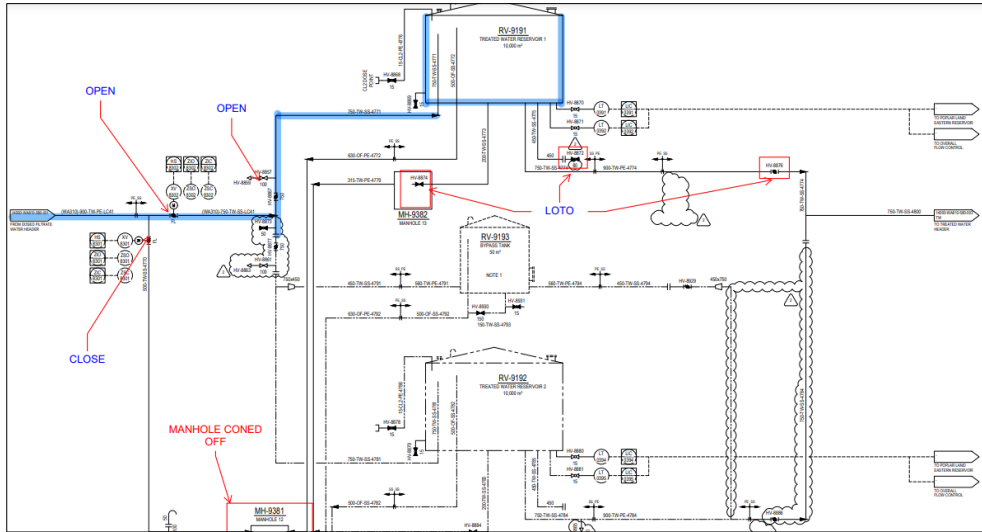


Insurances (Supply and Construction)

How did it go?



CONSTRUCTION / COMMISSIONING WORK PACK										Station Name: Waiari WTP				
OUTSTANDING WORK/DEFECT LIST										Walkover done 24/08/22				
<p>The listed Defect List items must be completed as dictated by the stated Category before the commissioning of the asset covered by this Construction Work Pack proceeds to the next phase. Phases and Categories are detailed in the Pump Station Pre-Commissioning, Commissioning and Testing Procedure.</p> <ul style="list-style-type: none"> Category A – Complete prior to Chemical Commissioning Category B – Complete prior to Water Commissioning Category C – Minor items that do not prevent commissioning Category D – Items not part of project scope. <p>Type refers to the following:</p> <ul style="list-style-type: none"> Snag (S) - any defects/fauls/problems/issues/actions identified prior plant handover Defect (D) - any defects/fauls/problems/issues/actions identified at plant handover and during Defect Liability Period 														
ITEM NO.	ITEM REPORTED BY, CATEGORY, AND DISCIPLINE:					PERSON TO ACTION	PROGRESS REPORT			ITEM COMPLETED		ACCEPTED BY CEG		
	By	Date	Cat.	Disc.	Type		DETAILS	Initial	Date	Report	Initial	Date	Initial	Date
20	SC	14/09	A	NA	ME	Dual contain injection points as per Caustic	CF/DN	DN	28/9	NA - not done				
21	SC	14/09	B	NA	ME	Confirm PACL tank inlet pipe has perforations down the vertical line	DN	DN	28/9	Confirmed photo	DN	28/9		



Water by 1 December



Not too many battle scars



Months of time savings



Return to some parts of plant



$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$f(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - x^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{1}{\frac{1}{h}}$$

$$= \frac{1}{2\sqrt{x}}$$

$$f(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

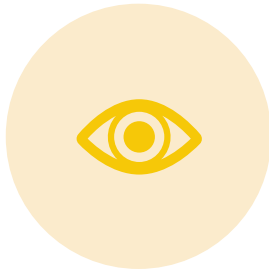
$$f(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

Key Learnings

$$g(x+h) - g(x)$$

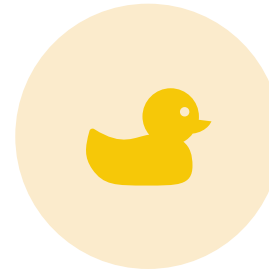
$$h$$



BE SURE TO LOOK
AHEAD



HAVE SCADA AND
ELECTRICAL /
INSTRUMENTATION
ON HAND



KEEP SOME FLOAT
– YOU’LL NEED IT



KNOW YOUR
SUCCESS
FACTORS AND
COLLABORATE TO
GET THERE



BE OPEN TO
EXPLORE OPTIONS



REMOVE POLITICS



CLEAR
COMMUNICATIONS



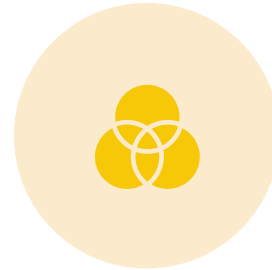
ACCOUNTABILITY



LOOK WIDER THAN
JUST YOUR ROLE



SUCCESS COMES
FROM EVERYONE



IF SOMETHING
DOESN'T FEEL
RIGHT, CHECK IT!



HAVE SOME FUN
ALONG THE WAY