



Sustainable Communities
Sharing Knowledge

Scott Hockly

Environmental Management of an Inner
City Rooding Project



Overview



- National War Memorial Park (Pukeahu)
- The big picture
- The Alliance

- Constraints
- Memorial Park Empowering Act
- Approach
- Reality







Changing Buckle St from this...



28 March 1900: Crowds walk east on Buckle Street to Basin Reserve, on the right, for a Māori carnival. Ellice Street is ahead on Mt Victoria. Source: Alexander Turnbull Library; Ref: PA1-o-127-11.



To this...



Mt Cook Prison
circa 1910



To this...



May 1930: Roadworks on Buckle Street with a cannon visible at the barracks gates. Source: Alexander Turnbull Library; Ref: 1/2-075035-F.
Photo: Evening Post newspaper.



To this...



Anzac Day, 25 April 1932: 50,000 people stand in silence for the dedication of the Carillon on Mount Cook - the first of the National War Memorial buildings. Source: Alexander Turnbull Library; Ref: 1/1-020293-G; Photo: Sydney Charles Smith 1888-1972

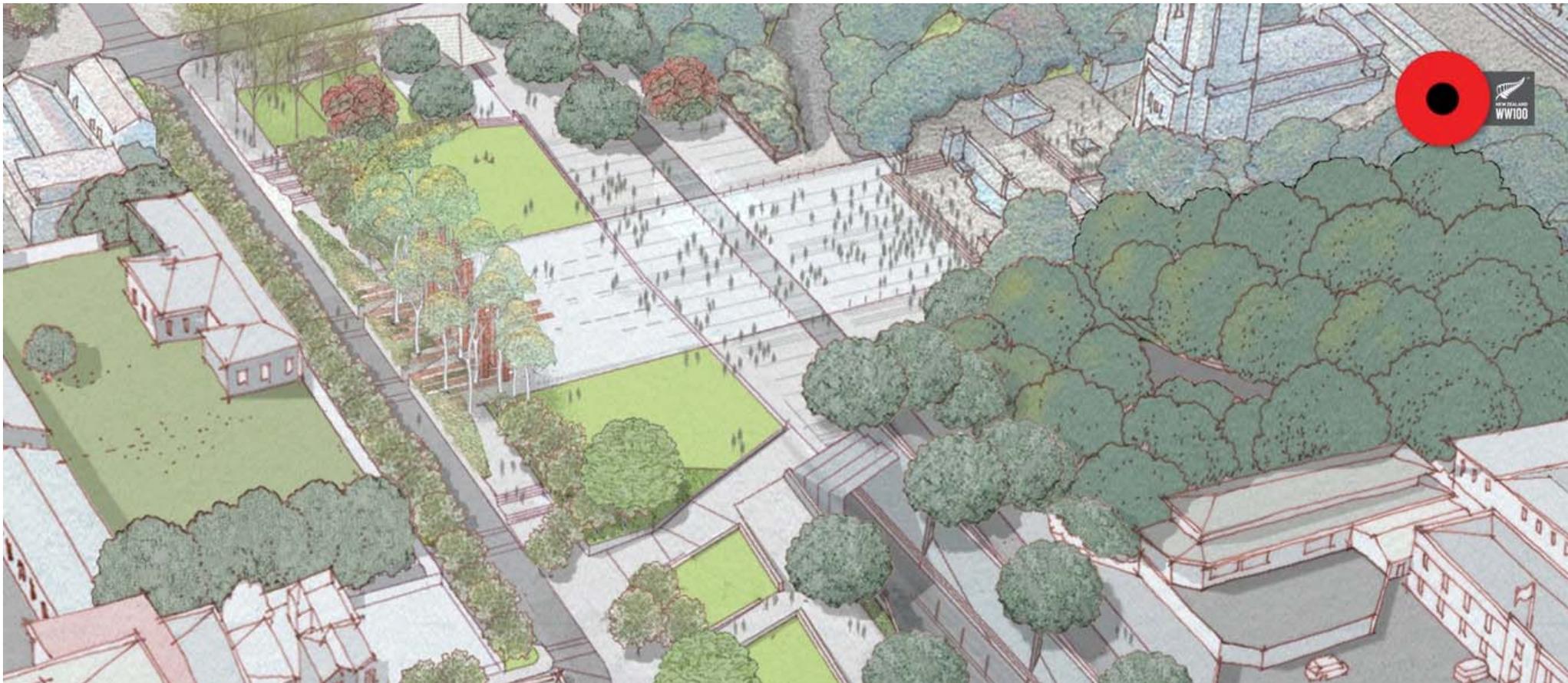


To this...





and finally to this...





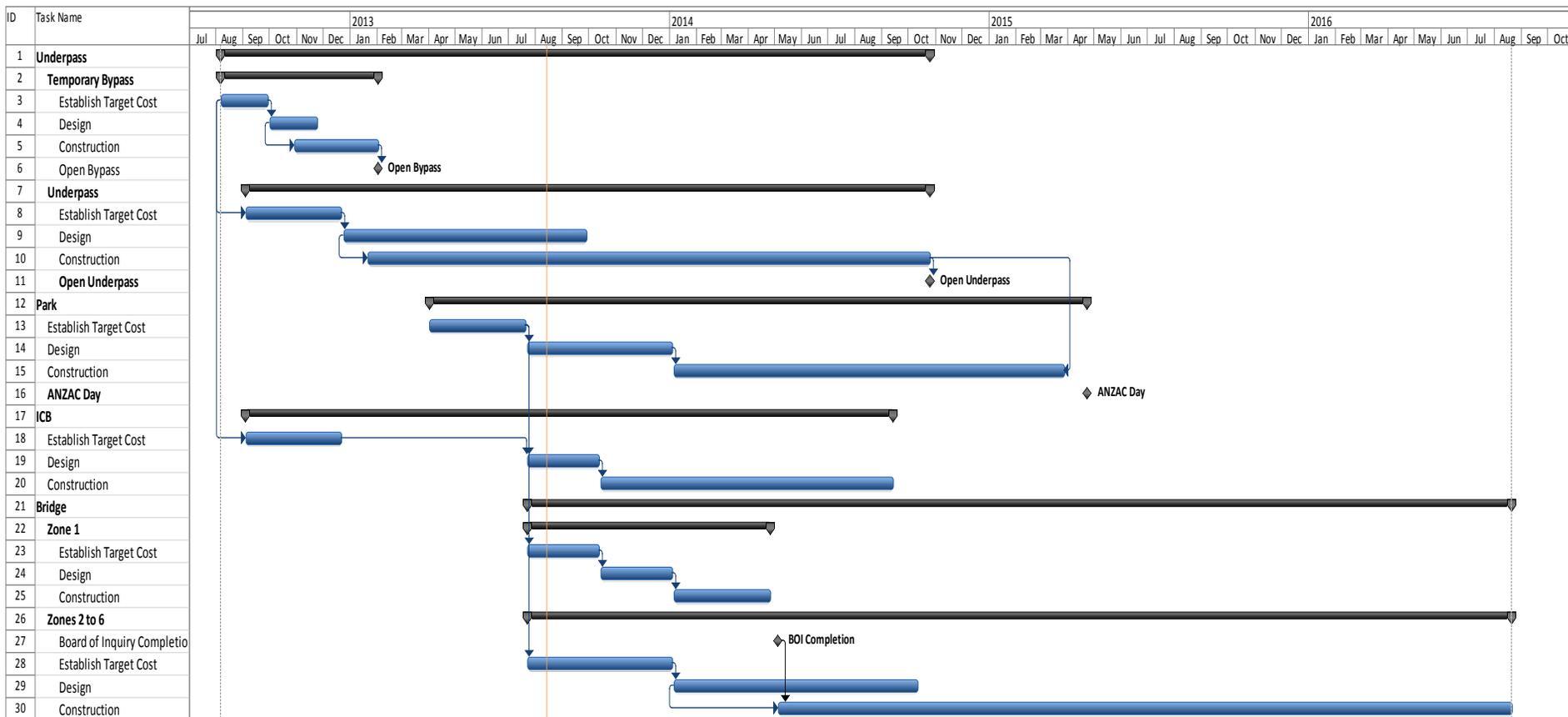


Constraints

- Time
- Space
- Surrounding buildings and activities
- No disturbance to State Highway 1
- Archaeology
- Services



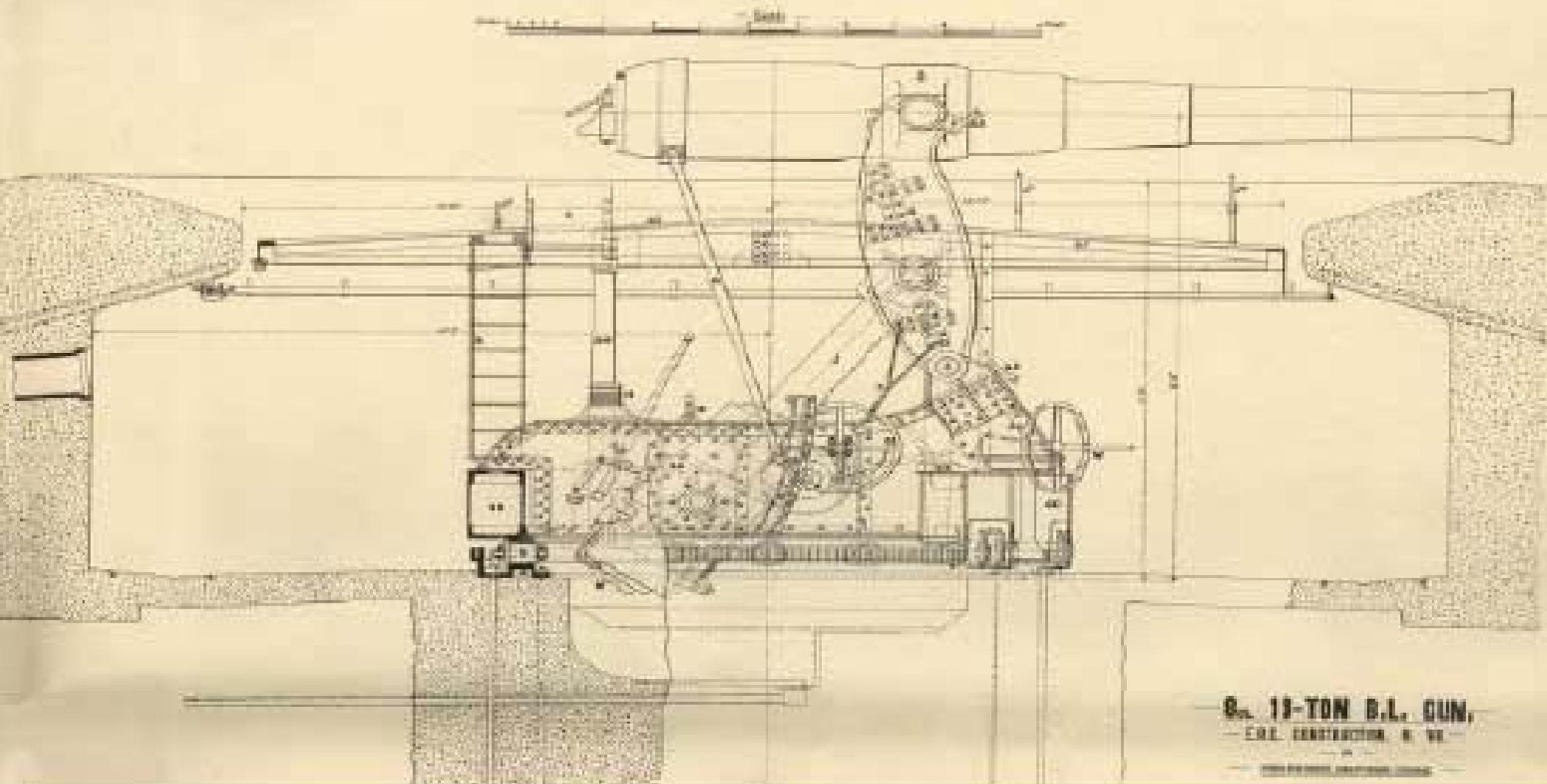
Programme











9. 9.2-INCH 19-TON B.L. GUN,
— E.M. CONSTRUCTION, N. 10 —

— U.S. ARMY, ARTILLERY, 1918 —





Park Act

- Only way to ensure construction underway on time
- Broad consensus across the House
- Grants to NZTA and MCH all resource consents, designations and building consents.
- Facilitates amendments of statutory authorisations granted by this Act
- Allows independent certification of plans and documents required by conditions of the Act



**National War Memorial Park
(Pukeahu) Empowering Act 2012**

Public Act 2012 No 76
Date of assent 3 October 2012
Commencement see section 2

Contents

		Page
1	Title	4
2	Commencement	4
	Part 1	
	Preliminary provisions	
3	Purpose	4
4	Interpretation	5
5	Meaning of Park land	7
6	Status of plans in Schedule 9	8
7	Act binds the Crown	9
	Part 2	
	Statutory authorisations and other matters	
	Subpart 1—Resource consents and designations	
	<i>Resource consents</i>	
8	Resource consents granted	9
	<i>Designation</i>	
9	Designation provided for Agency	10
	Subpart 2—Authorities relating to archaeological sites	
10	Authority to destroy, damage, or modify archaeological site	11
		1



How the Act works

Schedule 1

Resource consents granted to Agency and conditions applying

Schedule 2

Resource consents granted to chief executive of Ministry and conditions applying to them

Schedule 3

Designation provided to Agency and conditions applying

Schedule 4

Archaeological authorities granted to Agency and conditions applying

Schedule 5

Building consents granted to Agency and conditions applying

Schedule 6

Building consents granted to chief executive of Ministry and conditions applying

Schedule 7

Power of entry and property rights granted to Agency and conditions applying

Schedule 8

Power of entry and property rights granted to chief executive of Ministry and conditions applying

Schedule 9

Plans



Approach to environmental management

Approach

- Have a Plan
- Keep it simple
- Be flexible

Objectives

- Minimise adverse effects
- Treat problems at source where possible
- Incorporate environmental management activities into the daily construction process





Sediment control

- All areas with vehicles movements stabilized
- Avoiding any tracking over the excavation area
- Sweepers to clean up any spill from trucks







Treatment tools

- DEBs
- Filter socks
- Silt fences
- Sump bags
- Impoundment
- Settlement tanks





Settlement tanks

- Theory
- All water contained within underpass excavation
- Pumped to tanks via filter gallery to settlement tank (capacity 40 l/s)
- Tank provides opportunity for settlement (capacity 120m³)
- Discharged to stormwater (in batches if necessary and flocculated if required)







Tonkin & Taylor

Description: Sediment tank

Project: MPA

Computed: SFT

Checked:

Revised:

Checked:

20

20

20

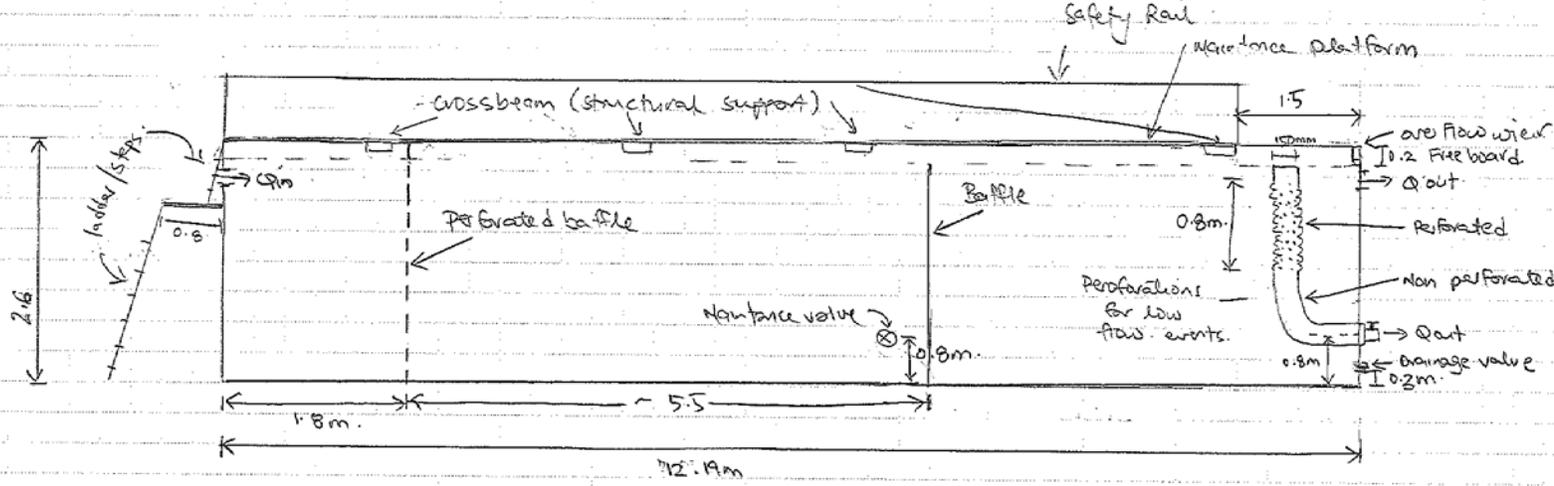
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Sediment
control unit

Memorial Park
Alliance

A Bacc members



City of San Diego



URS
CONSTRUCTION

URS



The E&SCP

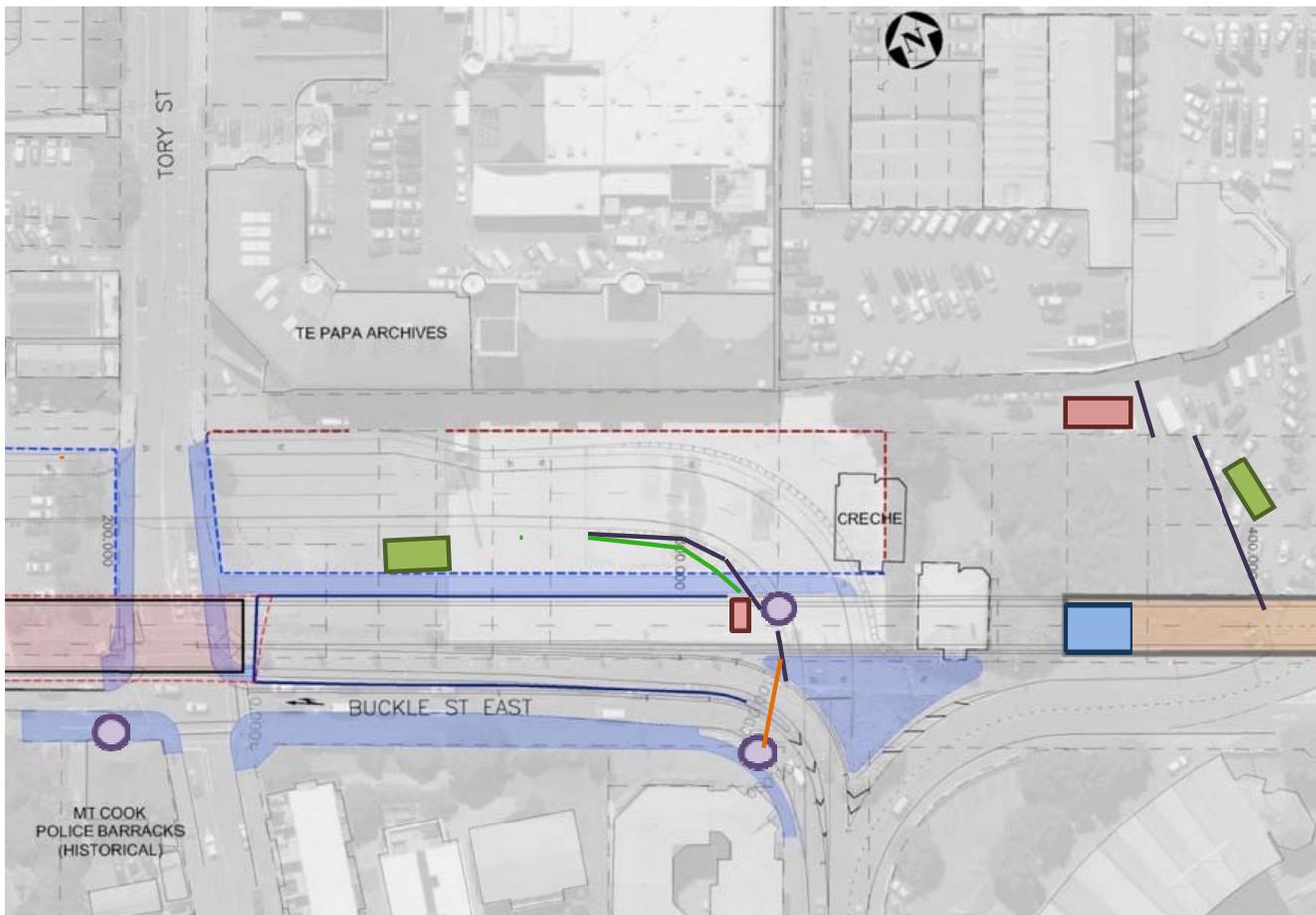


- A succinct document identifying responsibilities and methods
- A simple drawing showing the location of E&SC measures.
- To be updated in response to construction activities
- A second drawing covered actions prior to wet weather also regularly updated





ESCP Summary Plan



Period 1/2/14 to 1/4/14
Eastern half
PREPARED EDB & BM

Key:	
	Silt Fences
	Treatment Unit
	Grit traps
	Bio sock
	Stabilised entrances
	Sumps
	Collector drains

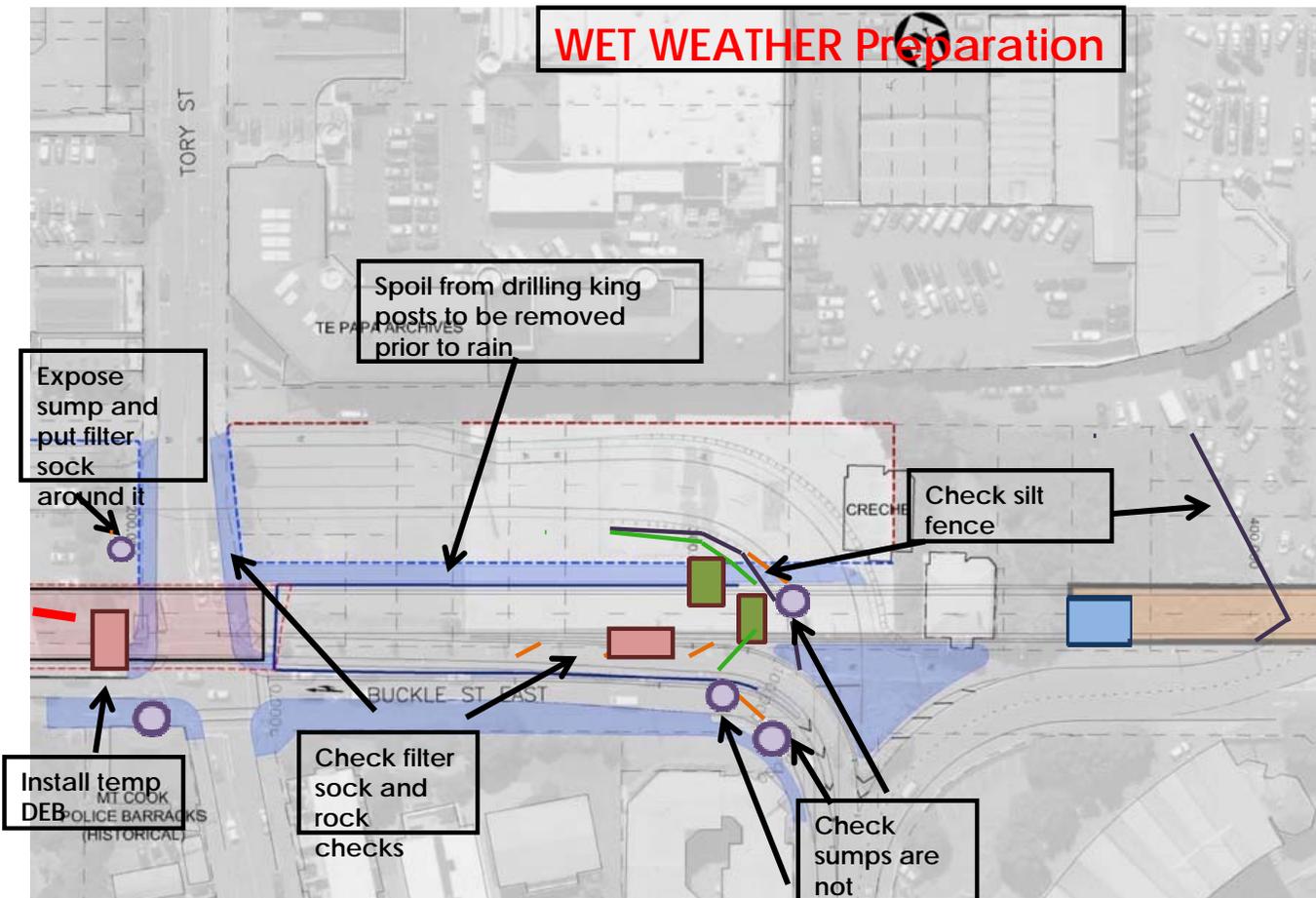


ESCP Summary Plan



WET WEATHER Preparation

Period 13/5/15 to 13/5/22
Eastern half
PREPARED EDB & BM



Key:

- Silt Fences
- DEB
- Grit traps
- Bio sock
- Stabilised entrances
- Sumps
- Collector drains



Reality



- The E&SC was prepared in advance investigations and design being completed
- 558 ground anchors had to be installed using 16,000 bags of cement
- 7500m³ of concrete placed
- pH values up to 14.5 measured in settlement tanks
- Sediment not a problem









Solution

Initially used magnesium sulfate in solution to lower pH

- this was labour intensive
- Slow
- hazardous

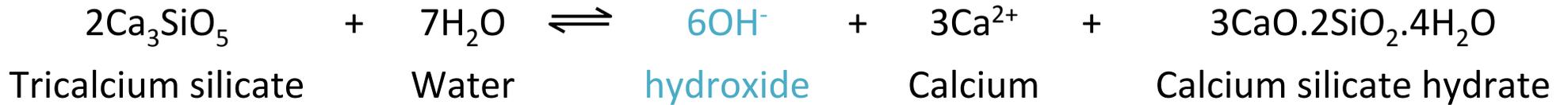
Replaced by using CO² gas

- Quick
- safe

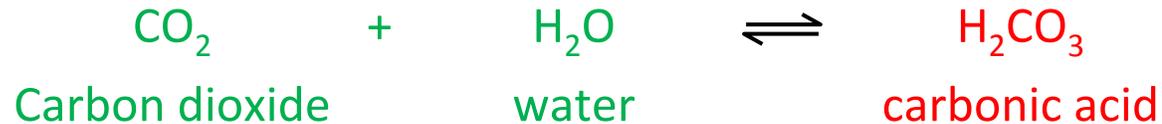


CO₂ treatment of high pH stormwater

Cement produces caustic hydroxide in water:



Some of the carbon dioxide bubbled through the water dissolves, forming carbonic acid



Carbonic acid neutralises the hydroxide released by the grout









CO² Process

- The CO² was bubbled a low level in the settlement tank at low pressure via a leaky irrigation house
- This produce the discharge of small bubbles of CO²
- pH levels were monitored at all at the top of the tank and at the base
- When pH levels were blow 8.0 the treated water was released
- The tanks needed regular emptying of sediment using jet vaccing





Process vs Outcome

- You need both
- They are interrelated
 - you need a plan
 - you need a measureable outcome
- Balance is required
- You need to have flexibility to respond to site conditions





Questions

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