

Bolin Bolin Billabong Wetland Project – *Design Challenges for the Protection and Rehabilitation of the Bolin Bolin Billabong*

Nick Andrewes (GHD) & Lachlan Johnson (Manningham City Council)

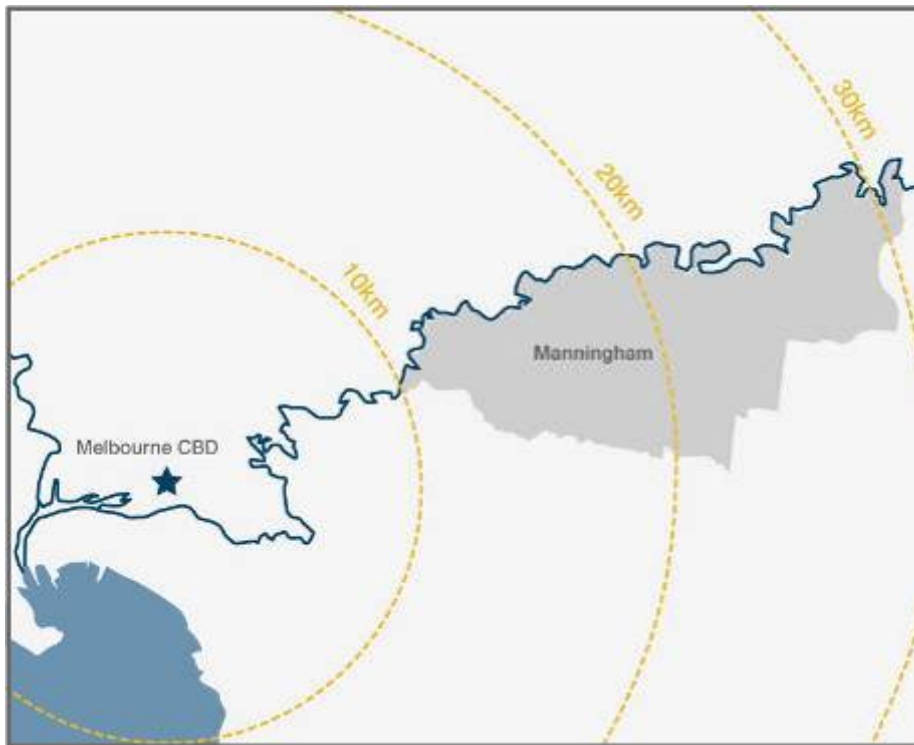


8 May 2013 – 2013
Stormwater Victoria Conference

Agenda

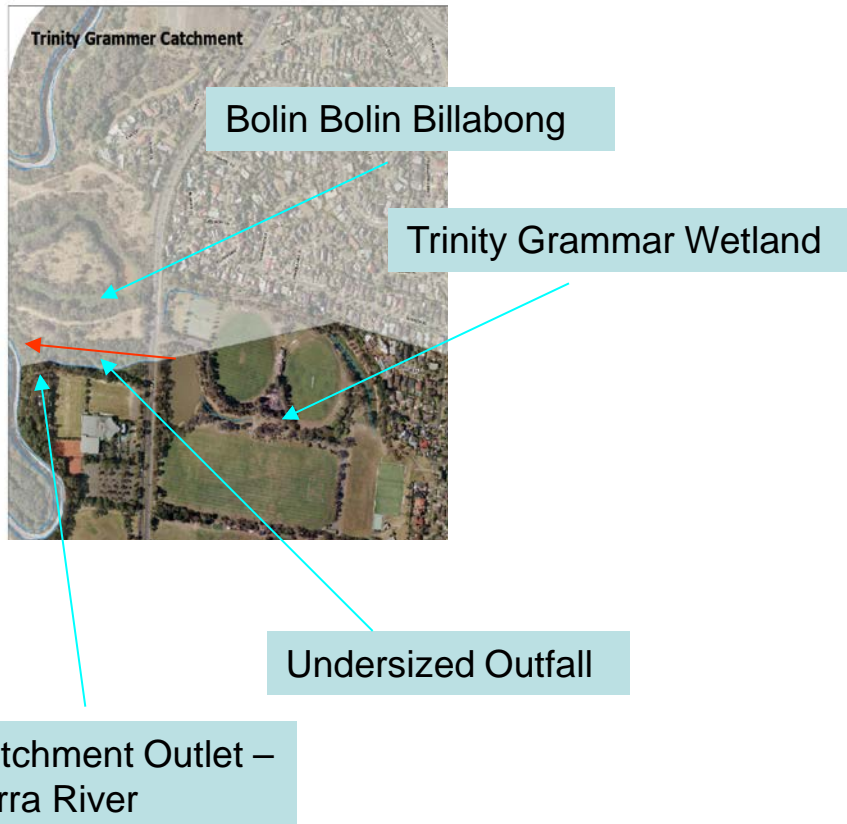
1. Introduction – Nick Andrewes (GHD)
2. Project Context (5) – Lachlan Johnson (MCC)
3. Design Challenges (16) – Nick Andrewes (GHD)
4. Current Design Status (3) – Lachlan Johnson (MCC)

Project Context – Manningham Council (1-5)



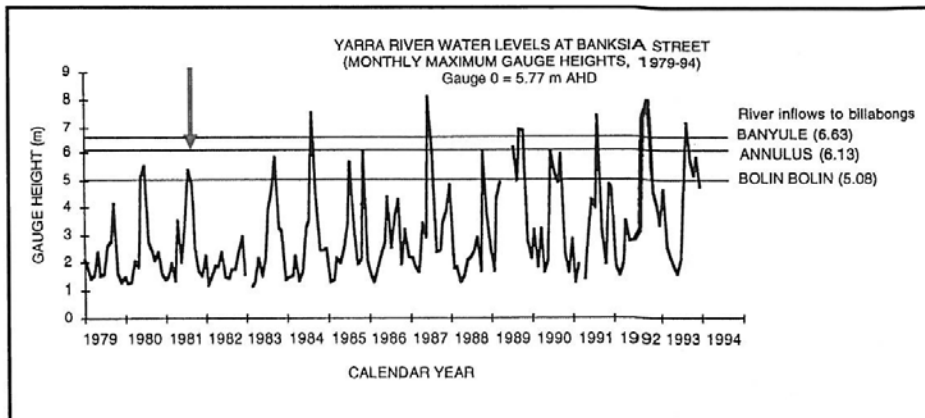
- Includes the suburbs of Doncaster, Templestowe, Bulleen, Donvale, Park Orchards & Wonga Park
- 115,847 Residents
- 114 km²
- 15km from the Melbourne CBD

Project Context – Catchment (2-5)



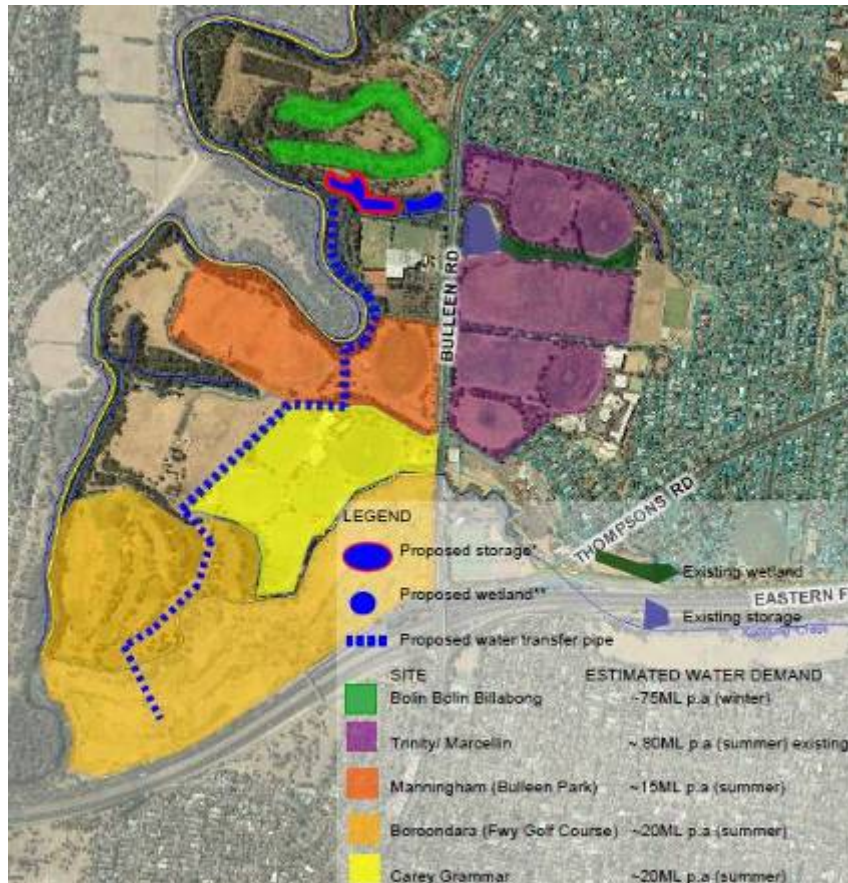
- Bulleen Catchment – Developed in the 1960s – Lack of overland flow paths.
- Council invested ~\$7M (10 years) in diverting 100 year ARI flows to the lower reaches of the catchment (Trinity Grammar land).
- Council invested ~\$400K in the construction of a wetland inside Trinity Grammar.
- **Outfall** from Trinity Grammar to the Yarra River flows through Parks Victoria managed Crown Land **adjacent to the Billabong** – current outfall capacity significantly undersized and causing flooding of Trinity land.
- Council has obligation to Trinity Grammar to resolve 'outfall issue'.

Project Context – Bolin Bolin Billabong (3-5)



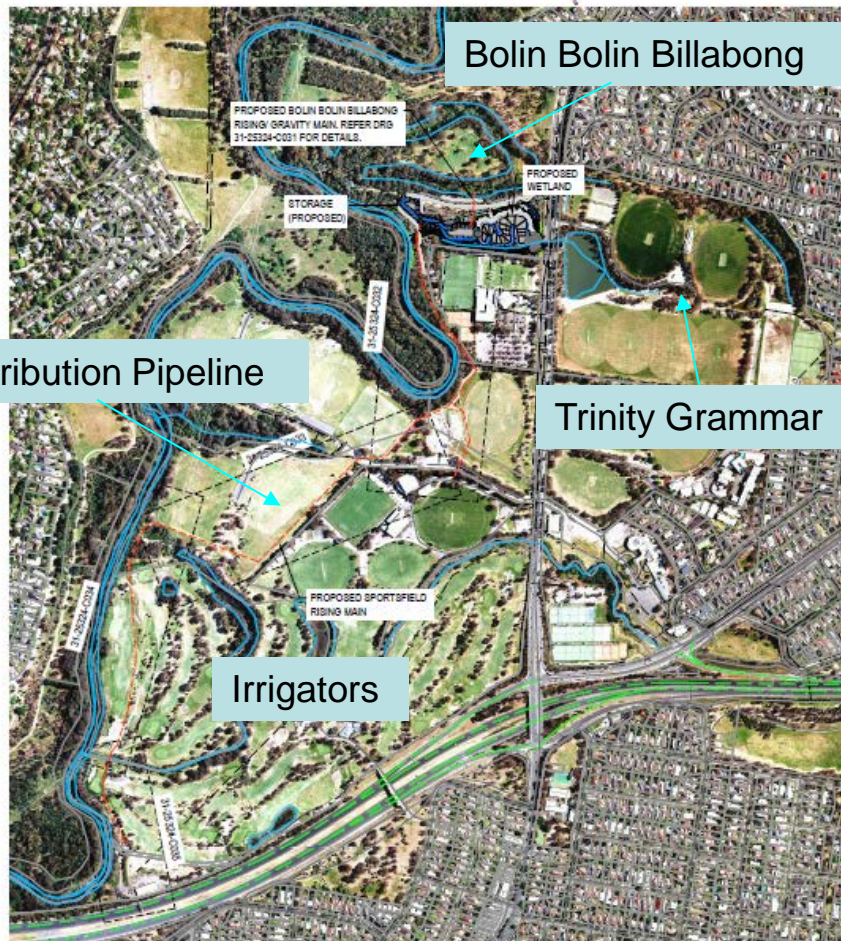
- **Highly culturally significant to the Wurundjeri people.**
- Highly significant ecological values *'is the best preserved (floodplain) communities in the region'* (Dodo, 2010)
- Yarra inundation normally occurs every 9 months
- Billabong has suffered a dramatic bio-diversity downturn due to reduced inflows from the Yarra River, particularly exacerbated by drought;
- Dodo Environmental Report – 2010, examined options for rehabilitating the Billabong.
- Report found that utilising local stormwater would be the most feasible option, provided high quality could be achieved.
- The Billabong needs stormwater, Council needs an outfall from the local catchment.

Project Context – Integrated Outcome (4-5)



- Billabong requires inflows during winter (4 months)
- Area shared with numerous irrigators who currently draw from the Yarra River.
- Council unable to fund capital expenditure for the expanded project scope without assistance.
- **Solution:** Enable irrigators to draw from the system during the summer months provided they contribute towards the capital expenditure for the whole system.
- Water balance modelling verified that summer-winter split arrangement is viable.

Project Context – Concept (5-5)



- 4 objectives:
 - Bolin Bolin Billabong rehabilitation;
 - Bulleen catchment drainage outfall ;
 - Improve the quality of stormwater; and
 - Provide alternative source of water for irrigation.
- Project Funding Partners:
 - Melbourne Water;
 - Manningham City Council;
 - The City of Boroondara;
 - Carey Grammar School; and
 - The Commonwealth Government of Australia (Melbourne WaSSH).

Bolin Bolin Wetland Project

Bolin Bolin Wetland Project an Opportunity to design an Integrated Water Cycle Management solution.

Multifunctional asset:

- Reduced flooding;
- Provision of an alternative water supply;
- Improved water quality;
- Rehabilitation of natural systems;
- Rehabilitation of a culturally significant site; and
- Enhanced regional liveability.



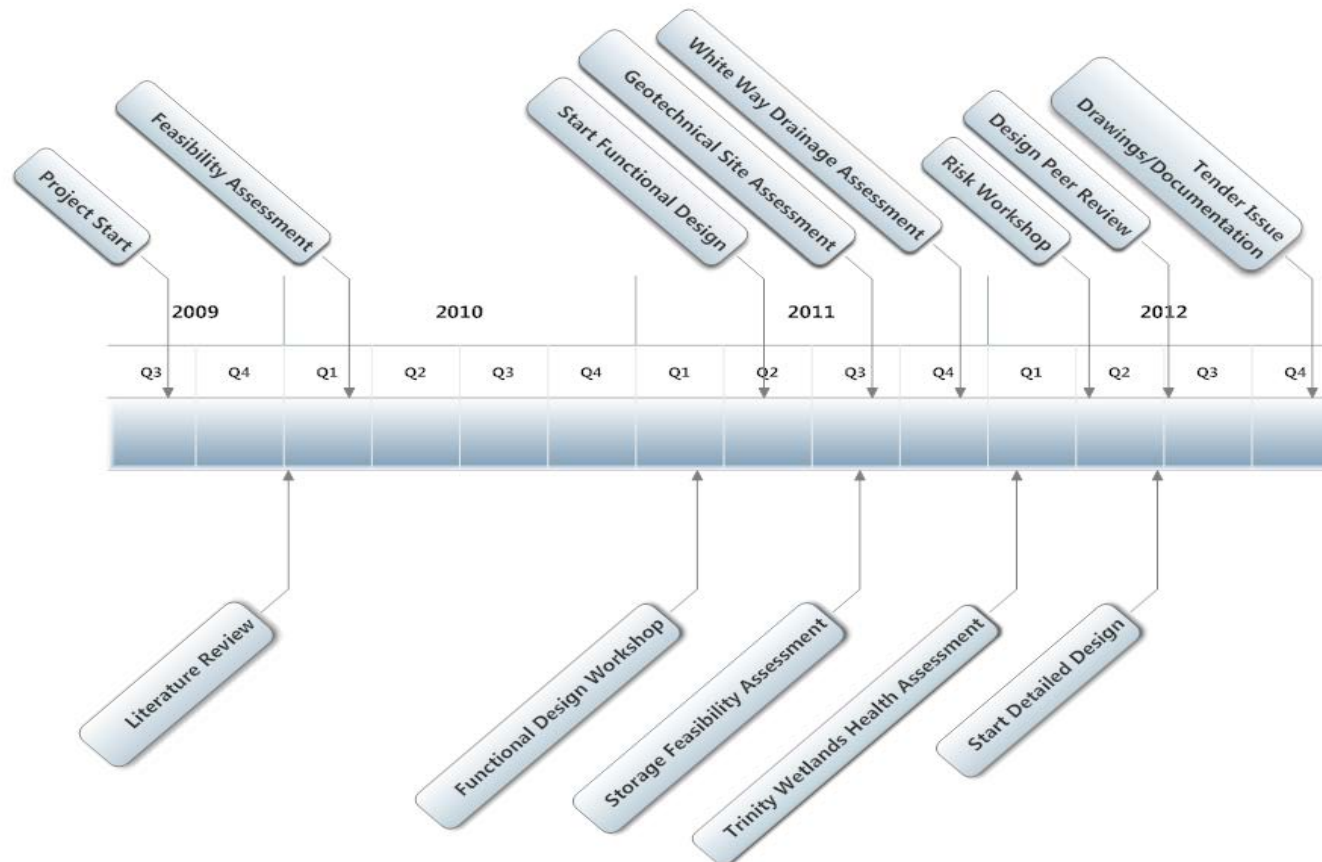
Section Overview

- Design Context (3)
 - Project Timeline
 - Project Relationships & Communication
 - Design Team
- Design Outcomes (4)
 - Key elements
 - System Performance
- Technical Challenges (6)
 - Site constraints
 - Water Quality Objectives
 - Stormwater Harvesting
 - Flood Mitigation



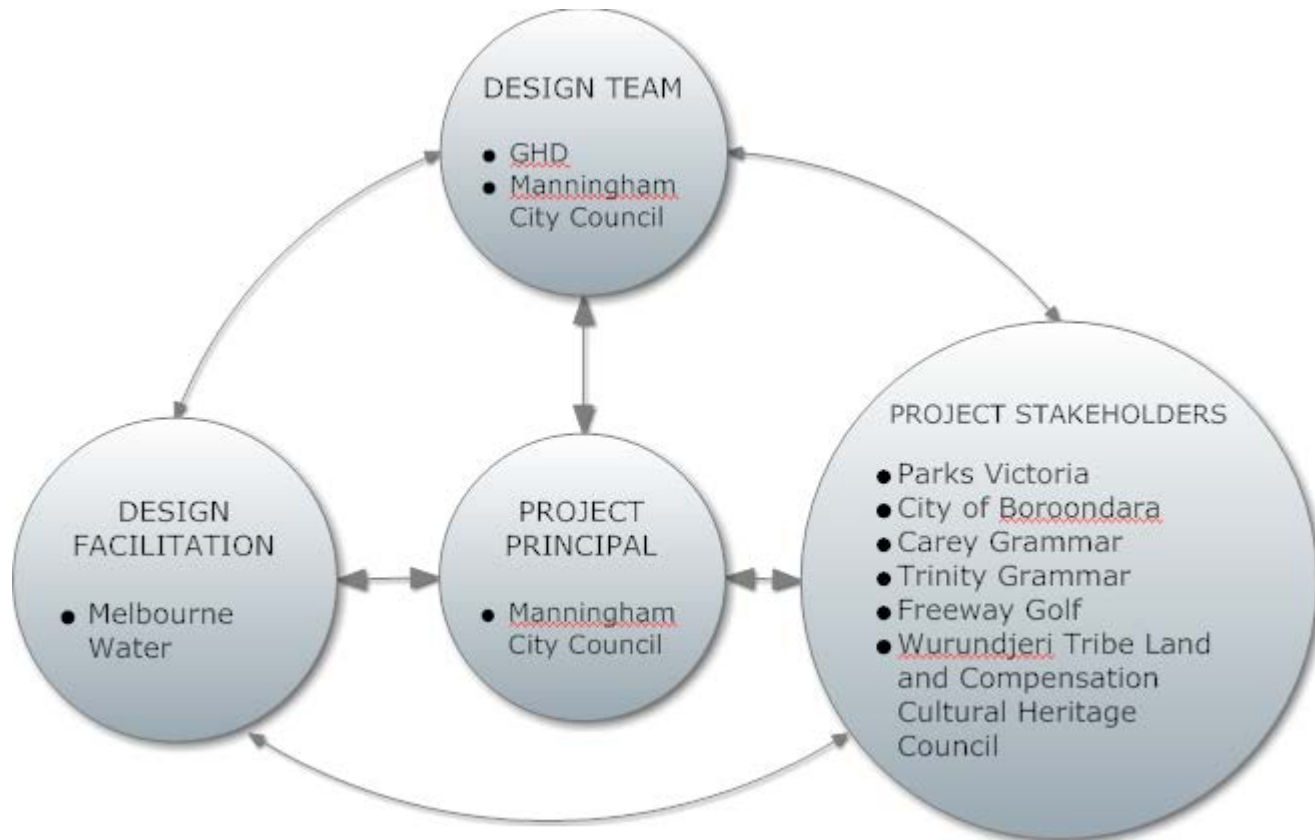
Design Context (1-3)

Key Events & Milestones



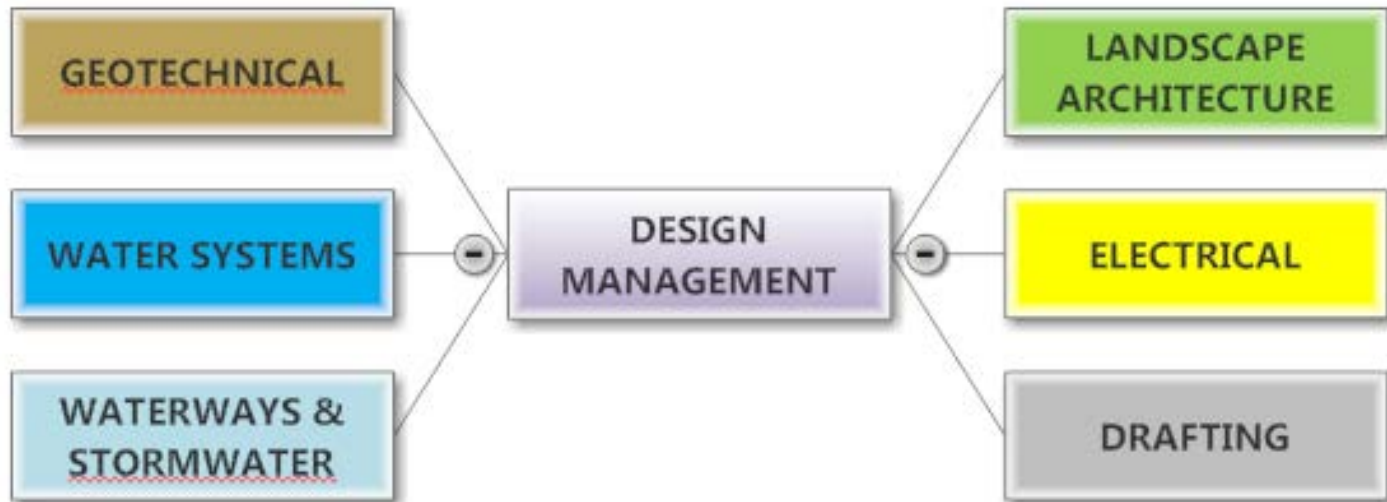
Design Context (2-3)

Project Relationships & Communication



Design Context (3-3)

Design Team



Design Function(1-4)

Winter Supply:
Bolin Bolin Billabong

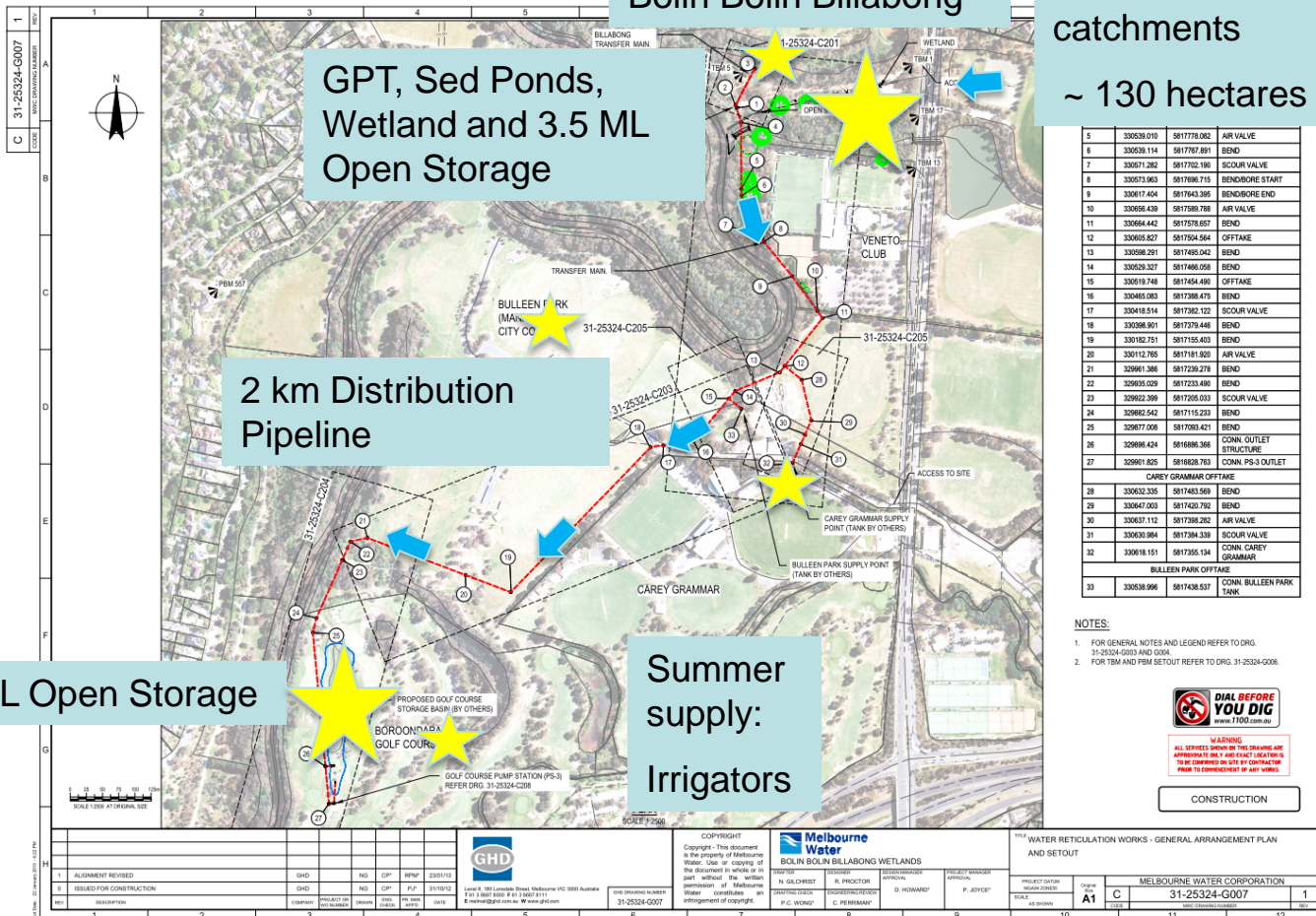
2 urban
catchments
~ 130 hectares

GPT, Sed Ponds,
Wetland and 3.5 ML
Open Storage

2 km Distribution
Pipeline

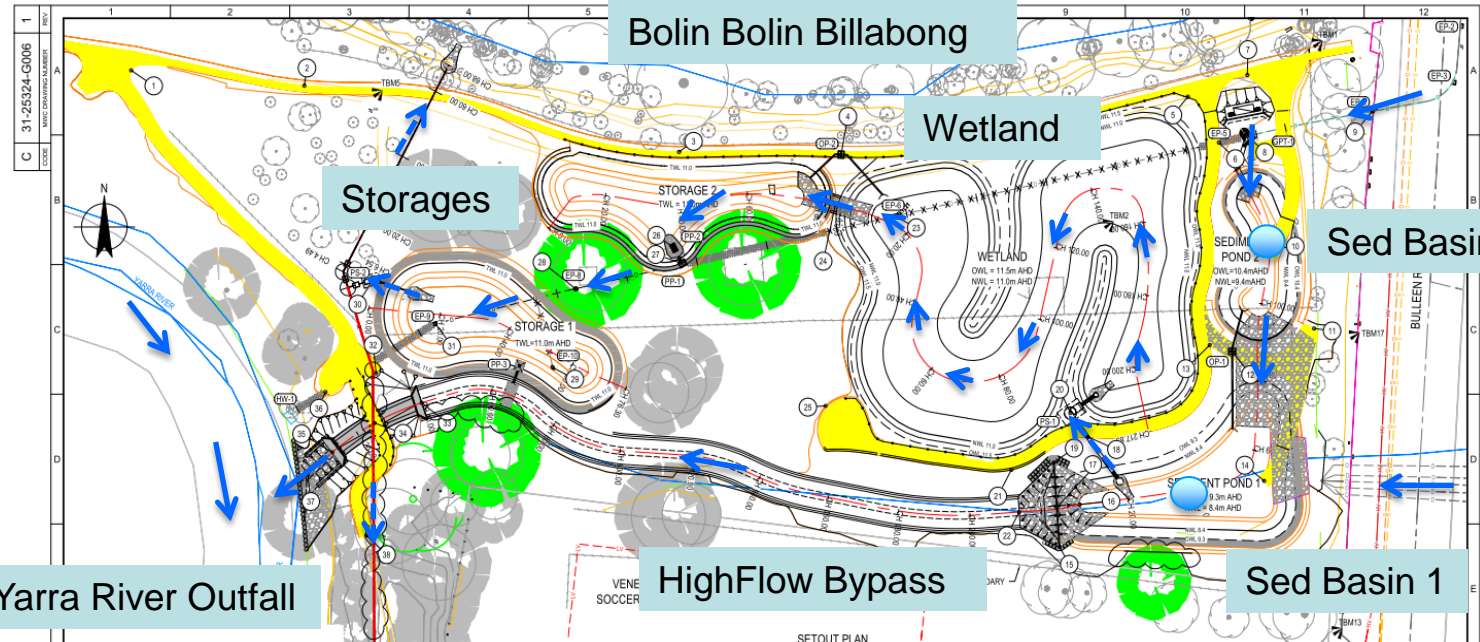
10 ML Open Storage

Summer
supply:
Irrigators



Design Function(2-4)

Treatment and onsite storage



Yarra River Outfall

Storages

Bolin Bolin Billabong

Wetland

Sed Basin 2

HighFlow Bypass

Sed Basin 1

SETOUT PLAN
SCALE 1:500

TEMPORARY BENCHMARKS				
PT	EASTING	NORTHING	HEIGHT	DESCRIPTION
TBM01	330041.207	581787.488	12.750	STAIN POKER
TBM02	330243.867	581781.292	12.853	STAIN POKER
TBM03	330683.887	581781.964	14.386	SPIKE IN TOP OF POST
TBM07	330814.812	581787.447	13.856	RAMMET TAG IN KEYS
TBM08	330889.230	581781.881	13.830	RAMMET TAG IN KEYS
TBM09	330688.838	581788.208	12.700	RIVET IN CONCRETE STRIP
TBM07	330234.840	581788.840	13.870	CONCRETE STRIP
TBM01	330881.838	581782.157	13.170	RIVET IN BRIDGE
TBM05	330881.202	581828.827	12.440	GRAVEL PIT

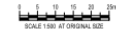
PERMANENT BENCHMARKS				
PT	EASTING	NORTHING	HEIGHT	
PM01	330232.883	581781.962	21.100	
PM03	330830.948	581781.000	48.470	

SETOUT POINTS				
POINT	EASTING	NORTHING	COMMENTS	
1	330471.888	581780.840	EDGE OF MAINTENANCE TRACK	
2	330519.367	581788.850	EDGE OF MAINTENANCE TRACK	
3	330824.881	581780.621	EDGE OF MAINTENANCE TRACK	
4	330889.238	581788.861	EDGE OF MAINTENANCE TRACK	
5	330784.881	581788.700	EDGE OF MAINTENANCE TRACK	
10	330780.814	581781.288	EDGE OF MAINTENANCE TRACK	
11	330887.282	581788.247	EDGE OF MAINTENANCE TRACK	
12	330778.442	581788.284	CENTRE OF PIT SP-1	
13	330772.138	581788.019	EDGE OF MAINTENANCE TRACK	
14	330787.378	581788.022	EDGE OF MAINTENANCE TRACK	
15	330781.238	581783.086	EDGE OF ROCK HEEL	
16	330785.882	581784.000	EDGE OF ROCK HEEL	
17	330782.478	581783.889	EDGE OF ROCK HEEL	
18	330784.131	581782.088	EDGE OF ROCK HEEL	
19	330788.680	581788.028	EDGE OF ROCK HEEL	
20	330731.248	581784.808	CENTRE OF P.S. 1	
21	330718.781	581784.800	EDGE OF MAINTENANCE TRACK	
22	330718.888	581784.800	TOP OF ROCK HEEL	
23	330884.308	581782.311	CENTRE OF EASTING PIT EP-1	
24	330887.813	581788.218	CENTRE OF ROCK HEEL	
25	330884.906	581781.467	EDGE OF MAINTENANCE TRACK	
26	330822.854	581784.808	CENTRE OF PIT SP-2	
27	330824.947	581781.290	CENTRE OF PIT SP-2	
28	330885.138	581783.354	CENTRE OF EASTING PIT EP-2	
29	330888.712	581781.887	CENTRE OF EASTING PIT EP-10	
30	330838.880	581788.880	CENTRE OF P.S. 2	
31	330858.820	581788.820	CENTRE OF EASTING PIT EP-1	
32	330838.411	581788.214	EDGE OF MAINTENANCE TRACK	
33	330828.158	581787.317	CENTRE OF EASTING PIT EP-2	
34	330838.887	581788.734	CENTRE OF MAINTENANCE TRACK	
35	330827.075	581788.880	CENTRE OF HIGH FLOW BYPASS	
36	330828.283	581787.283	EDGE OF MAINTENANCE TRACK	
37	330838.338	581788.748	CENTRE OF HIGH FLOW BYPASS	
38	330838.884	581788.225	EDGE OF MAINTENANCE TRACK	

- NOTES:
- FOR GENERAL NOTES AND LEGEND REFER TO DRG. 31-25324-G003 AND G004.
 - ALL TBM AND SETOUT CO-ORDINATES ARE TO MG84 ZONE 55 AHD. SURVEY WAS OBTAINED FROM A VARIETY OF SOURCES INCLUDING:
 - TGM, 2010
 - MILLAR MERRIGAN, 2011
 - MANNINGHAM CITY COUNCIL, 2011
 - TGM, 2012
 - SURVEY BASED UPON PM057 WITH RL 20.517 LOCATED AT CORNER OF LINN ST AND THE BOULEVARD.



WARNING
ALL SERVICES SHOWN ON THE DRAWING ARE APPROXIMATE ONLY AND EXACT LOCATION IS TO BE CONFIRMED IN SITE BY CONTRACTOR PRIOR TO COMMENCEMENT OF ANY WORKS.



CONSTRUCTION

11	REVIEWED AS CLOUDED	GHD	NS	JBP	RPM	23/01/13
12	ISSUED FOR CONSTRUCTION	GHD	NS	JBP	PLP	31/10/12
REV	DESCRIPTION	DATE	BY	CHKD	DATE	

100 Collins Street, Melbourne VIC 3000 Australia
 T +61 3 8867 8000 F +61 3 8867 1111
 E enquiry@ghd.com.au W www.ghd.com.au

COPYRIGHT
 This document is the property of Melbourne Water. Use or copying of the document in whole or in part without the written permission of Melbourne Water constitutes an infringement of copyright.

BOLIN BOLIN BILLABONG WETLANDS

DESIGNER	N. GLECHERT	PROJECT MANAGER	D. HOWARD
DRAWING CHECK	P.C. WONG	ENGINEERING SUPERVISOR	J. BERNEDEY

TITLE SEDIMENT PONDS, WETLAND AND STORAGE
SETOUT PLAN AND SURVEY BENCH MARK DETAILS

PROJECT NUMBER	31-25324-G006
CLIENT	MELBOURNE WATER CORPORATION
SCALE	AS SHOWN
DATE	31-25324-G006
REV	1

Trinity Grammar

Design Function(3-4)

System Performance

Water Supply (based on 2000 – 2005 rainfall record)

- Billabong - 42 ML/yr
- Sports Field and Golf Course Irrigation - 39 M/yr

Water Quality

(including upstream Trinity Wetlands Treatment)

- 94.4 % reduction in TSS
- 80.3 % reduction in TP
- 59.7 % reduction in TN



Trinity Wetlands 35 ML storage (21/10/2011)

Design Function(4-4)

System Performance

- Flooding frequency from local catchment events reduced from < 1 year ARI to 20 year ARI
- Rehabilitate the Bolin Bolin Wetland by introducing a more natural inundation regime
- Additional liveability benefits
- Capital Cost \$3.8 M





Outlet to Bulleen culverts (27/11/2010)

Technical Challenges (1-5)

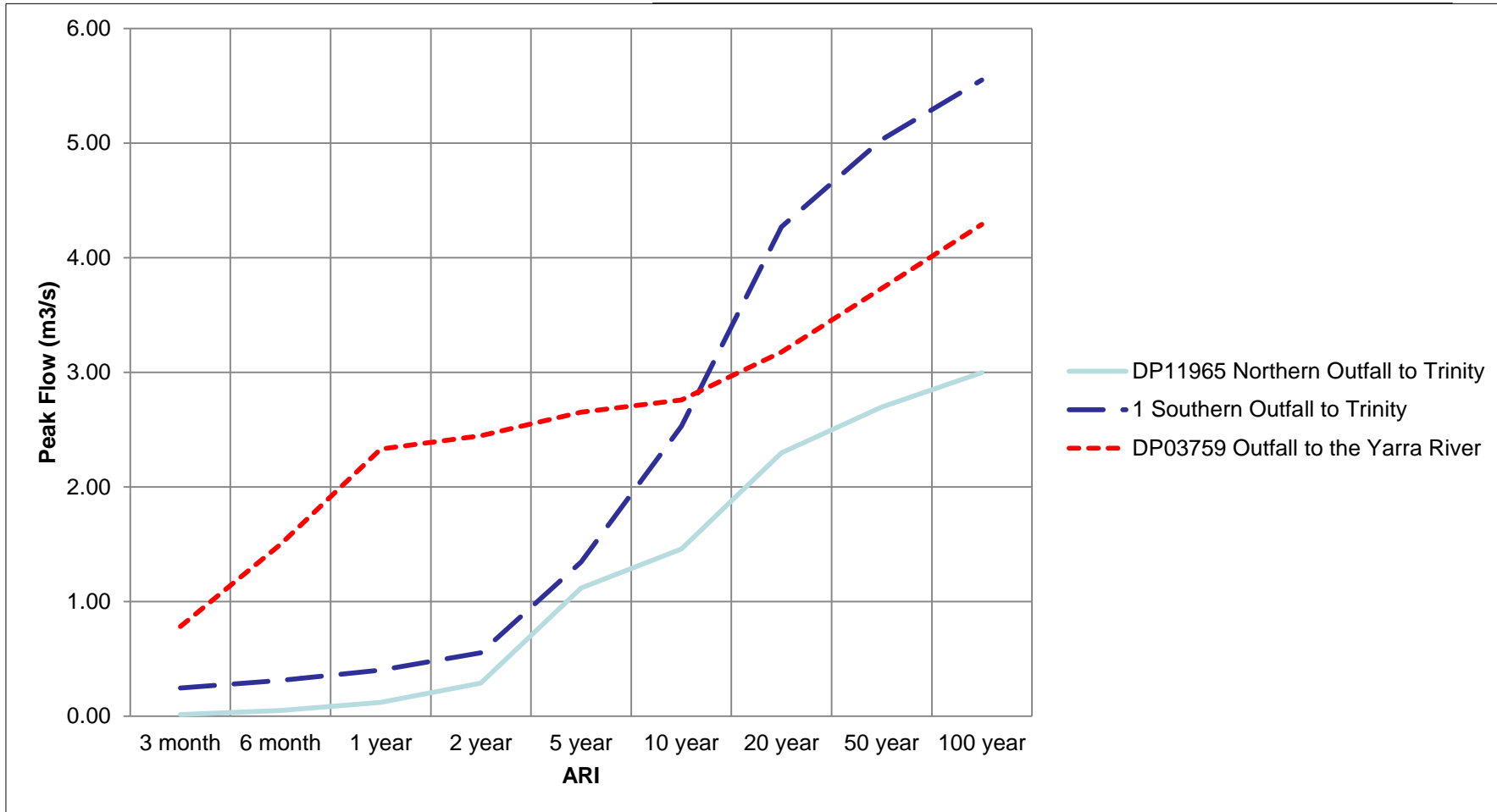
Site Constraints

- Geotechnical
 - Hydraulically conductive sand lenses
- Small site footprint
- River Red Gums
- Yarra River Flooding

Design Outcome

- 
- Pump Based System
 - Challenges in satisfying water quality and yield requirements.
 - Improved cut/fill balance
 - Higher OPEX
-
- 
- Location of equipment above Yarra flood levels
 - Design shaped to protect environmentally significant trees

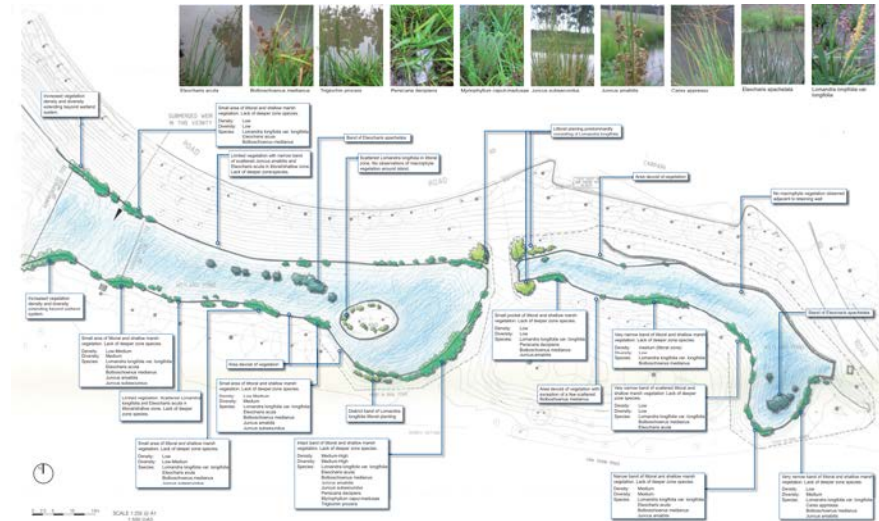
Technical Challenges (2-5)



Technical Challenges (3-5)

System Challenge – Water Quality

- Adaptation of the upstream treatment train at Trinity Grammar
 - Modification of bathymetry to provide benching and allow macrophyte zonation.
 - Formalise extended detention depth.

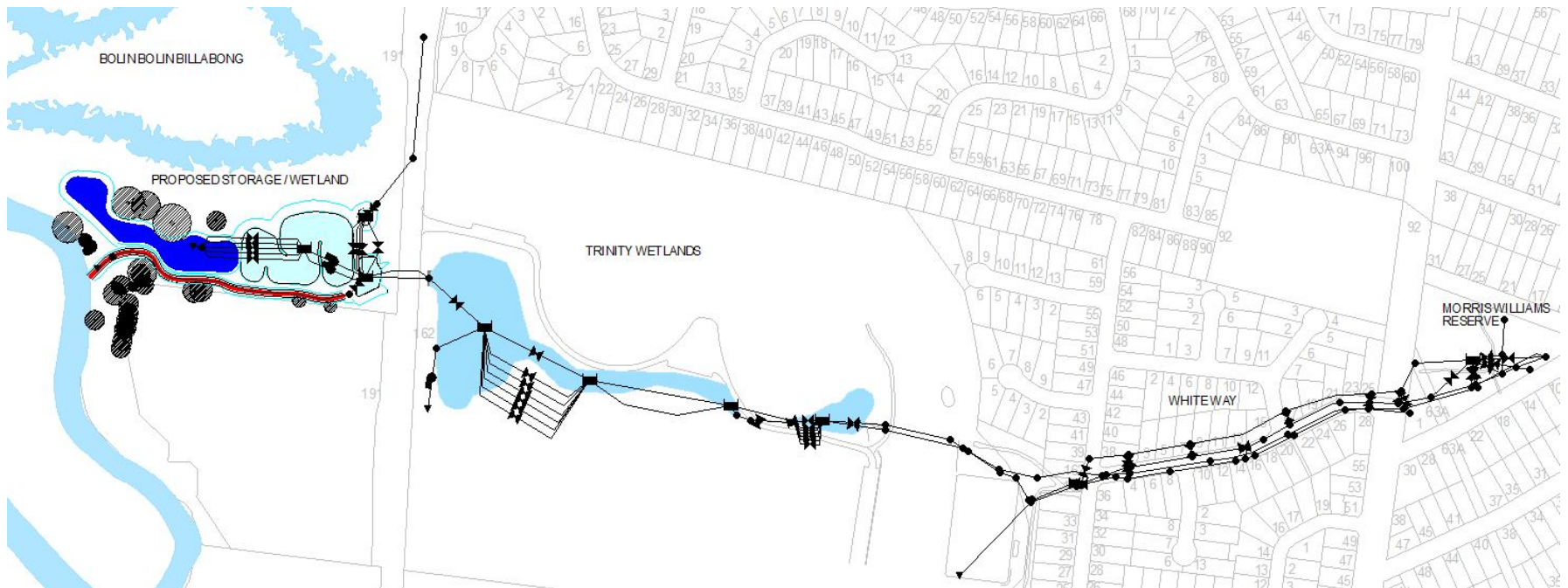


Technical Challenges (5-5)

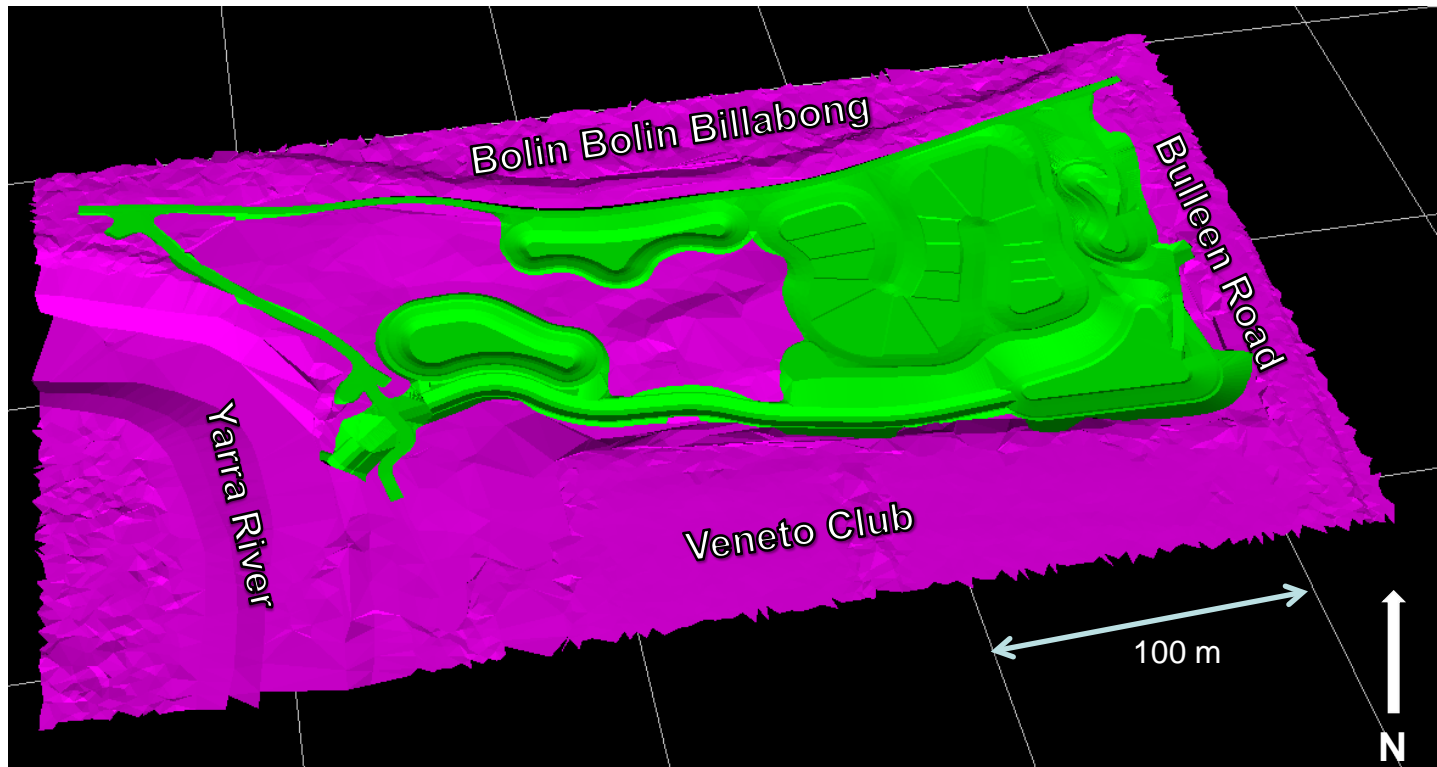
Modelling Approach

Progressed from a water balance spreadsheet to incorporate a range of industry models:

- MUSIC, EPA SWMM, H2O MAP, HECRAS



Bolin Bolin Wetland Project - Design



Current Project Status – Revised Objectives (1-3)



- Department of Sustainability & Environment have advised with the drought breaking their preference is for Yarra River extractions to be used to fill the Billabong;
- Reduced water quality objectives (no longer dictated by Billabong requirements);
- Reduced quantum of stormwater to be harvested;
- Capital shortfall (confirmed by tender process);
- Maintenance & Operational cost shortfall;

Current Project Status – Revised Objectives (2-3)



- Project to proceed given it is still appealing to irrigators and to Council to achieve their respective outcomes;
- Reductions in scope due to changed Billabong objectives provide an opportunity to address:
 - Capital shortfall;
 - Maintenance & Operational shortfall; and
 - Improve constructability.

Current Project Status – Project Redesign (3-3)



- Project to be redesigned to fit within new scope:
 - No longer supply Billabong with harvested stormwater;
 - Supply water at ‘fit for purpose’ quality for irrigation;
 - Reduce the quantum of harvested stormwater (50% reduction);
 - Reduce capital costs;
 - Reduce operational costs;
 - Maintain irrigator supply probability;
 - Maintain flood conveyance capacity; and
 - Maintain IWCM philosophy objectives.