Green Square Snapshot

- $13 billion construction cost
- 30,500 new dwellings
- 21,000 jobs
- Highest population density in Australia – average 22,000 persons / km²
- 9,900 dwellings in construction or assessment
Historical context:
catchment conditions circa 1880
Wide Range of Existing Flood Problems

• Many legacy issues arising from the catchment history
• Trunk drainage systems disjointed and under-capacity
• Upgrading is difficult;
  – due to fragmented ownership,
  – expense,
  – conflicts with other infrastructure

Joynton Ave: Feb 2001 (minor storm event)
PROGRESS UPDATE

• Revised Approach: Refined Model

STUDY AREA

- Moore Park Golf Course
- West Kensington
- Victoria Park
- Total Area: 250 ha
- City of Sydney LGA: 53%
- Randwick City Council LGA: 47%

Green Square
- Entry to Green Square
- Railway Station

Railway Station
- South Dowling St
- Epsom Rd
- Joynton Ave
- Portman St
- Australian Golf Club

Botany Rd
- O’Riordan St
PROPOSED GREEN SQUARE TOWN CENTRE SITE

Existing Conditions: 1% AEP Event

Portman St
Botany Rd
O’Riordan St
Drying Green Alliance

- **Sydney Water** – trunk drain asset owner
- **City of Sydney** – local drain asset owner
- **UGL** - constructor
- **Seymour Whyte** - constructor
- **WSP Parsons Brinckerhoff** - designer
- **RPS Manidis Roberts** – environment and communications
Site context

• Heavily built up commercial, residential and industrial area just south of Sydney CBD
• Major arterial roads
• Low lying ground with high groundwater
  – Unregulated fills
  – Old lake (Waterloo Swamp)
• Numerous and major existing utilities in
  – Joynton Ave
  – Portman St
  – Botany Rd
  – O’Riordan Street
  – Maddox Street
  – Huntley Street
• Numerous adjacent property owners
Project scope

- 2.5m km long twin and triple DN1800 pipes
- Installation by micro-tunnelling up to 9m below ground
- Open cut sections upstream and downstream
- Twenty local flow inlet and transition structures
- 2 x in-line gross pollutant traps
- DN840 water main relocation
- Existing trunk drain diversion
- Huntley St bridge
Green Square Stormwater Drain (GSSD) Project area
Hydraulics

- GSSD operates under pressure in design event
- Flow capacity 30 m³/s
- HGL maintained below ground
- Design to manage air transport and minimise blow back potential
- Modelling to minimise hydraulic head loss
Design

- TUFLOW modelling in conjunction with hydraulic grade line analysis determined drain size
- CFD and physical modelling optimised structures and verified theoretical head loss calculations
- Key horizontal and vertical alignment constraints
  - Existing buildings and underground infrastructure (Suttons, Maddox St Ausgrid)
  - Main Southern sewer in O’Riordan Street
  - New residential developments under construction (Meriton)
  - Future Green Square Town Centre (coordination and consultation)
  - Proposed aquatic centre
Longitudinal section of GSSD
Hydraulic modelling - CFD

- Allowed structure designs to be optimised quickly
- Provided configuration for flow balancing
- Input to HGL analysis (head loss factors)
- Input to physical model build

Structure 14 CFD model
Hydraulic modelling - physical

- Confirmation of head loss from CFD modelling
- Assessment of flow and air transport in part to full flow transition
- Flow balancing

Physical model of Structure 14, two pipes into three
Hydraulic modelling - TUFLOW

- Reduced flood hazard at Botany Rd Interchange
- Flood depth At Joynton Ave reduced from 2.0m to 0.3m
Gross pollutant traps

- Improve overall water quality discharging to Alexandra Canal
- Treat 3-month ARI flow in GSSD (1.5 m$^3$/s each)
- Proprietary in-line vortex type
- Diversion structure drop to reduce head loss
Maddox St to Huntley St

• Original design was large RCBC
• Removal of existing restrictive box culvert
• Replacement with bridge and channel widening over 300m - reducing local flooding
• Shared path alongside channel to provide future connectivity with CBD
Huntley Street channel widening and shared path
Huntley Street bridge and shared path crossing
Micro-tunnelling benefits

• Minimum impact on existing roads and properties (no open cut)
• Minimum impact on more than 120 utilities crossing GSSD
• Minimum environmental impact (spoil and dewatering)
• Minimum community impact (no open cut)
• Cost effective hydraulic solution
Micro-tunnel installation – DN1800 pipe
Structure 14 internal benching completion