Creating Connections

Jim McNeill

B2B4 Access Road
Project Insight

The client wanted this road

Or did they?
B2B4?

Brockman 2 mine
to Brockman 4 mine

B2 opened 1992
B4 opened 2010

Iron ore mines

from WA to
Location & Client

- Pilbara region
  (2.5 billion year old landscape)
- Half way up WA

Rio Tinto

Expanding iron ore operation from 225Mt pa to 330Mt pa

Iron ore facts
- 13% of worlds
- 80% of Australia
Creating Connections

A sense of scale and remoteness

Western Australia = Argentina

or easily fits Japan, the UK & Texas
Project Insight

Determining the appropriate level of service (LoS)

Competing factors

- Safe connection
- Operational needs
- Acceptable risk
- Funding
B4 Mine – Big Plant

Ore body 15 km by 3 km
B2B4 Access Road – Current situation

- Private unsealed road
- Provides low LoS
- 27 km length
- Crosses a flood plain & along a valley floor
- Subject to flooding
- Used for commuting between the camp and mine sites
- Also provides access to new airport and a fuel hub

- Infrastructure design life 20 years

Airport completed last year
The weather

Wet and Dry seasons
(Dry season April to November)

Subject to cyclones

Flat catchment area
(within a cyclone)

Significant flooding
B2B4 Access Road - Required LoS ?

- Initial design - high LoS but expensive > $100M
- Traffic volumes ~500 vpd
  4WD, buses, fuel road train, large transporters
- Went back to basics
  - value engineering
  - reviewed large cost items
- No real surprises
  very remote site
  earthworks
  pavements
  drainage
  > 6 km of culverts (0.6 to 2.8 m dia).
B2B4 Access Road - Affordable LoS ?

- Optimisation of design to match budget (<50%)

- What LoS = Budget
  - reduced cost by lower road profile
  - floodways to reduce culverts

- Considered floodways at existing creek levels
Funders ‘happy” while operations?

- Funders now “happy” with capital cost

- But Operational personnel not happy with low LoS – serviceability of floodways

  ✓ We needed to *create a connection* between the two

  ✓ Compromise floodways with relief culverts

  ✓ Provides acceptable level of serviceability and cost
Creating Connections

Oh how things can change

- Then in late 2012 iron ore prices fell to under $100/T

- Funders not happy with any cost

- Operational personnel not happy with not being able to access the mines sites even after small flood events

  ✔ In mid 2013 compromise to fund the two worst flood prone sections

  ✔ and depending upon funding access to the airport
Two critical flood prone sections

Boolgeeda creek crossing
Required some flood studies

Catchment areas - showing synthetic streams (indicative flow paths)
Catchment areas ~200km²

Catchment
8 = 74 km²
16 = 106 km²
Flooding levels assessed 5 years = 60 m3/s
Comparisons
Rotorua – Puarenga stream
74 km² @ ARI 100 = 56 m³
Extensive rock protection

Floodway

Lots of rock

Railway
2nd section – Northern Creek Diversion
Northern creek diversion

Existing road at creek crossing
Catchment ~ 60km²

ARI Flows
5 = 73 m³/s
Flood levels
Project status

✓ Preliminary design of road
✓ Detailed design of critical 6 km lengths
✓ Tenders called and awarded

❑ Construction due to commence?

• Wet season approaching fast
B2B4 Access Road - Observations

This case study demonstrates

- Clients often want to fast track projects
- Clients want the highest level of service, *but seldom can afford it*
- Only when the design is completed & costed, *does reality set in*
- Even then competing stakeholders have different views on acceptable serviceability
- Optimising the design and *creating the connection* between design, cost and serviceability with all stakeholders is the key.
Jim McNeill
Perth WA
jim.mcneill@ghd.com