PARSONS BRINCKERHOFF

Business not as usual






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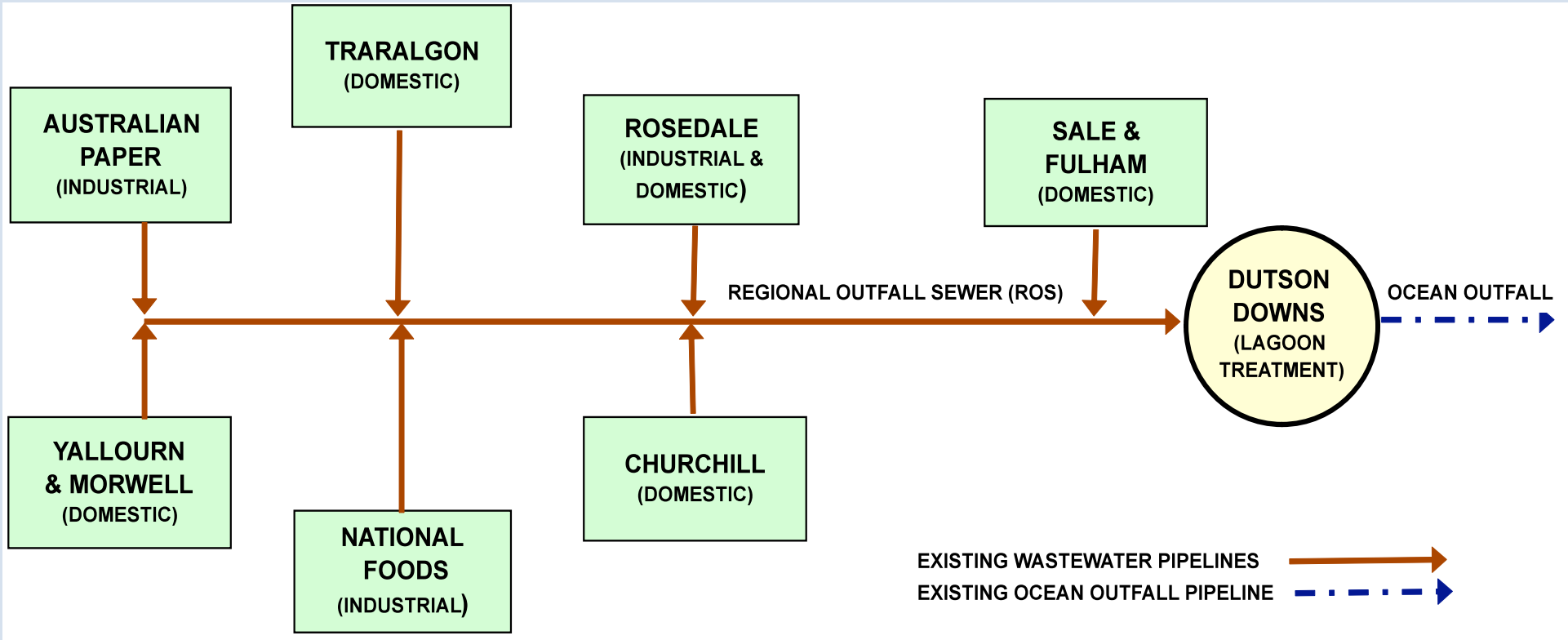
PB 100 YEARS®

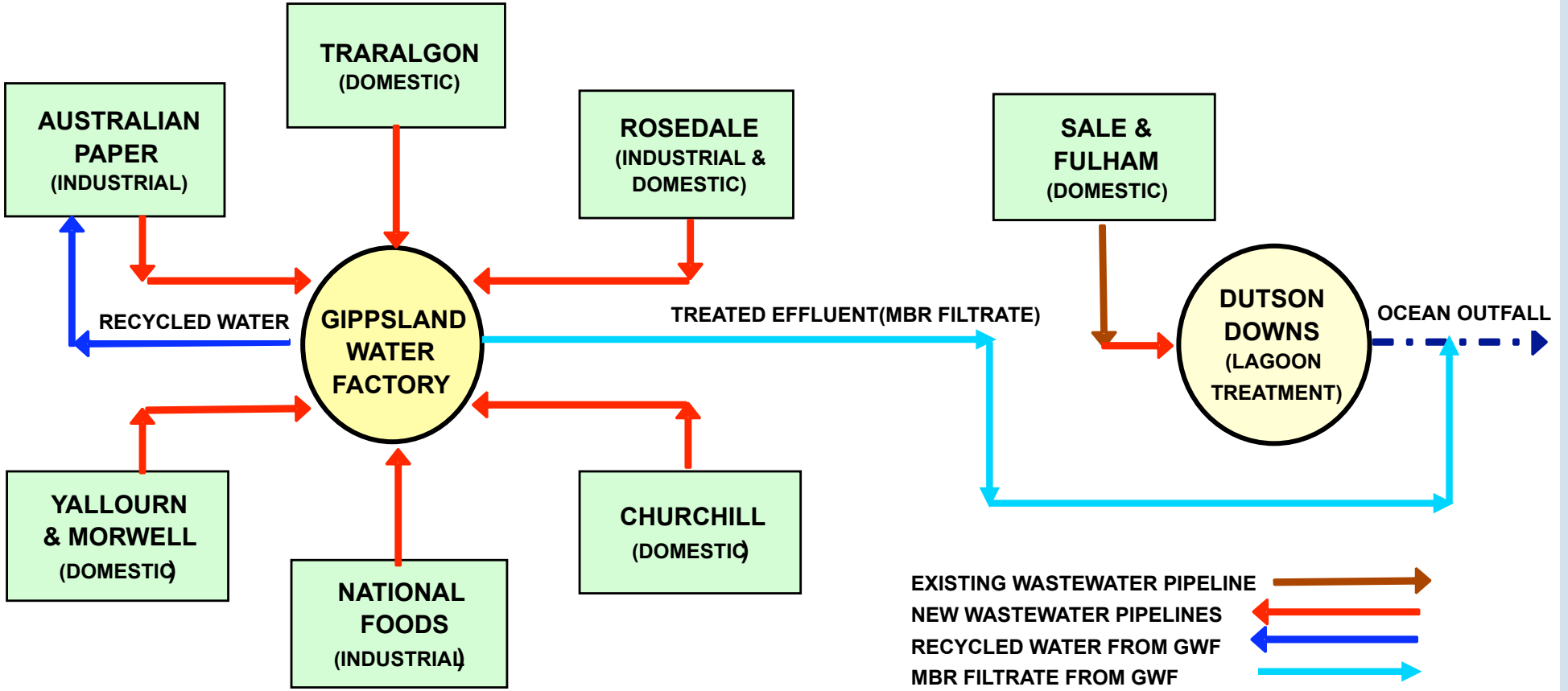
What happens a paradigm changes?

- Prior advantages/limits neutralised
- Unexpected outcomes possible
- New entrants likely to adapt/adopt first
- Custodians of status quo try to maintain it (and tend to resist change)
- Sometimes dinosaurs win, mice lose
- Dinosaurs often lose….
- Carbon is a new differentiator.

GWF Case Study
- GW Existing system - linear



New system – hub/spokes



GWF Facility Features

- Anaerobic Pre-treatment
- Nutrient integration/stream segregation
- Membrane bioreactor treatment
- Odour capture and two stage treatment
- Reverse osmosis desalination
- Visitor interpretive centre

Anaerobic reactors

Carbon Constraints

- Carbon KPI based pricing: design performance incentive
- Sliding scale, effective rate in range approximately $5 - 15/t (the more we save the more its worth), mitigated by other incentives (e.g. cost, time and tech. risk)
- Consequences:
  - LCA guided decision making
  - Integration of LCA and NPV in design decisions
  - Process stream segregation
  - Anaerobic pre-treatment
  - Micro hydro and Cogeneration power supply augmentation
  - Energy and chemical efficiency “respectable” process design attributes
  - GHG burden of chemicals equated with electric power burden (including freight costs of chemicals and sludges)
  - Capital GHG vs. Operational GHG
  - Development of “sustainability consciousness” in project team
  - Effective carbon price probably significantly higher than the incentive value
- A higher incentive, say $40/tonne, likely to drive much more profound changes and innovations

Final comments

- Murphy's Law of dirt
  - To make something clean, something else must become dirty
- Energy, waste and water
  - Making water clean, requires energy and makes sludge
  - Processing sludge for offsite reuse (or even just disposal) requires energy (and water)
  - To make electric power (often) uses water and makes waste
- When water, waste and energy (carbon) are ALL constrained: Integrated solutions, such as GWF, will emerge.