Managing Environmental Impacts for Interventions to Alleviate a State of Disaster – the Case Study of Exploiting the Table Mountain Group Aquifer

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LAND USE SCIENTIST

20 June 2018
Drought and Water Supply Crisis

Percentage Water Stored in Major Dams (WCWSS)

[Graph showing percentage water stored in major dams from 21-Sep-13 to 21-Jan-17]

[Images showing drought-affected and water-filled dams]
Drought and Water Supply Crisis

Western Cape Water Supply System (WCWSS) Weekly Dam Drawdown Tracker

Day Zero: 11-May-2018

Implementation of Phase 2 of CCT Disaster Plan (13.5%)

Water difficult to abstract from dams (10%)

Critical Zone: Partial Compliance with DWS Restrictions; Normal Evaporation; Winter Rainfall same as for 2017

Failure Zone: Inadequate Compliance with DWS Restrictions; Max Evaporation; Winter Rainfall same as for 2017

Week Ending:
- 29-Oct-17
- 29-Nov-17
- 29-Dec-17
- 29-Jan-18
- 28-Feb-18
- 31-Mar-18
- 30-Apr-18
- 31-May-18
- 30-Jun-18
- 31-Jul-18
- 31-Aug-18
- 30-Sep

Actual vs. Projected
State of Disaster

City of Cape Town

• Provincial State of Disaster 24 May 2017
• Section 41(1) of Disaster Management Act (Act 57 of 2002)
  – Declaration of provincial disaster

• Constitution: Bill of Rights
• 27. Health care, food, water & social security
• 24. Environment

• Disaster – rapid response
• Water provisioning projects require authorisation with associated timeframes for process
  – NEMA
  – NWA
  – etc

Solution?
Environmental Legislation

• National Environmental Management Act (NEMA) 1998

• Environmental Impact Assessment Regulations
  – Primary tool – Environmental Authorisation
  – Listed Activities
    – Various revisions
  – Specific process with associated timeframes

• Strategic Environmental Assessment & other IEM tools
NEMA Section 30A Directive

- NEMA S30: Control of emergency incidents
- Directive into S30A: carry out listed activities to address current water supply emergency
- No environmental authorisation required
- Valid for duration of State of Disaster
- Includes all relevant listed activities e.g.:
  - Clearing of natural vegetation
  - Infrastructure for water transportation
  - Dams or weirs
- Includes any activity related to water provisioning e.g.
  - Access roads
  - Powerlines
Requirements of Directive

- Water Supply Emergency Intervention Plan
- Generic Environmental Management Programme (EMP)
  - For any listed activity
- Method Statements for each measure or intervention
  - For any listed activity
- NEMA Section 2 principle of the mitigation hierarchy of avoid, minimize and restore must be adhered to
  - How?
- NEMA Section 28 duty of care and remediation of environmental damage remains relevant
Impacts from Water Provisioning Projects

- Desalination Plants
- Wastewater Re-Use
- Groundwater
  - Cape Flats and Atlantis sandy aquifers
  - Table Mountain Group aquifers

Table Mountain Group Aquifer

- TMG Sandstone – Cape Fold Mountains
- Cape Floristic Region – most diverse non-tropical biodiversity hotspot
- Protected Areas
  - CapeNature provincial nature reserves
  - TMNP
TMGA Borehole Impacts

Short term impacts (within “emergency timeframe”)
• Disturbance related to access and drilling site footprint
• Outflow of water and sediment
• Installation of infrastructure e.g. pipelines, powerlines

Long term impacts (beyond “emergency timeframe”)
• Drawdown of water table
  – Confined vs unconfined aquifers
  – Potentially major impact on sensitive and diverse systems e.g. seep wetlands

How do we address environmental impacts in the absence of Environmental Authorisation??
TMGA within the State of Disaster

• City of Cape Town TMG Aquifer Project
  – Initiated 2002
  – Long term monitoring 2006 –
  – Until State of Disaster
  – Fast track & implement
  – 7 focus areas

• Environmental Working Group
  – CCT Bulk Water, EHRM, BMB
  – DEA, DEA&DP & DWS
  – CapeNature, SANParks & SANBI
  – Main consultant
  – Specialist consultants
Borehole Screening Tool

• EWG – address environmental impacts within the context of NEMA S30A Directive

• Outcome – screening tool
  – CapeNature lead
  – Workshopped with EWG

• Initial screening of boreholes
  – No go
  – Acceptable
  – Further investigation with site visit

• Roll out to all Western Cape Municipalities
Screening process
(sequential)

• NEMA Section 2 Avoidance Module
• Ecological Sensitivity Module
• Legal Compliance Module
• Strategic Considerations
NEMA Section 2 Avoidance Module

**Purpose:** To give consideration to the Section 2 Principles of NEMA as per the provincial and national directives:

“the mitigation hierarchy of Avoid, Minimise and Restore must be implemented by the municipality”
Ecological Sensitivity Module

Purpose: To screen for sensitive ecological features and their buffering requirements (CapeNature has this data)

- Wetlands (incl. springs & seeps)
- Rivers, watercourses & riparian zone
- Other Aquifer/Groundwater Dependent Ecosystems
- Rare or threatened plant habitat
- Sensitive amphibians & fish
- CR & EN Vegetation
- Steep slopes

• Critical Biodiversity Area
• Critically Endangered Vegetation (Swartland Alluvium Fynbos)
• Critical Plant Habitat & 4 SoCC
• Strategic Water Source Area
Legal Compliance Module

**Purpose:** Poses a series of questions for CapeNature to assist municipalities and their service providers at an early planning stage to avoid non-compliance.

- Is the DEA&DP 30A Directive applicable to the proposed intervention?
- If yes, have the required conditions been addressed?
- If no, what Environmental Authorisation is required?
- What other authorisations are required?
- What other permissions are required?
Strategic Considerations

**Purpose:** To highlight other relevant life-cycle factors to consider in the siting of interventions, such as:

- Monitoring requirements & costs
- Mitigation requirements & costs
- Co-location with existing infrastructure
Applying the screening process to proposed sites will result in one of the following recommendations:

<table>
<thead>
<tr>
<th>Sensitivity Value</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Avoid, too sensitive</td>
</tr>
<tr>
<td>4</td>
<td>Avoid or move and do assessment</td>
</tr>
<tr>
<td>3</td>
<td>Possible or move and do assessment</td>
</tr>
<tr>
<td>2</td>
<td>Probable, but do assessment</td>
</tr>
<tr>
<td>1</td>
<td>Conditionally ok, from biodiversity perspective</td>
</tr>
</tbody>
</table>
Conclusions

• First step filter
  – Large scale project, multiple footprints
  – Reduced in-depth investigation
  – Increased efficiency

• Provincial biodiversity spatial plan
  – Utilize same sets of spatial data + more specific data (complementary)
  – Address project specific impacts
Conclusions cont.

- Within context of NEMA 30A Directive
  - No obligation, therefore requires co-operation & buy-in (no stick)
  - Project no-go – unlikely
  - Best practicable alternative
  - NEMA Section 2 – mitigation hierarchy
  - Without screening tool
    - Only standard mitigation – good enough?
    - No influence on project design
<table>
<thead>
<tr>
<th>NEMA Avoidance Module</th>
<th>Purpose of step</th>
<th>NEMA requires consideration of:</th>
<th>Factor/Feature</th>
<th>Potential Data</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Has due consideration been given to the NEMA principle of avoidance? | "Avoiding disturbance of ecosystems" | proclaimed Protected Area | - WHS & biosphere boundaries  
- CN reserve boundaries  
- CoCT PAs  
- WCBSP PAs & SAPAD  
- plus Zonation information | where the purpose of the PA (and zoning, where applicable/available) is for the protection of biodiversity |
| | "Avoiding loss of biological diversity" | Critical habitat for species of Conservation Concern | - SANBI TSP/CREW plant data  
- CN expert input & SOB | species specific data may be harder to defend at this screening level |
| | "Avoiding disturbance of landscapes and sites that constitute the nation's cultural heritage" | Notable heritage or archaeological sites | - SG interpretation sites  
- CoCT heritage data  
- PAMP data | while important and sensible to screen for, doesn't fit as tightly with the biodiversity/ecological purpose of the tool; note as 'other' consideration |

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<th>Sensitivity Level</th>
<th>Sensitivity Value</th>
<th>Description</th>
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</table>
| Very High        | 5                | - Protected Areas, outside of development zones  
- Critically Endangered Vegetation (A1 or D1*) | **Avoid; seek alternatives** |
|                   |                  | *Whether or not D1 veg alone should trigger a 4 or 5 has been brought up. |
| High             | 4                | - Critical Biodiversity Areas (CBA1 & CBA2)  
- Endangered Vegetation (A1 or D1*)  
- CR (deg) | **Avoid or move; seek alternatives** |
|                   |                  | *Whether or not D1 veg alone should trigger a 4 or 5 has been brought up. |
| Moderate         | 3                | - EN (deg)  
- Vulnerable Vegetation (A1 or D1) | next module |
<p>| Low              | 2                | n/a, next | next module |
| Minimal          | 1                | n/a, next | next module |</p>
<table>
<thead>
<tr>
<th>Feature*</th>
<th>Qualifier</th>
<th>Sensitivity (unconfined)</th>
<th>Sensitivity (confined)</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Springs</td>
<td>Within 100m of 5</td>
<td>5</td>
<td>5</td>
<td>High aquifer dependency &amp; NFEPA (2011)</td>
</tr>
<tr>
<td>Springs</td>
<td>100-250m 5</td>
<td>5</td>
<td>4</td>
<td>DWS RQO &amp; WRC consultants</td>
</tr>
<tr>
<td>Springs</td>
<td>250-500m 5</td>
<td>5</td>
<td>4</td>
<td>NWA (36/1998), Notice 509 of 2016, definition of &quot;regulated area of watercourse&quot; (extent + 500m for wetlands) &amp; high dependency</td>
</tr>
<tr>
<td>Springs</td>
<td>500-1000 4</td>
<td>4</td>
<td>3</td>
<td>Parsons &amp; Wentzl (2007), Colvin et al. (2007), Saayman (2005) &amp; within zone of influence</td>
</tr>
<tr>
<td>Springs</td>
<td>&gt;1000m 3</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Wetland**</td>
<td>Within 5</td>
<td>5</td>
<td>5</td>
<td>as per NEMA, CARA</td>
</tr>
<tr>
<td>Wetland</td>
<td>0-32m 5</td>
<td>5</td>
<td>5</td>
<td>NFEPA (2011), NWA &amp; Wenger (1999)</td>
</tr>
<tr>
<td>Wetland</td>
<td>32-100 5</td>
<td>5</td>
<td>4</td>
<td>DWS RQO &amp; WRC consultants; within zone of direct influence, especially if a combination groundwater and hillslope interflow system.</td>
</tr>
<tr>
<td>Wetland</td>
<td>100-250 5</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
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<td>5</td>
<td>3</td>
<td>NWA (36/1998), Notice 509 of 2016, definition of &quot;regulated area of watercourse&quot; (extent + 500m for wetlands); if seeps are separated they would likely score higher for this zone.</td>
</tr>
<tr>
<td>Wetland</td>
<td>500-1000 4</td>
<td>4</td>
<td>n/a</td>
<td>Parsons &amp; Wentzl (2007), Colvin et al. (2007), Saayman (2005)</td>
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Thank you.

Acknowledgements: Genevieve Pence, CapeNature
City of Cape Town TMG Aquifer Environmental Working Group

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