HONIARA BOREHOLE CLEANING – LESSONS LEARNED

Opening

- Thank you
- I am
- Presenting for
- Presenting about

Background

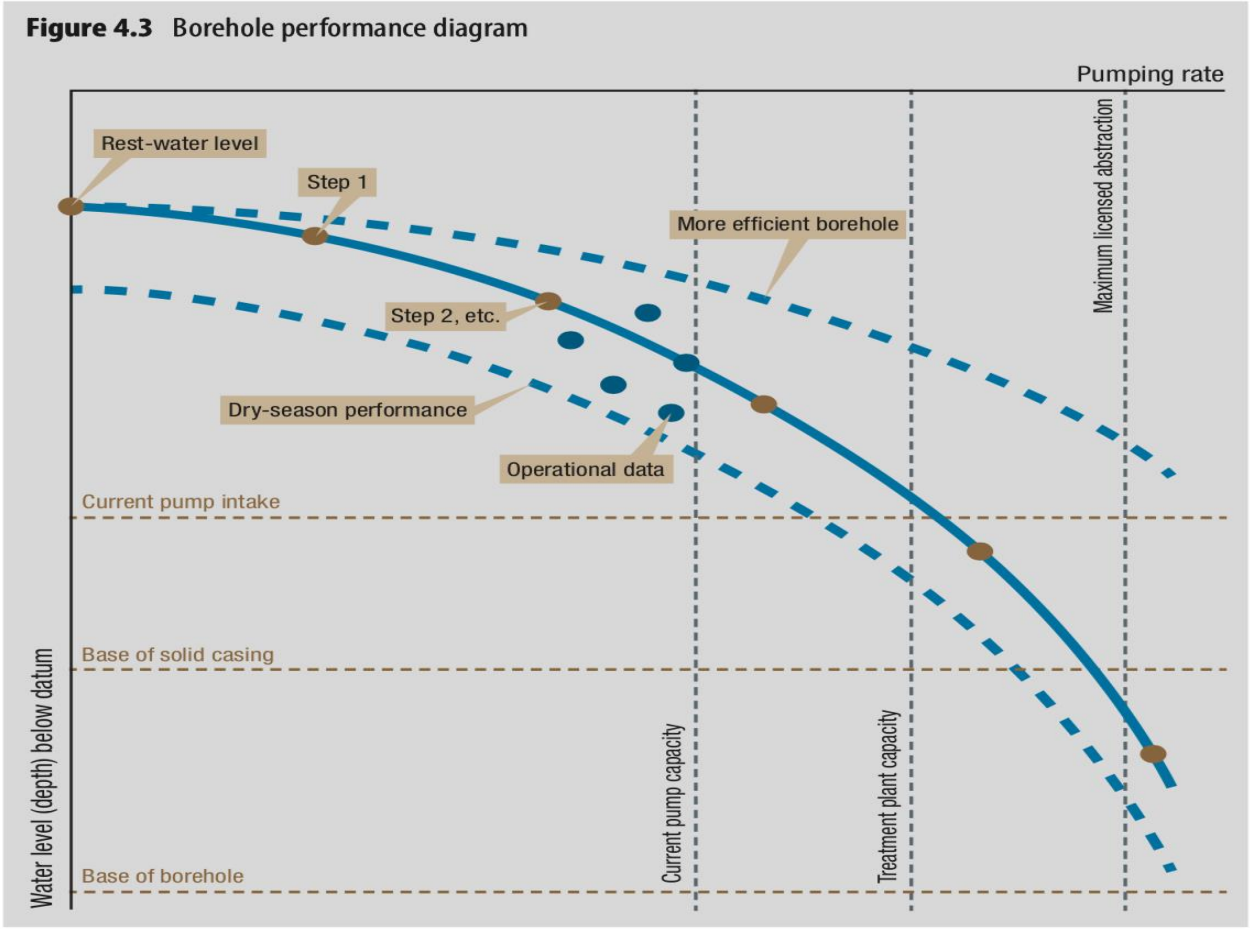
- SW has 30 bores producing approximately 18MLD or 45% percent of the total production
- Bores provide a reliable source of quality water for our network. Particularly important to compliment surface water
- SW bores are in general more expensive $/m3 and require good maintenance and operation to ensure efficient operation

The problem(s) and one desire

- Decline in yield suspected
- A desire for optimal running conditions
- Some data existed but much of it didn't line up with the design or as built data
- many as builts didn't exist especially for the older bores

- Lesson 002 - Data is useful, but only if its useful. collect the right data keep it accessible and updated.
- Lesson 003 – Some problems are relatable in any context

The roadmap to efficiency



Lesson 004 - A picture says a thousand words

Data Collection

- Pump Test?
- But of course the data was incomplete so the best way forward is to go out and get it
- Physical arrangement of some bores made data collection very difficult

A	B	A	B	O	Q	R	S	T	U	V	W	X	Y	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
				Ground elevation	bore depth	bore depth	SWL - at time of drilling	SWL (m	Drilled diameter	Bore casing diameter	Casing materia	Total screened thickness	pump depth	Current LWL switch (m	Current HWL switch (m	Screen #1 depths (m	Screen #2 depths (m	Screen #3 depths (m	Screen #4 depths (m	Screen #5 depth (m	Volume of water in bore	No. of pipe risers					
Bore ID	Name	Bore ID	Name	(m asl)	(m bgl)	(m asl)	(m bgl)	asl)	(m)	(m)	l	(m)	(m bgl)	bgl)	bgl)	bgl)	bgl)	bgl)	bgl)	bgl)	(L)	(5.5m/length)		mins per bore	volume (@ 2l/sec)		
KO-1	Borderline KO-1	KO-1	Borderline KO-1	56.05	130.6	-74.55	24.05	32	0.3	0.2	SS screer	79.8	37.04	34.8	24.8	45.1-73.6	119.2-124.9	-	-	-	3347			11.15789	mins per bore volume (@ 5l/sec)		
KO-2	Borderline KO-2	KO-2	Borderline KO-2	52.09	100	-47.91	11.48	40.61	0.3	0.2	SS screer	54.2	81.75	78.8	68.8	34.4-45.8	60.1-71.5	82.9-88.6	-	-	2781			9.269793	mins per bore volume (@ 5l/sec)		
KO-3	Borderline KO-3	KO-3	Borderline KO-3	48.6	127.7	-79.1	0.75	47.85	0.3	0.2	SS screer	82.7	23.29	21	11	42.1-53.5	59.2-64.9	96.3-102.0	119.1-124.8	-	3988			13.29417	mins per bore volume (@ 5l/sec)		
KO-4	Borderline KO-4	KO-4	Borderline KO-4	45.31	102.5	-57.19	2.8	42.51	0.3	0.2	SS screer	28.5	40.04	37	27	51.2-79.7	-	-	-	-	3132			10.44056	mins per bore volume (@ 5l/sec)		
MB-1	Skyline MB-1	MB-1	Skyline MB-1	50.5	130.6	-80.1	34.47	16.03	0.3	0.2	SS screer	68.4	92.89	89.8	79.8	45.1-56.5	79.3-90.7	102.1-113.5	-	-	2532	16.5		8.440412	mins per bore volume (@ 5l/sec)		
MB-2	Skyline MB-2	MB-2	Skyline MB-2	38.02	119.6	-81.58	16.12	21.9	0.3	0.2	SS screer	103.48	84.6	81.5	51	14.4-19.8	31.2-36.9	47.8-53.8	68.3-73.8	96.8-102.5	2501	15	85.4	8.335693	mins per bore volume (@ 5l/sec)		
MB-3	Skyline MB-3	MB-3	Skyline MB-3	30.45	113	-82.5	15.85	14.6	0.3	0.2	SS screer	90.9	62.64	59.5	49.5	14.4-19.8	54-59.7	76.8-88.2	99.6-105.3	-	2292	11		7.639306	mins per bore volume (@ 5l/sec)		
MB-4	Skyline MB-4	MB-4	Skyline MB-4	27.67	105.2	-77.53	12.87	14.8	0.3	0.2	SS screer	74.1	96.04	92.5	82.5	30.8-36.5	70.7-87.8	99.2-104.9	-	-	2362	17		7.874926	mins per bore volume (@ 5l/sec)		

So what did we find out?

- Bore cameras
- Dip tube installs
- pump and float heights all collected
  Screens, bore depths confirmed
- Current practice were not fully effective
- Zone of interference?

Calcite Deposition

Biological Build up (and cable tie)

Action

- Contractors to the rescue?
  - Engaged for undertaking cleaning, training and SOP development
  - Risky as there is no performance criteria on the contractor
- Engaged for 6 bores encompassing two bore fields
  - Kombito (old)
  - Skyline (new)

Bore	Period bore offline for cleaning (includes discharge of residual ASCA in bore)
Kombito bore field	
K-1	6 days (13-19 November) *
K-2	6 days (14-20 November) *
Skyline bore field	
MB-1	56 days (20 November – 15 January)
MB-2	55 days (21 November – 15 January)
MB-3	49 days (26 November – 15 January)
MB-4	48 days (27 November – 15 January)
* included one rest day during cleaning process.	

Results and lessons learned

- Immediate increase in yield of approximately 10% in the older Kombito Bores
- Not 100% effective and further work will need to be done.

Points to take away

- Keep an eye on your yields
  - Know your design and parameters
  - Monitor continuously (or at least regularly)
- There are multiple factors influencing the production of your bore
  - Consider the effect of other bores in the area
  - Previous operation and age
  - Climatic conditions
- The details matter
  - Data collection
  - As built information (including operational changes)
  - SOP's
  - Scheduled Maintenance

Further Readings

- International Committee of the Red Cross Practical Guide to pumping tests
- "Hydraulics of wells : design, construction, testing, and maintenance of water well systems. Published 2014, by American Society of Civil Engineers.

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- Shaun Kies-Ryan

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Questions?