

EXXARO MATLA COAL



Excess Water Challenges at Matla Coal

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MATLA | COAL

“Safety Always, All the way!”



Overview

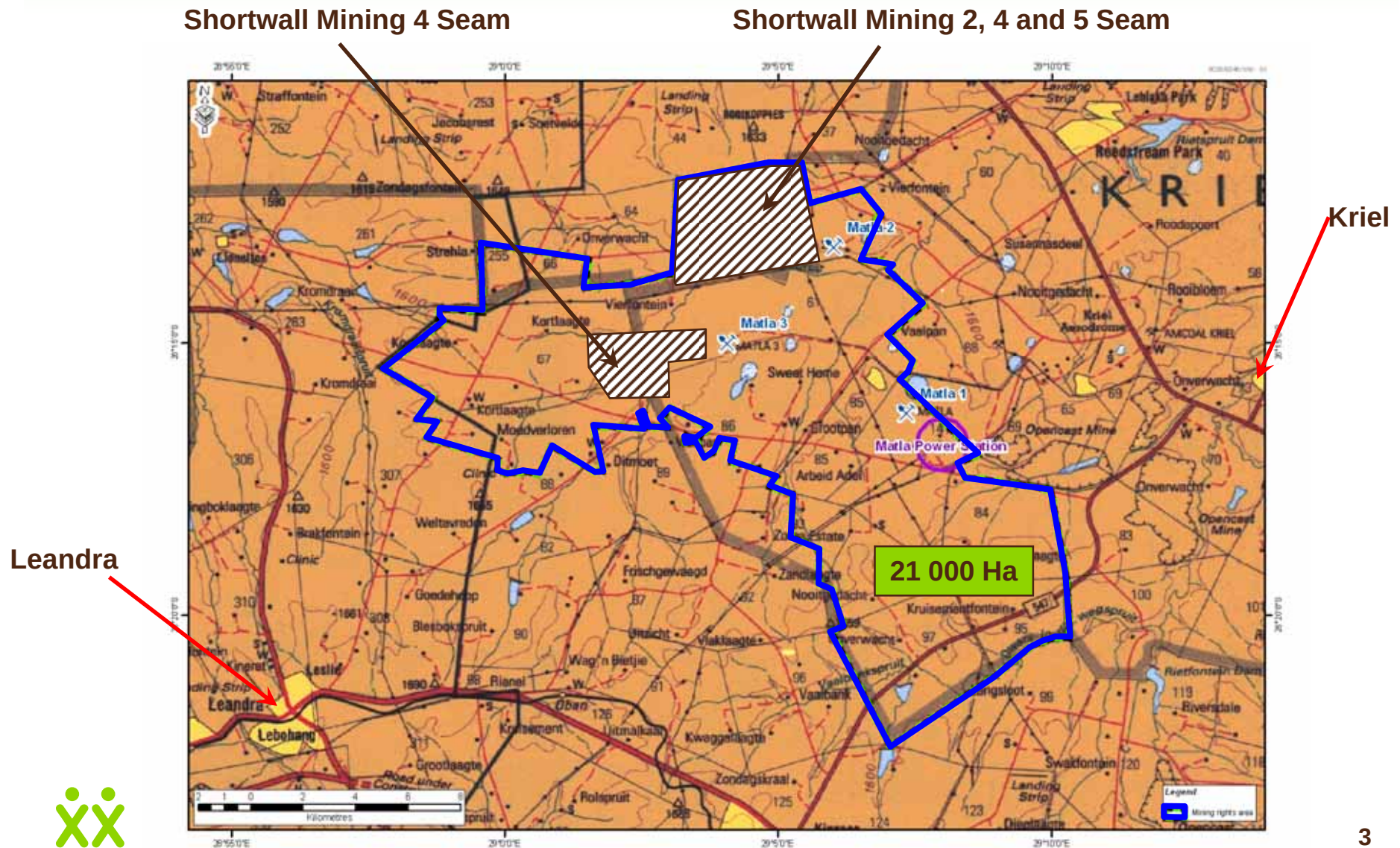
- **Background**
 - Locality, Interesting facts and multiple seam longwalling
- **Mine Water Balance**
 - Regional Perspective
 - Surface Topography vs Mined Areas
 - Excess Water Make up
 - Principles of the Water Management Strategy
 - Storage Capacity after re designing the LOMP
 - Projected Increase in Water Influx
 - Projected Available Space for Water Storage
 - Water Management Plan
- **Mine 2 water challenges**
 - Background to recent flooding
 - Measures used to address future water issues.
- **Acknowledgements**



Background



Locality

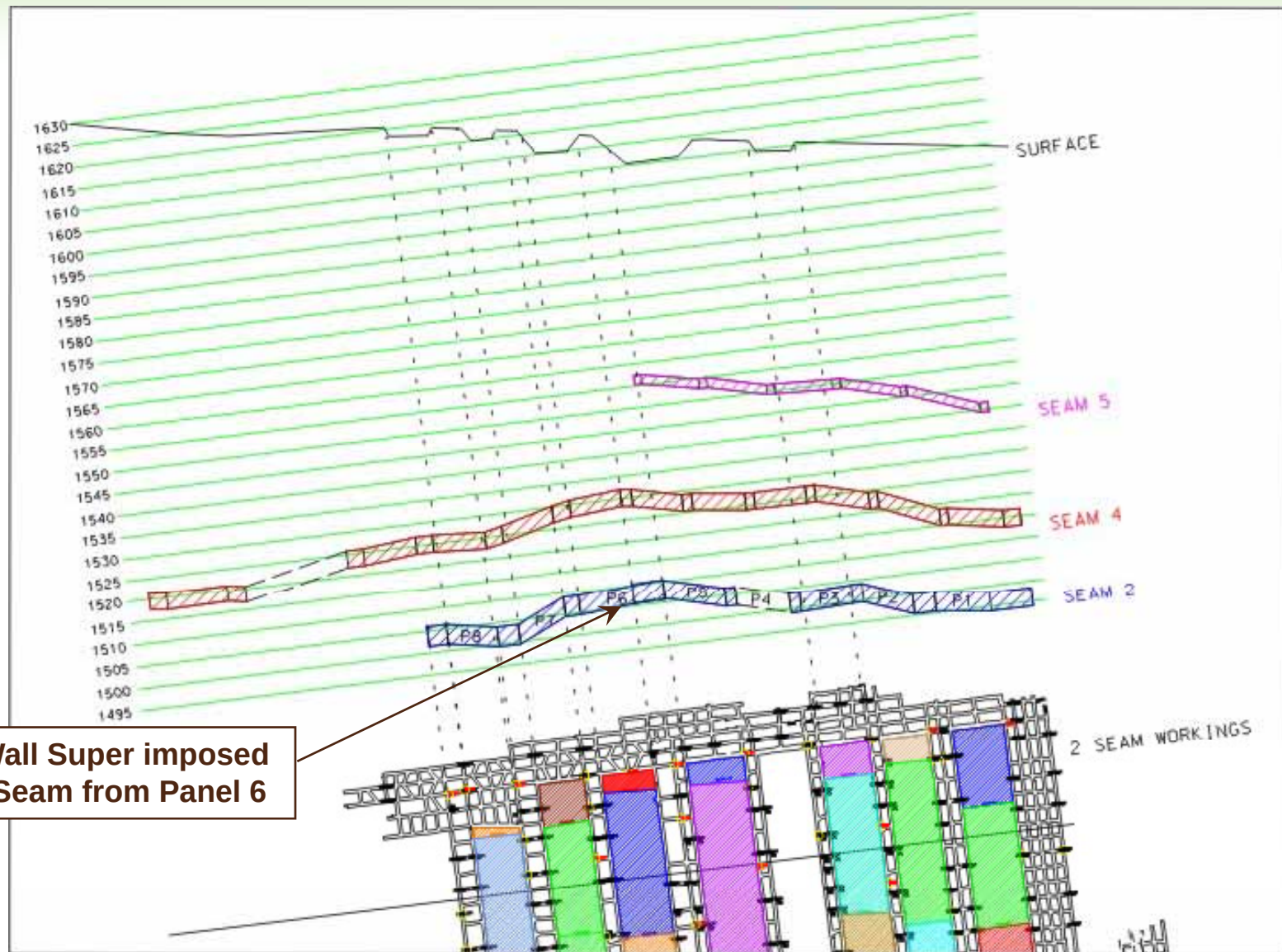


Interesting Facts

- **First production delivered from Mine 1 in 1979**
- **Mine 2 and 3 commissioned in 1980 and 1982 respectively**
- **First colliery in SA to implement fully mechanised sections**
- **Each Mine designed to deliver 50% of coal burn**
- **Capacity to produce in excess of 60 kt/day**
- **Sole market - Eskom**
- **Contracted to supply 12,5 mt per annum**
- **2 of the 3 Longwalls in RSA are at Matla**
- **1827 full time employees and 500 contractors**



Multiple Seam Wall Mining

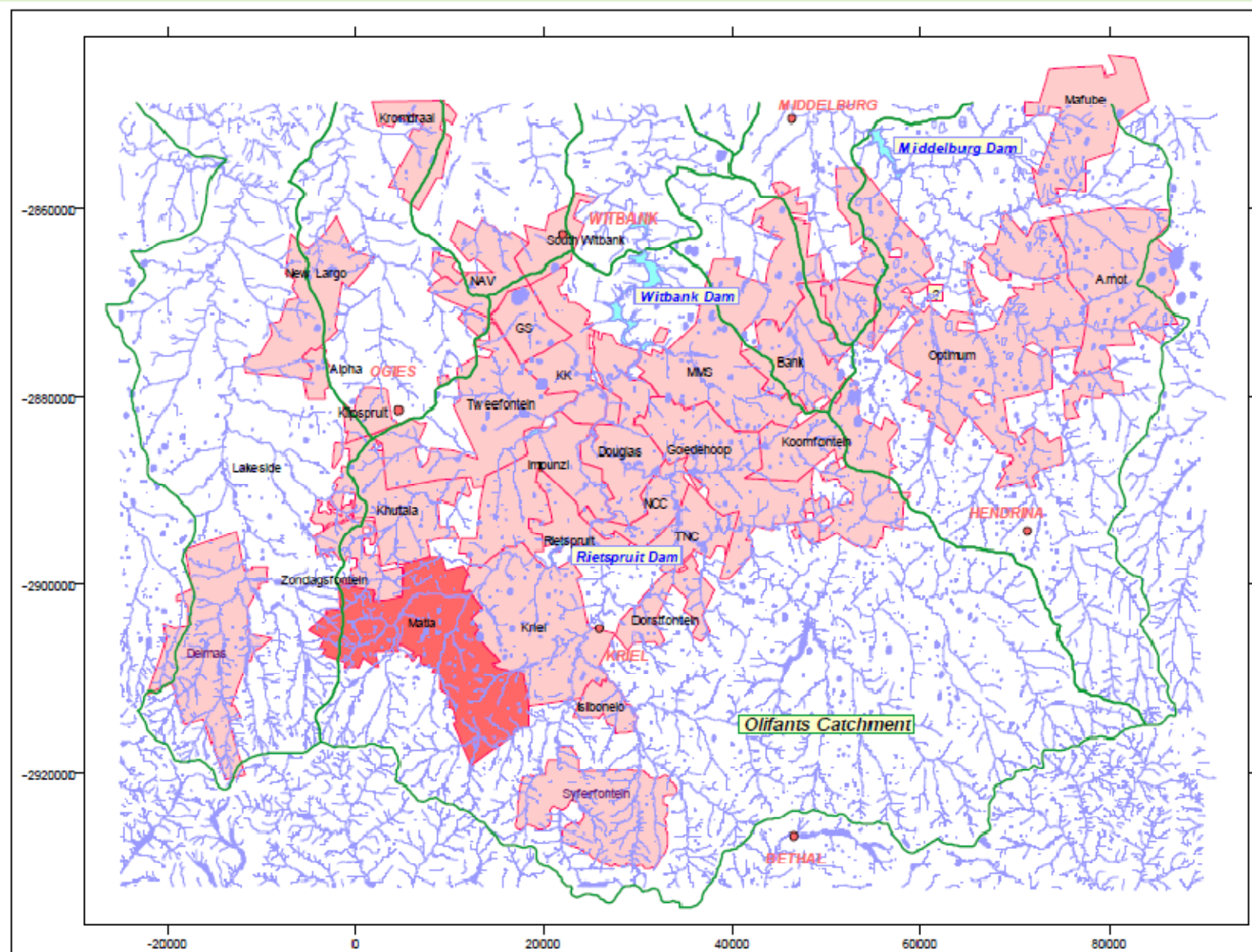


.../Mine 2/GENERAL/2ofsetbjg.dgn 15/04/2008 08:23:54

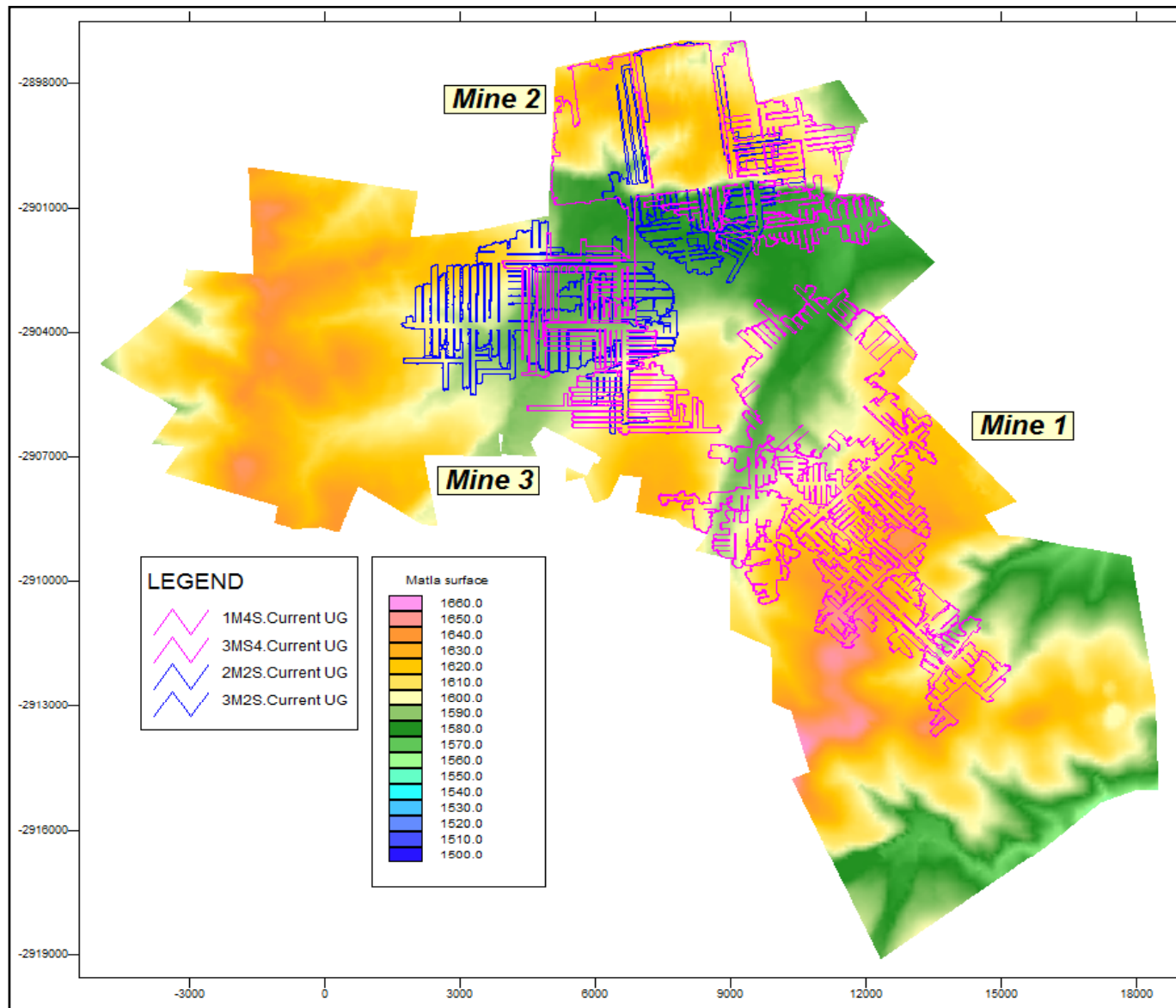
Mine Water Balance



Regional Perspective



Surface Topography vs Mined areas



Excess Water Make up

- Currently Matla has 2 of the 3 longwall operations in South Africa and therefore is exposed to a greater challenge in terms of water make up.
- The extent of the water makeup is dependent on the mining method used.

Mining Method	Recharge as a percentage of the average annual rainfall
Bord-and-pillar	1 - 3%
Stooping	6 - 13%
Longwall and shortwall	15 - 20%
Opencast	20 - 30%



Principles of the Water Management Strategy

- **Matla Coal fully redesigned the life of mine plan to best accommodate excess water in the mine workings whilst continuing mining. This follows more than 25 years of excess water problems.**
- **Currently Matla is investigating short and long term water treatment solutions**
- **Projections are made for the life of mining and beyond, until equilibrium conditions are reached.**

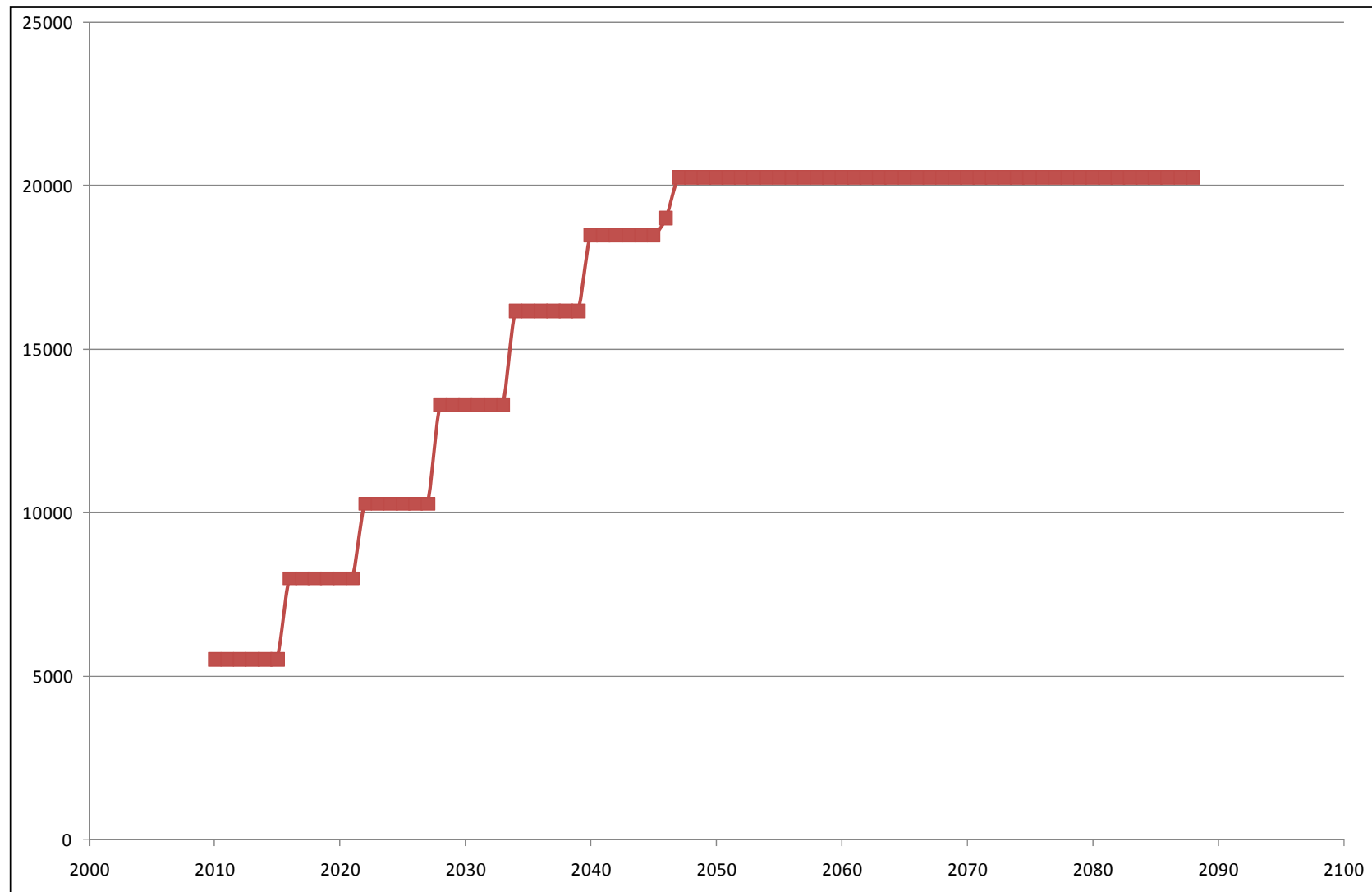


Storage Capacity Available after re designing LOMP

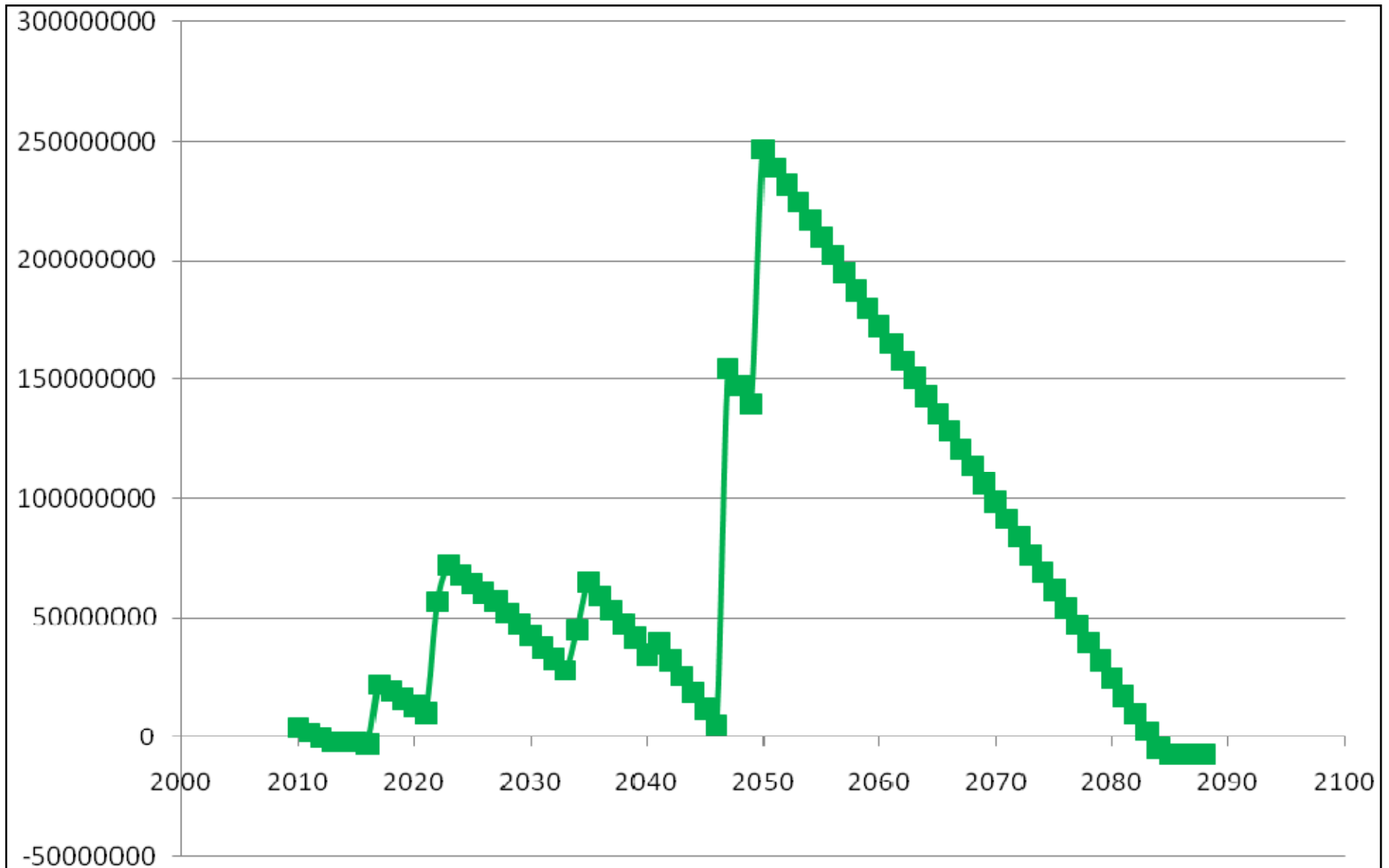
Area	Earliest Availability	Capacity (Mm ³)
Mine 3, 2 Seam	2010	7
Mine 1, 4 Seam	2017	25
Mine 2, 2 Seam	2022	50
Mine 2, 4 Seam	2023	19
Mine 3, 4 Seam NW	2034	23
Mine 2, 2 Seam at Mine 3	2035	26
Mine 2, 2 Seam East	2041	11
Remainder Mines 2 and 3	2047	157
<u>Remainder Mine 1</u>	<u>2050</u>	<u>114</u>
Total		432



Projected Increase in Water Influx (m³/day)



Projected available space for water storage (m³) for the life of mine and beyond



Water Management Plan

- The 2010 LOM plan allows for far-reaching changes to the mine plans, such as:
 - A new access to the underground workings at Mine 1 and an incline from 4 Seam to 2 Seam at Mine 3.
 - Extracting 2 Seam coal from the northwest through the 4 Seam at Mines 3 and 2.
 - Rescheduling of mining to make available compartments for flooding at regular intervals.
 - Piping of excess water over long distances.
- It is concluded in this work that it would be possible to create sufficient underground water storage space to contain all the mine water whilst mining and for many years thereafter.



Water Management Plan (Cont.)

- **Influx of water will continue after mining has stopped and the mine workings are likely to be fully flooded by about 2080. Treatment of the excess water (max 20 ML/d) will have to be coordinated.**
- **Eventual water levels in the mines should be kept well below their decanting elevations. These levels will be 20 m below the decanting elevations and will retain a slight groundwater gradient towards the mines and in so doing, eliminate the possibility of mine water seeping into the adjacent strata.**



Background to Recent Flooding

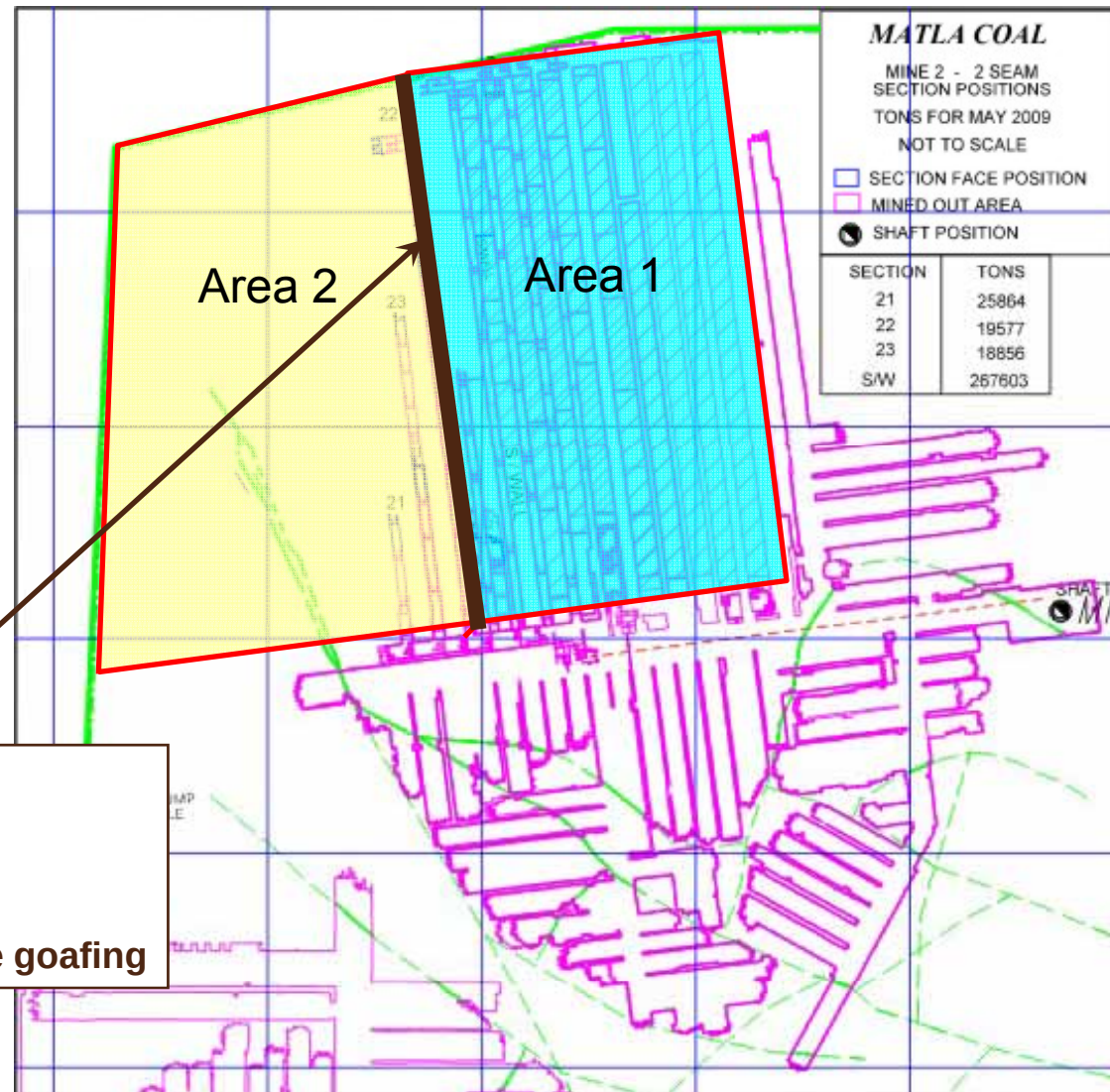


Background to Water Management on the 4 Seam

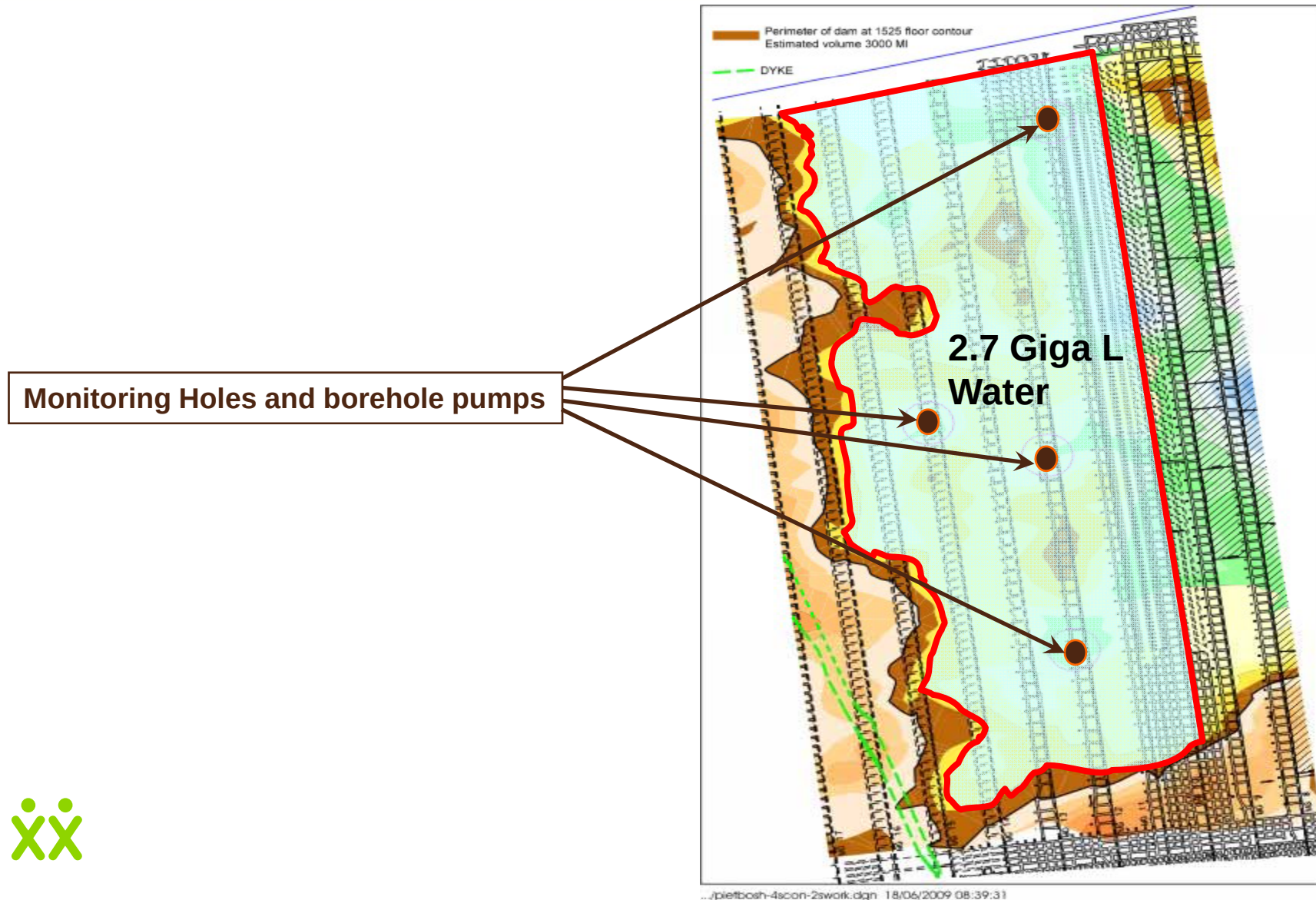
- The 2 Seam shortwall undermined area 1 with minimal water issues
- Prior to mining area 2, boreholes were drilled into the sealed area 2 on 4 seam and it was determined that there was approximately 2,7 GL of water. 4 Seam wall area was sealed off in 2008 in order to minimise the possibility of spontaneous combustion and to optimise the ventilation layout at Mine 3
- This water on 4 seam had to be pumped prior to the 2 seam goafing area 2.
 - Pumping started in July 2009 and was completed in December 2009.
 - Approximately 28km of piping and 12 borehole pumps were installed to move this water from the 4 Seam to storage compartments on 2 Seam at Mine 3 and also to a 4 Seam storage area at Mine 1.
 - In addition, pumps were placed in surface goaf ponding areas to pump off rain water to nearby streams
- Low areas on the 4 Seam were monitored weekly and pumps were started as and when required.



Mining Area 1 and 2



Water on the 4 Seam - Area 2



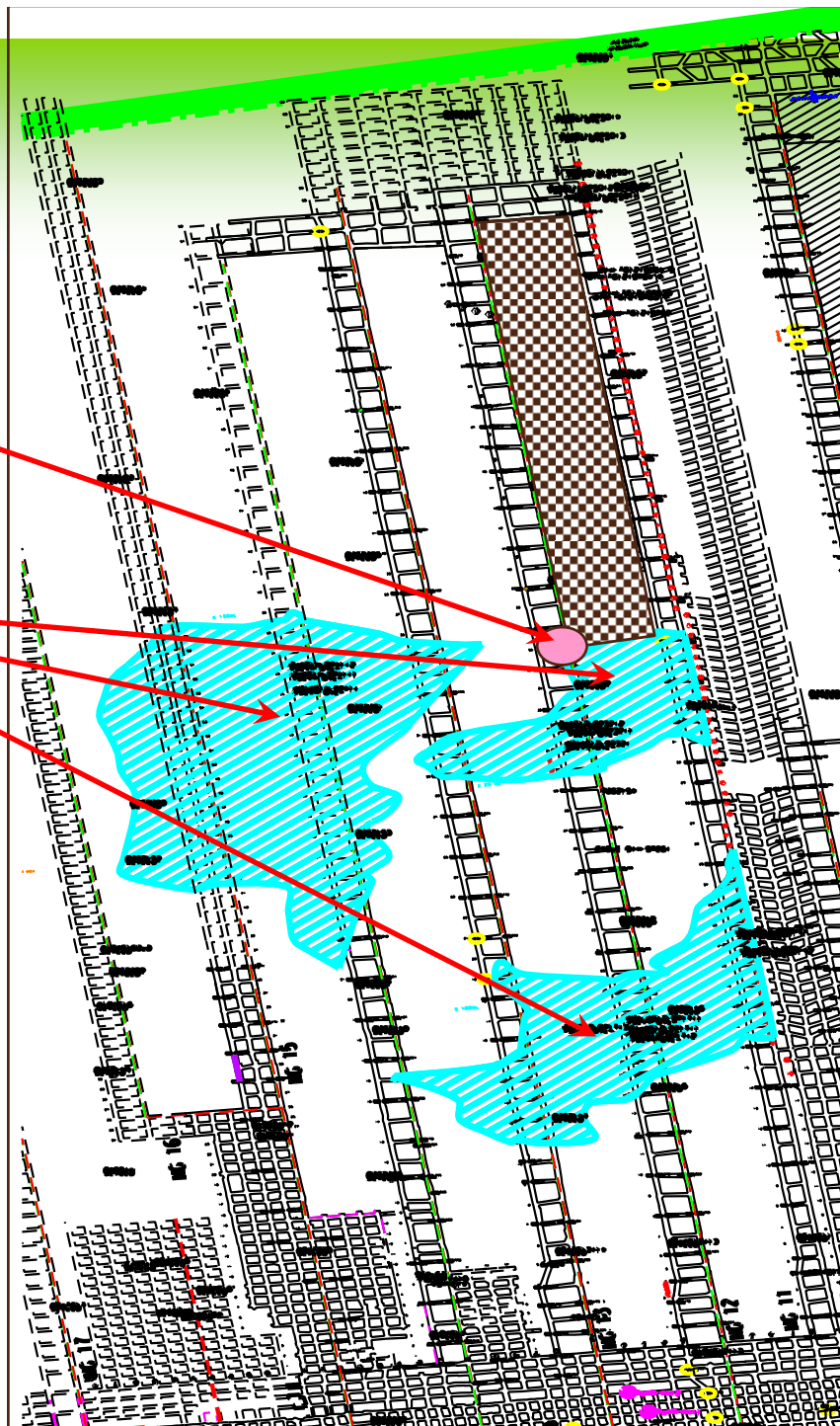
Flooding April/ May 2010

- Monitoring holes indicated very little water – pumps in dry run
- Maingate 3m lower than tailgate
- 37kW pump pre installed as a precaution
- As systematic goafing occurred, water started to rush in from midface and accumulated at the pantech in maingate
- The 37 kW pump could not keep up with the water inrush to a point where the power on the pantech had to be isolated. The pump was fed from the pantech. From the start of the inrush to the isolation of power to the pantech was less than 12 hours.
- The water level at the pantech and traveling road at the deepest point was 3,2m



Area where pantech flooded

Localised water accumulations



Immediate Actions Taken

- Pump transformer and switches moved closer to the flooded area
- Turned fresh water line into 2nd pump line
- Installed a 90kW flight pump and a 75kW barge pump
- Installed additional 132kW pump on transfer dam
- Once water subsided sufficiently;
 - Sourced OEM technicians to assist
 - 3 Shift engineering crew to test and strip components
- Removed current borehole casing, pumps and reamed holes to 15 inch and drilled 5m into floor. Re-installed casing (bottom end perforated) and re-installed pumps.
- Contacted a company to conduct inter seam drilling to dewater localised water accumulation (Controlled release via valves)



Equipment Affected

- 5 x HP pump motors
- 2 x Guarantee set motors
- 1 x Booster pump motor
- 1 x 1250 kVA transformer
- Stop switches
- Cables: trailing and HT



Impact of Flooding

- **Pantech isolated** **24 April 2010**
- **Production resumed** **08 May 2010**
- **Production loss** **168 000 tons**
- **Post flooding issues:**
 - **Intermittent electrical trips**
 - **Effect of loading fines/ water**
 - Excessive wear on AFC flightbars, chain and sprockets
 - Dogbone pocket break outs
 - Strip out conveyor structure and belt to load out fines
 - Excessive wear on conveyor top and bottom covers
 - Conveyor belt carcass degradation
 - Premature roller failure



Lessons Learnt

- Do not under estimate low lying areas and localised patches of water
- Borehole pumps do not pump to zero water level. Drill into floor to get zero water level
- Areas where maingate is lower than tailgate, ensure enough pumping capacity is available
- Ensure independent HT power is available at the face for pumping
- Dewater 4 seam at all low lying areas via interseam drilling prior to undermining
- For multiple seam total extraction methods, water management requires finite planning, implementation and constant monitoring.



Acknowledgements

- **Professor Frank Hodgson** **Mine Water Balance for Matla Coal**



Thank you

