

Donaldson Coal
Abel Mine
SMP STAKEHOLDER MEETING
ABEL AREA 1

24 June 2009

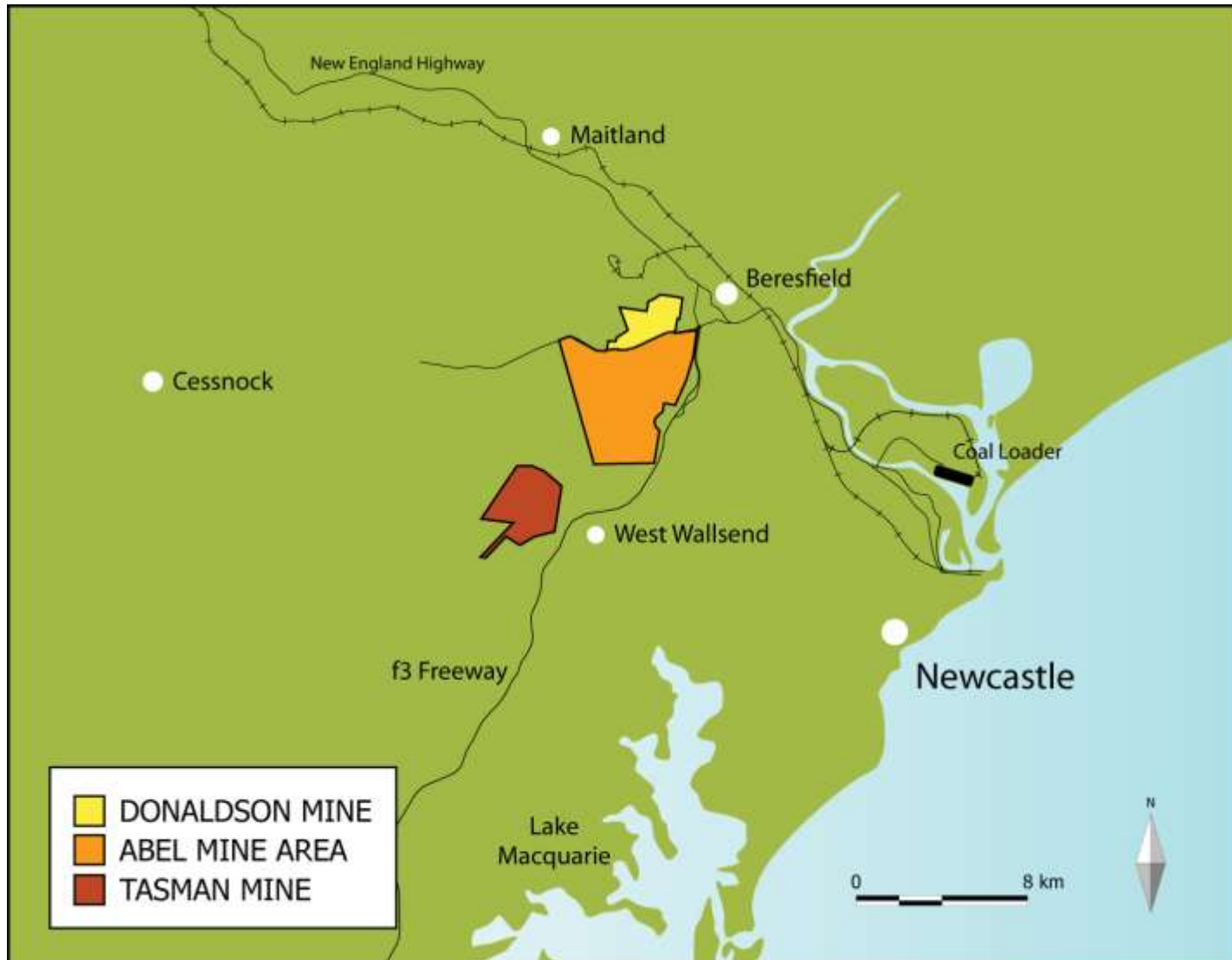
Agenda

- Introduction and Meeting Objectives
- Donaldson Coal Background
- The SMP Process
- Abel Mine
 - ◆ Project Approval
 - ◆ Mine Planning
 - ◆ Mining Methods
 - ◆ SMP Area Surface Environment Assessment
 - ◆ Subsidence Assessment & Predictions
 - ◆ Key surface features
 - ◆ Proposed Monitoring
 - ◆ Abel SMP Schedule
- Field Visit SMP Area
- Lunch

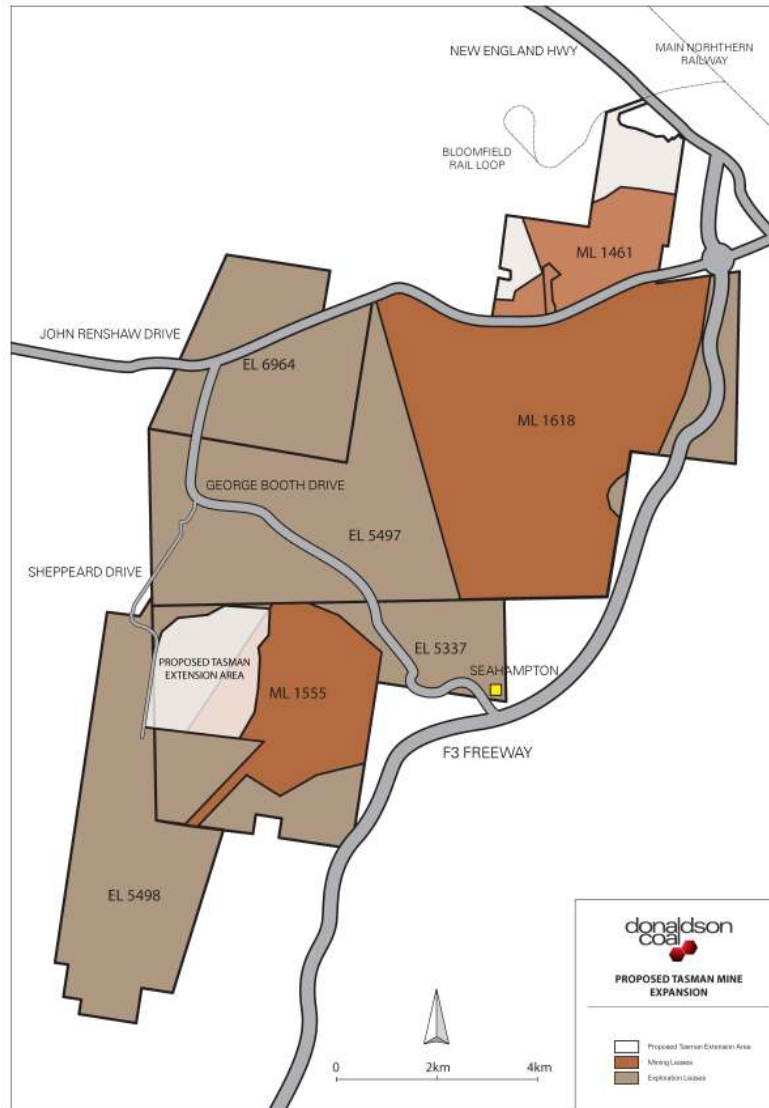
Purpose of Meeting

1. Provide interested parties with an introduction to both the Subsidence Management Planning Process and outline the planning in relation to the Abel mining proposal for Abel Area 1
2. Consult with interested parties to identify any potential issues or relevant concerns to be considered and addressed in the preparation of the Subsidence Management Plan for Abel Mine

Location of Donaldson Coal Operations



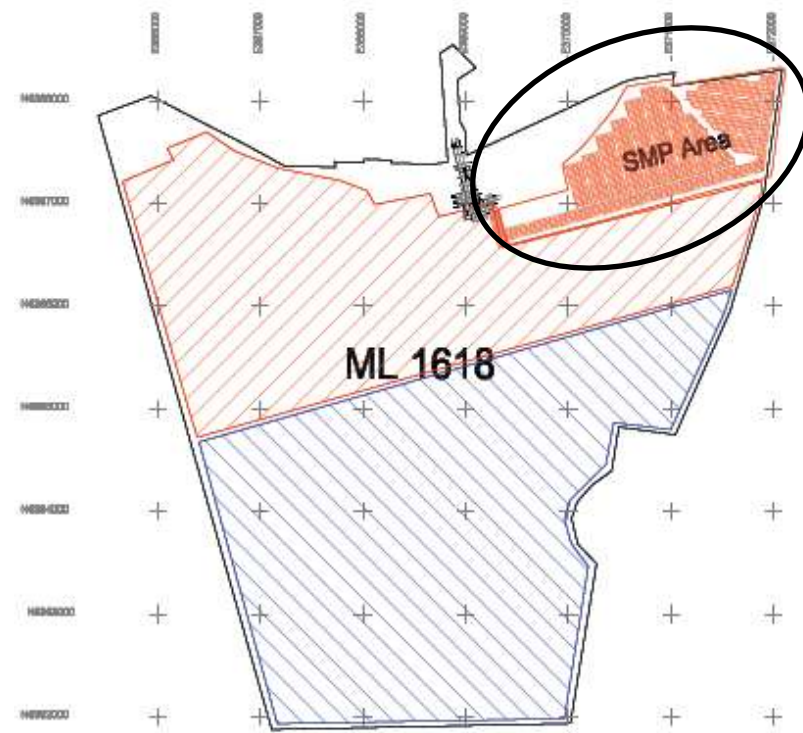
Lease Areas



- Current Leases:
 - ML 1461 (Donaldson O/C)
 - ML 1618 (Abel U/G)
 - ML 1555 (Tasman U/G)
- Current Exploration Areas:
 - EL 5337 (Tasman)
 - EL 5498 (Tasman)
 - EL 5497 (Abel)
 - EL 6964 (Abel)

Abel Mine Plan

- Commenced coal production in May 2008 and will ramp up to 4.5mtpa by 2012 and maintain that rate for >20yrs
- Target seams are the Upper and Lower Donaldson which range in thickness from 1.9m to 2.6m
- Soft coking and thermal products from the Upper Donaldson. Thermal from the Lower Donaldson
- At full production of 4.5mtpa will employ >350 people
- ML1618 area = 2,755 ha
- SMP Area 1 = 260ha

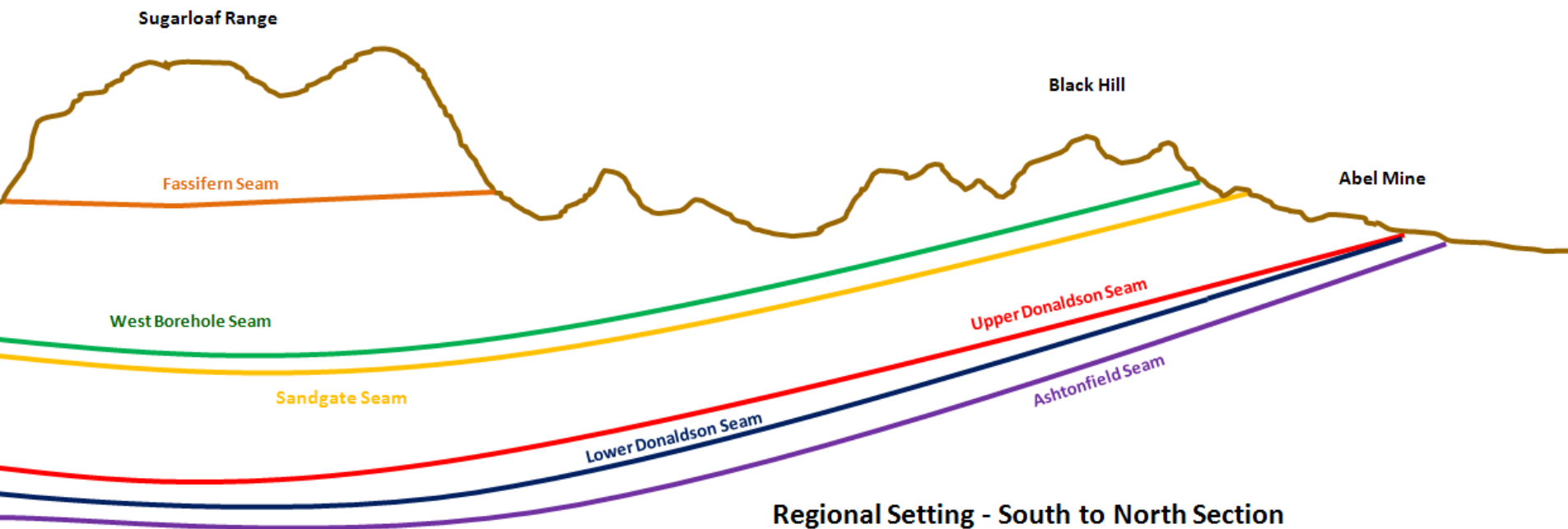


Upper Donaldson

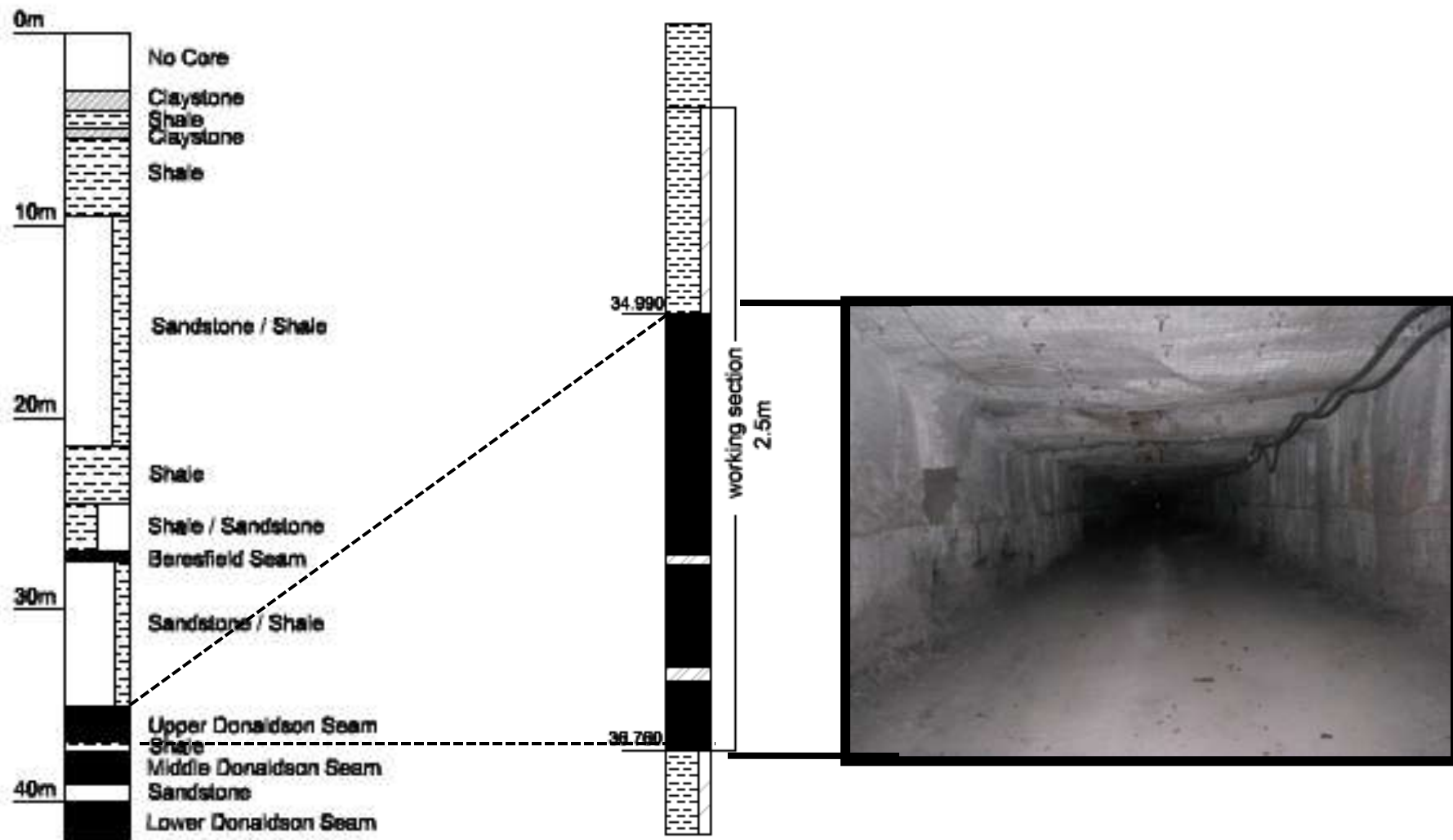
Lower Donaldson

Geological & Mining Setting

- Target seams are part of the East Maitland/Tomago district Four Mile creek formation
- Seams dips to south



Typical Stratigraphic column



Abel Project Milestones

- ◆ Planning Focus Nov 2005
- ◆ EA lodged 2006
- ◆ Project approval granted June 2007
- ◆ Mining Lease ML1618 granted May 2008
- ◆ EPA Licence No. 12856
- ◆ MOP Approved Dec 2008
- ◆ Construction commenced late 2007
- ◆ CCC 1st meeting late 2007
- ◆ Abel commenced underground production from box cut off highwall in May 2008
- ◆ Pillar extraction production from Area 1 to commence early 2010



SMP Application Process

- Approval process introduced in March 2004 for the management of coal mining subsidence (*New Approval Process for Management of Coal Mining Subsidence – NSW*)
- Condition of Abel's Mining Lease 1618 that the leaseholder shall prepare a Subsidence Management Plan prior to commencing underground mining operations which will potentially lead to subsidence of the land surface



SMP Requirements

◆ SMP Application to include:

- ◆ Description of the surface area
- ◆ Mine workings and extraction schedule
- ◆ Subsidence predictions
- ◆ Assessment of impacts and socio-economic benefits
- ◆ Extracts of relevant conditions from Project Approval, Leases, Licences, Approvals
- ◆ Description of previous subsidence predictions, results and impact assessments from previous approvals
- ◆ Baseline monitoring / assessment including flora, fauna, surface water and groundwater
- ◆ Monitoring proposals
- ◆ Proposals to minimise surface impacts where required
- ◆ Proposals for ground and surface water management
- ◆ Proposals for rehabilitation if or where necessary
- ◆ Results of consultation with relevant stakeholders (community)
- ◆ Results of Risk Assessments carried out for the SMP Application
- ◆ Details of ongoing community consultation process

SMP Preparation Stages

▪ **Stage 1 – Information Collection and Review**

- ◆ Initial Consultation and Advertisement
- ◆ Review of Statutes, Baseline Monitoring, Subsidence Prediction, Mine planning and initial Mine layout

▪ **Stage 2 – SMP Development**

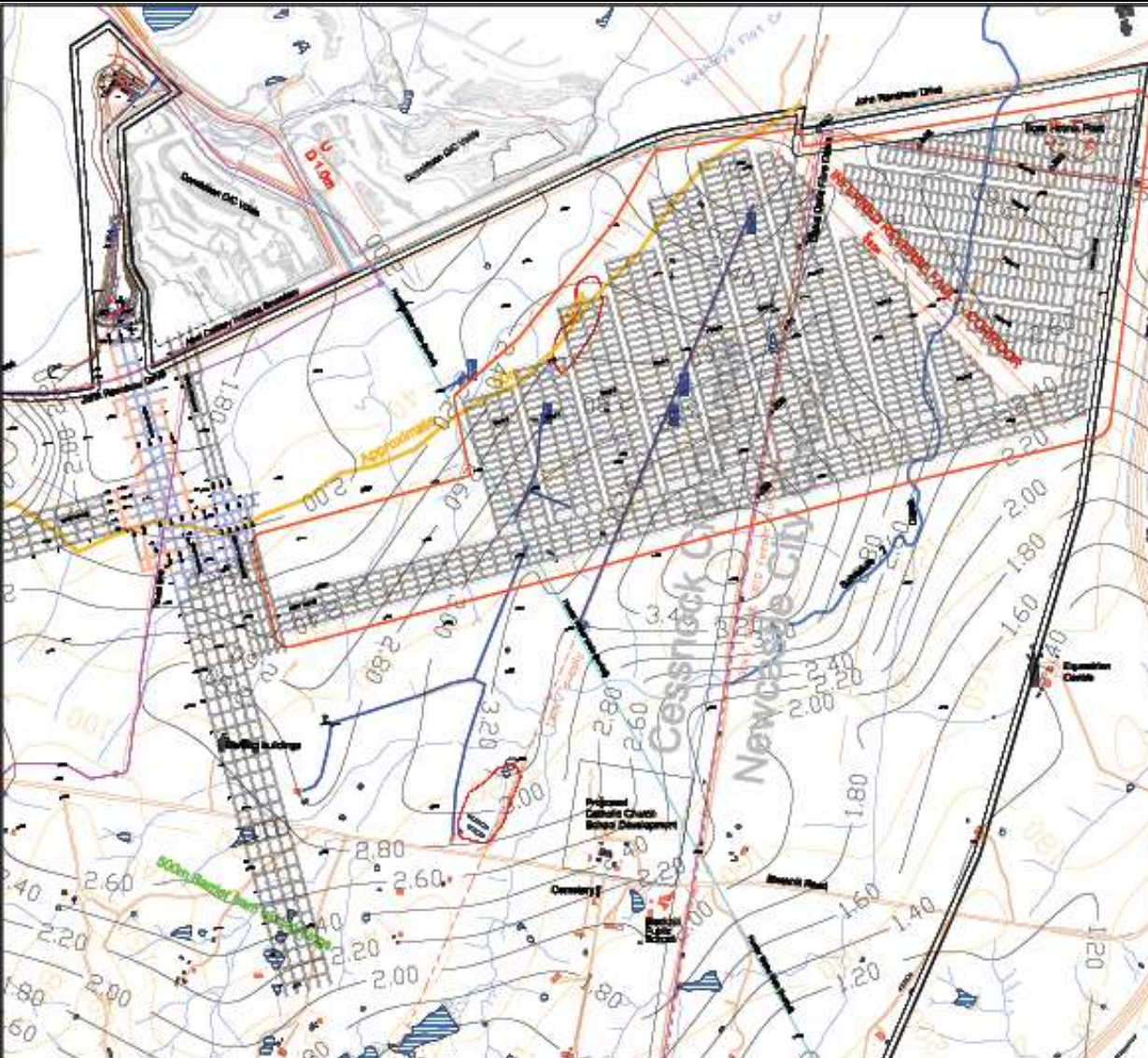
- ◆ Impact and Risk Assessment, monitoring program, mitigation / rehabilitation planning
- ◆ Assessment and consideration of community input
- ◆ Finalise Mine plan
- ◆ Preparation of SMP report and Subsidence Management Plan

▪ **Stage 3 – Assessment**

- ◆ Submission of application to DPI-MR
- ◆ Advertise and public display – opportunity for comment and submission
- ◆ SMP Inter Agency review committee and DPI-MR assessment

- **Stage 4 – Implementation if Approval Granted**
 - ◆ Implement SMP subject to Approval Conditions

- **Stage 5 – Reporting, Review and Ongoing Consultation**
 - ◆ Review monitoring results in relation to predictions
 - ◆ Review impacts in relation to predictions
 - ◆ Report monitoring results, impacts and compliance with SMP through AEMR, reporting as required by Approval Conditions and through Community Consultation Process



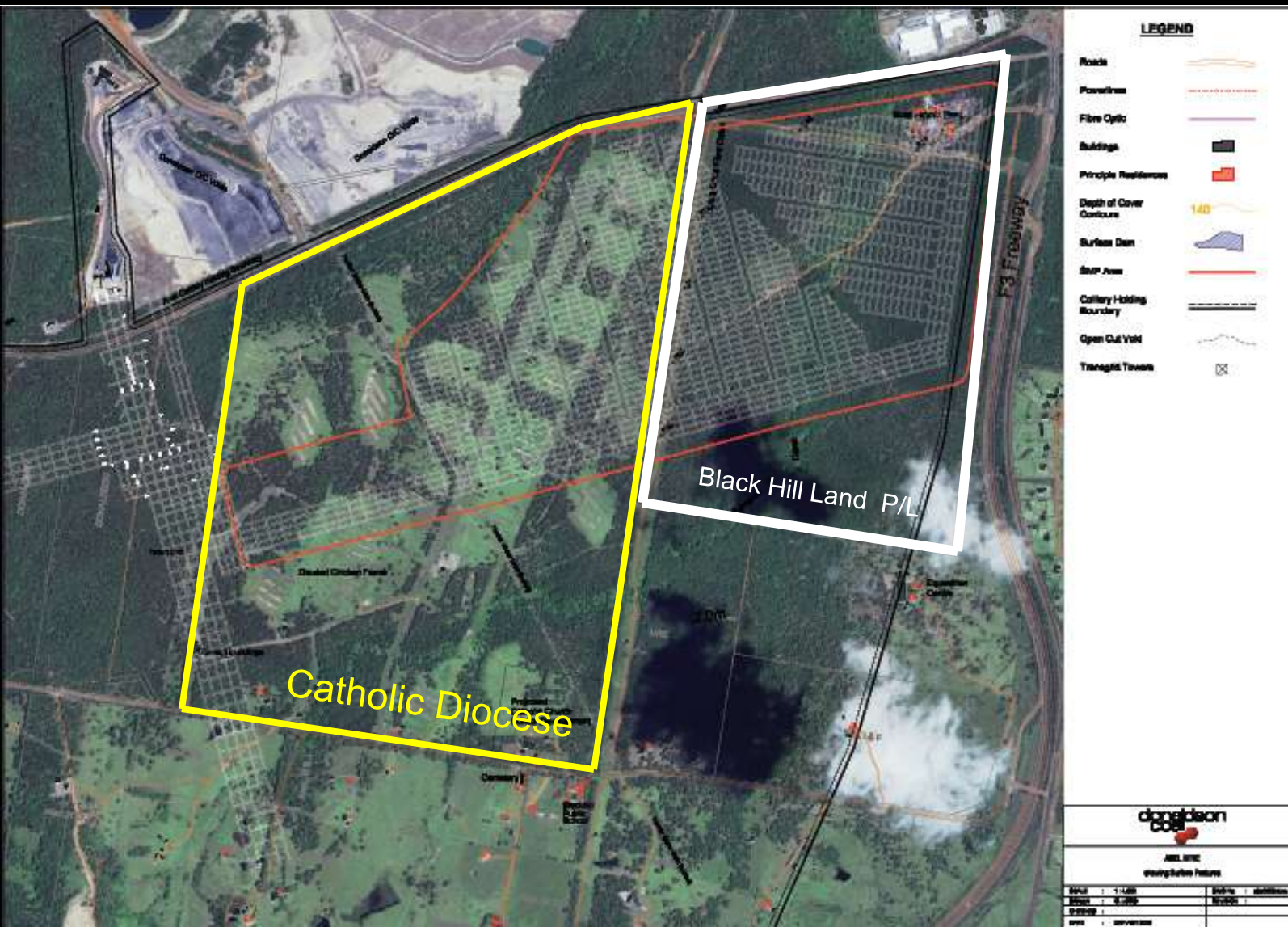
Contains 7.3m tonnes of insitu coal

Is divided into 13 Panels & 2 lots of Mains

Project Approval condition-
effective Subsidence to be
completed by Jun 2013

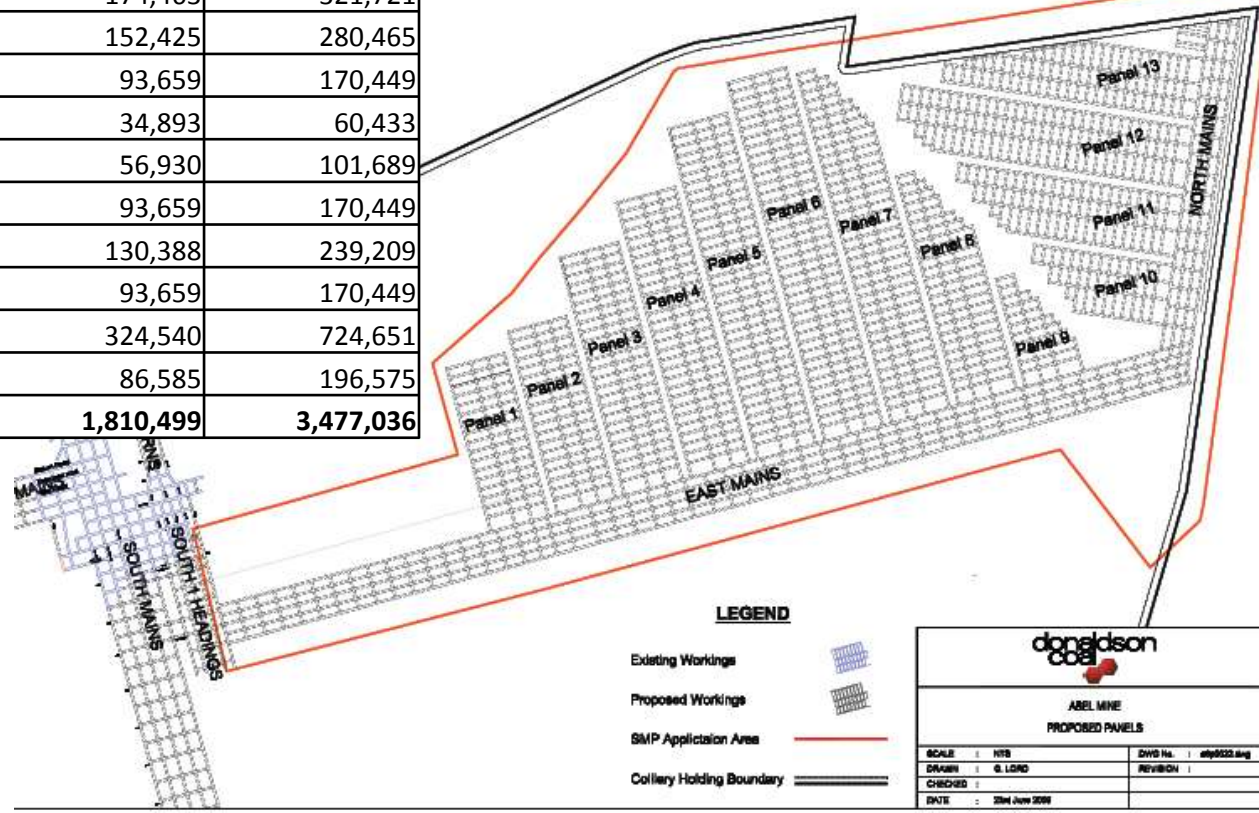
Area to be re-classified as a
Subsidence District by MSB

SMP Application Area 1

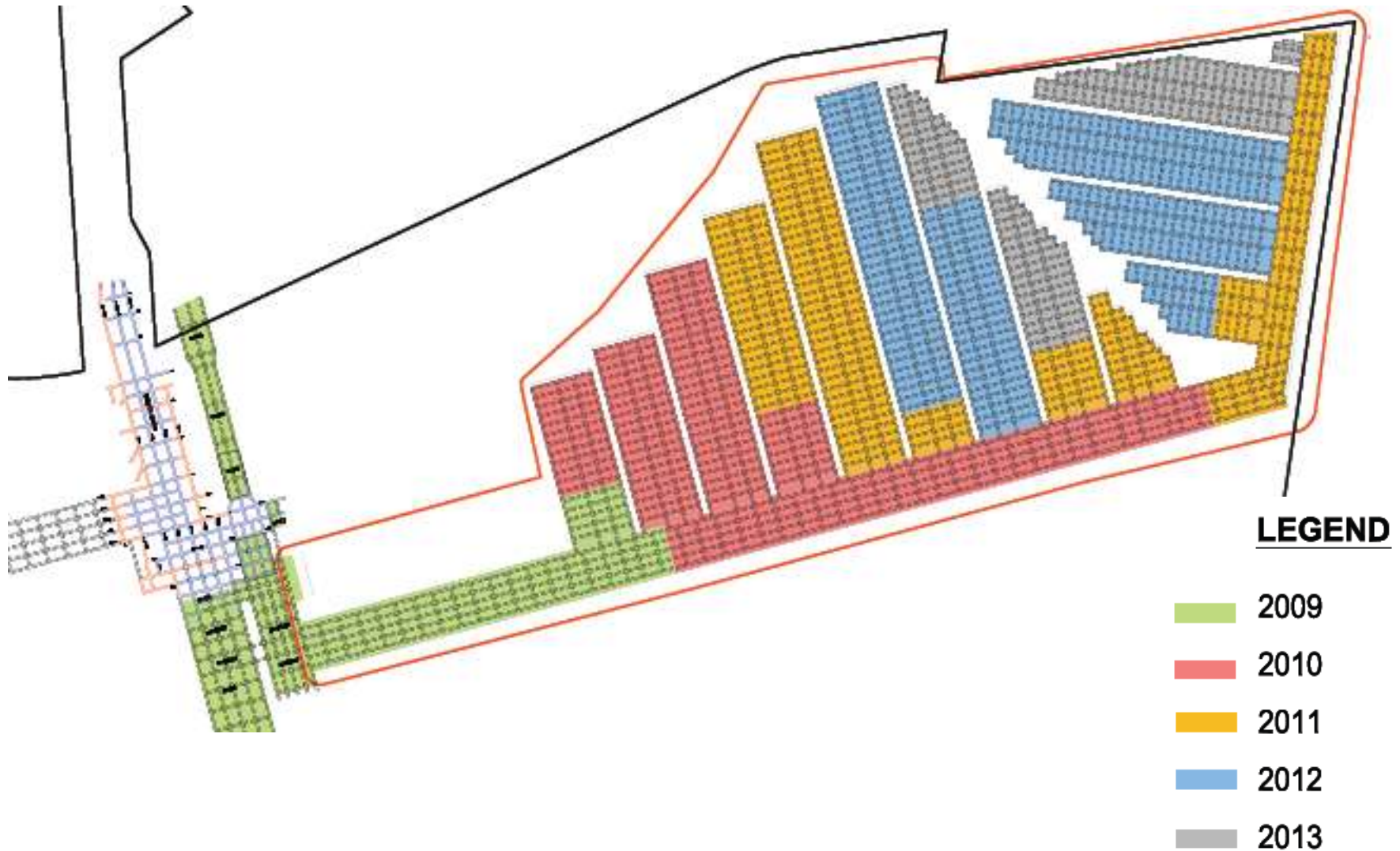


SMP Area 1 Panel tonnages

Panel	Length	Metres driven	Tonnes (1st works)	tonnes (Pillar extraction)
Panel 1	420	4,007	77,131	139,117
Panel 2	470	4,484	86,313	156,697
Panel 3	620	5,915	113,860	208,267
Panel 4	720	6,869	132,224	242,647
Panel 5	870	8,300	159,771	294,217
Panel 6	950	9,063	174,463	321,721
Panel 7	830	7,918	152,425	280,465
Panel 8	510	4,865	93,659	170,449
Panel 9	190	1,813	34,893	60,433
Panel 10	310	2,957	56,930	101,689
Panel 11	510	4,865	93,659	170,449
Panel 12	710	6,773	130,388	239,209
Panel 13	510	4,865	93,659	170,449
East Mains	2,570	16,859	324,540	724,651
North Mains	870	4,498	86,585	196,575
		94,052	1,810,499	3,477,036



SMP Area 1- Production Schedule



Mine Design Parameters - Area 1

- Review conducted to confirm appropriate Project Approval/Statement of Commitments and other approvals
- Full extraction where there are no constraints
- Full extraction represents 85% reserve recovery within a mining panel
- Subsidence protection by either first workings or partial extraction
- No Pillar extraction below 50m depth of cover
- Panel width of 160m with appropriately designed barrier pillars

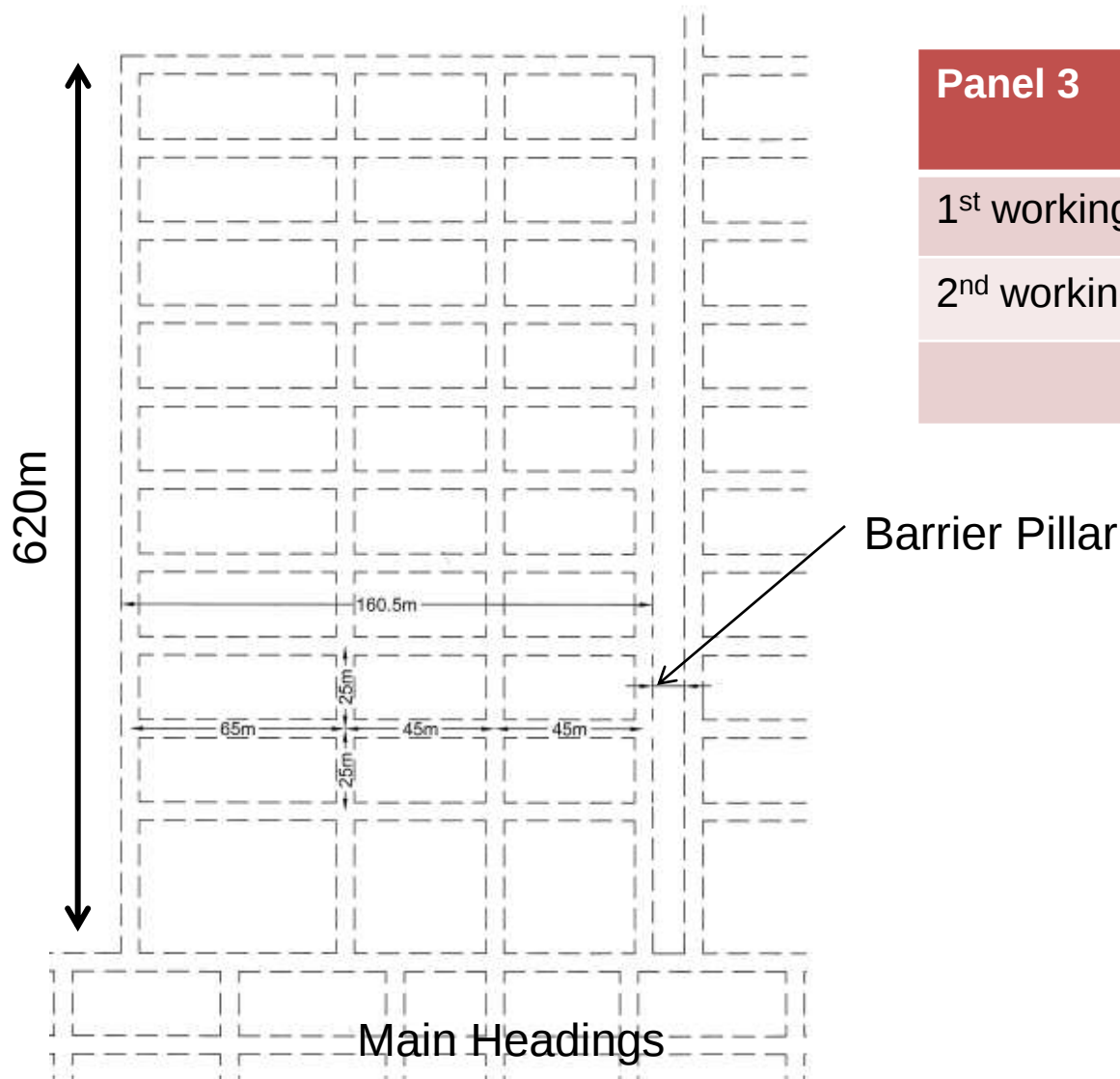


Abel Mining Method

- Continuous miner based bord and pillar system
- Layout designed to minimise impact on sensitive surface areas while minimising resource sterilisation
- Panels 160m wide
 - 4 heading layout
- 1st workings (Roadway development)
 - Single Continuous Miner (CM) Unit (20-30m /shift)
 - Dual CM Unit (35- 45m/shift)
- 2nd workings (Pillar extraction)
 - 1,000 tonnes per shift
- Depth of cover range 55m to 140m



Abel Typical Panel Layout - Panel 3



Panel 3		Time taken
1 st workings	5,915m	~13 weeks
2 nd workings	208,267t	~17 weeks
		~30 weeks

FIRST WORKINGS

Barrier Pillar

65m

45m

45m

Barrier Pillar

FIRST WORKINGS

Barrier Pillar



65m

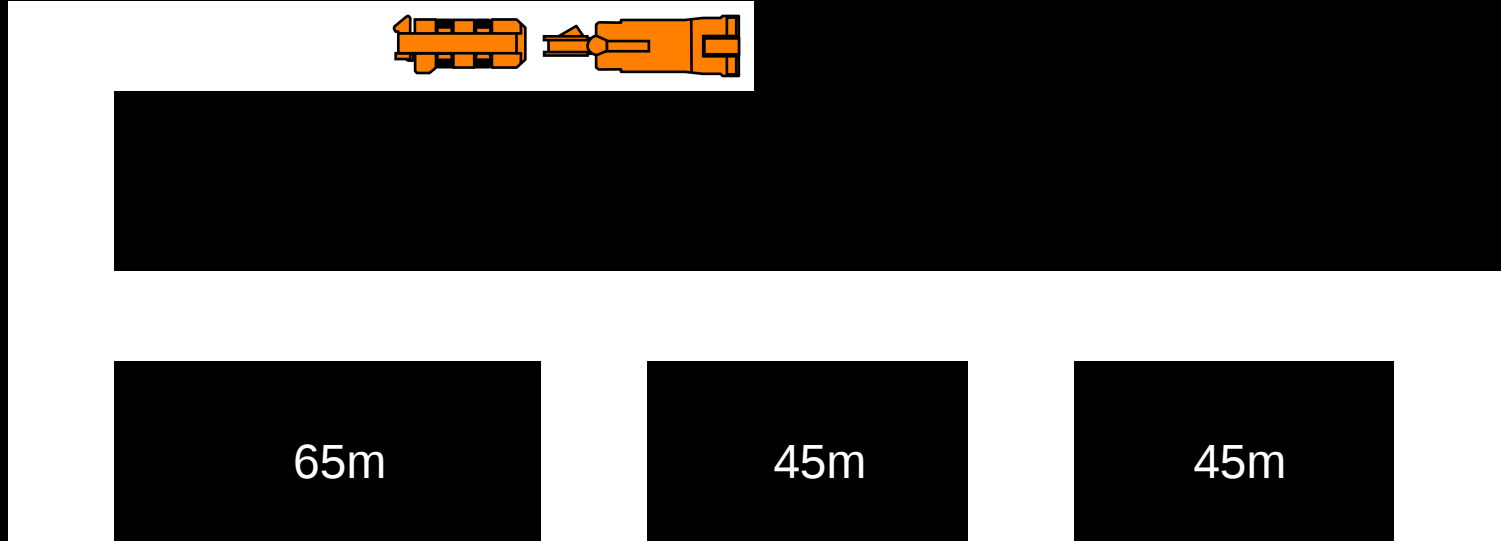
45m

45m

Barrier Pillar

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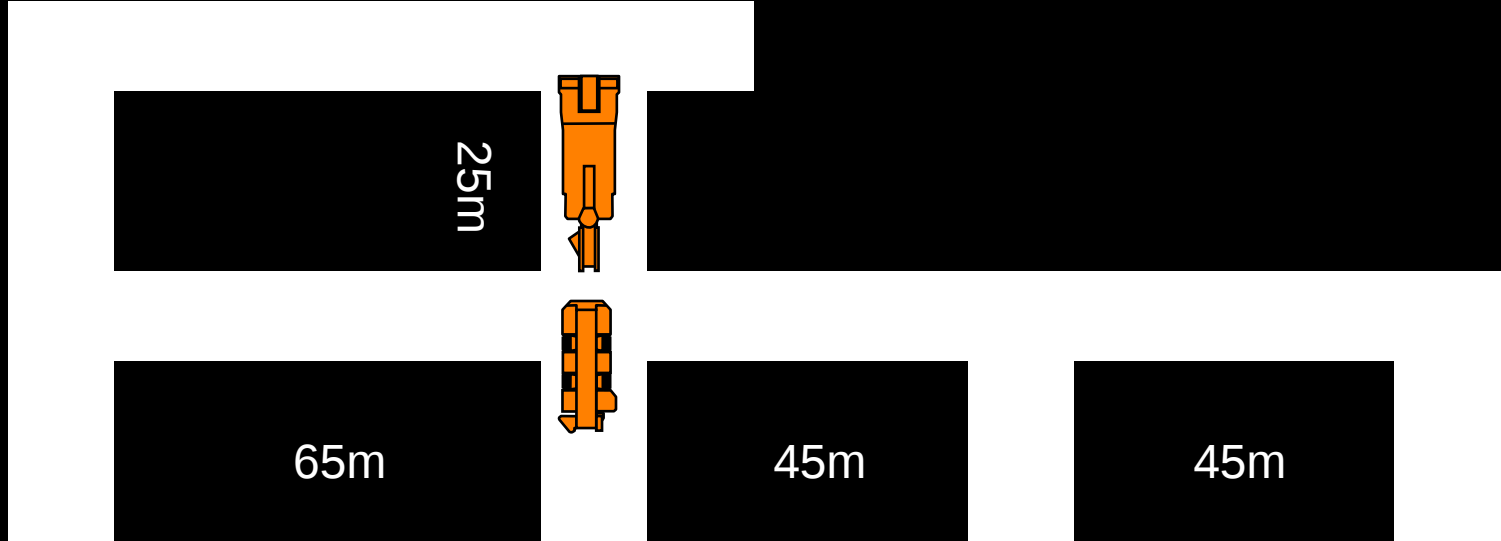
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45m

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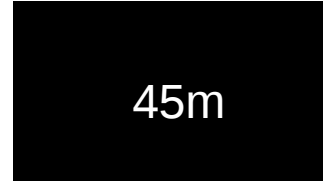
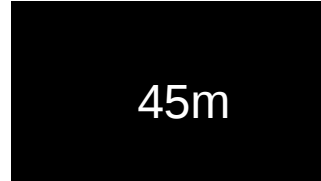
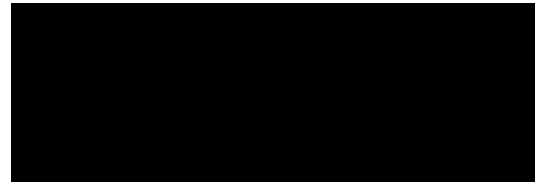
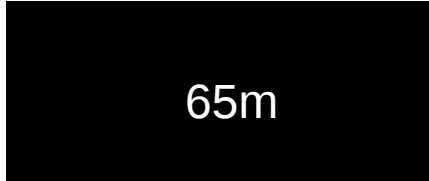
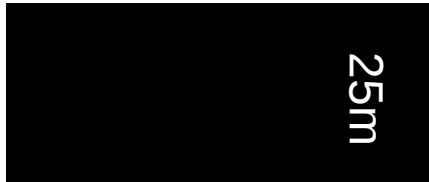
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Barrier Pillar

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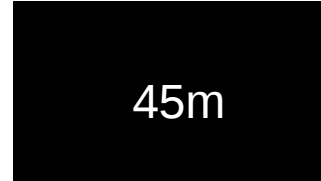
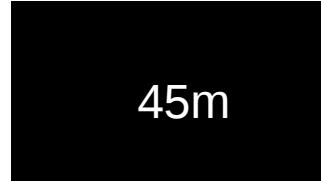
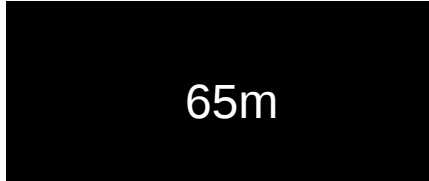
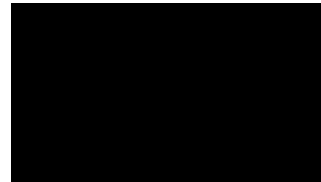
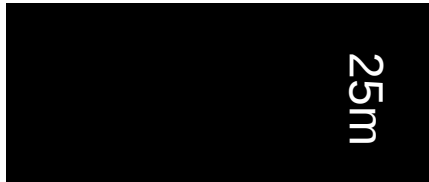
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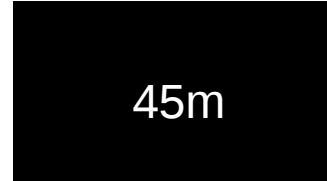
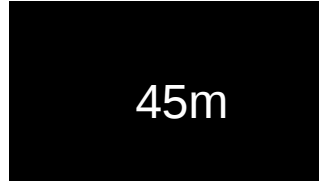
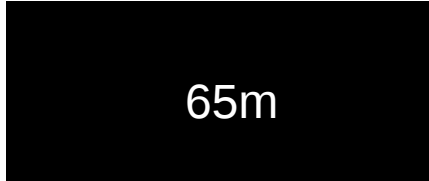
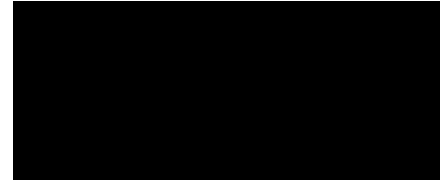
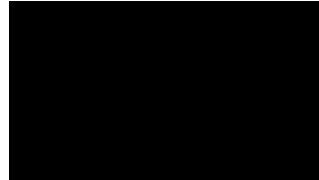
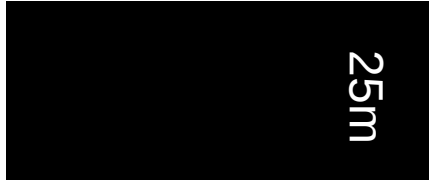
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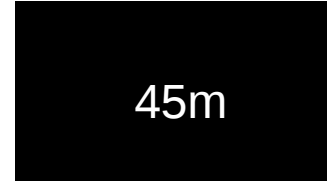
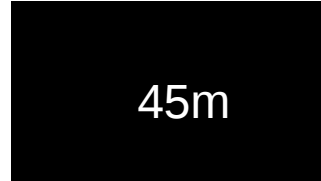
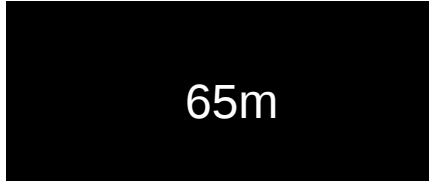
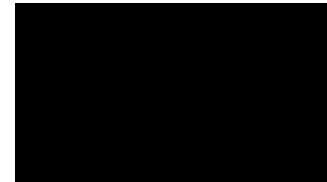
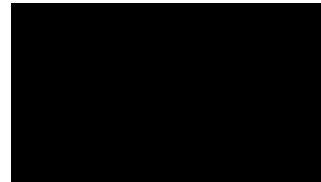
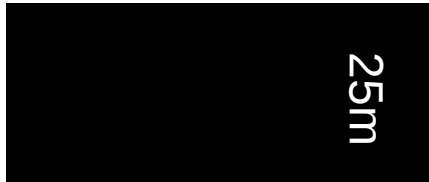
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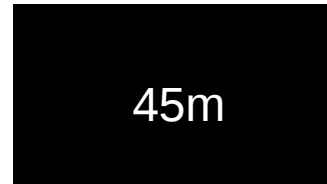
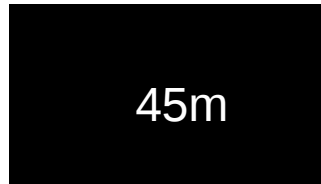
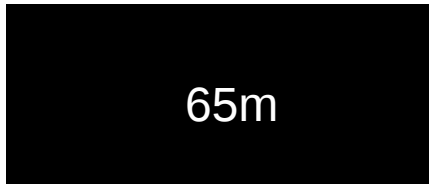
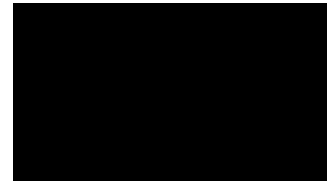
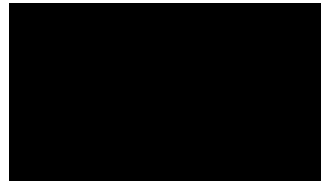
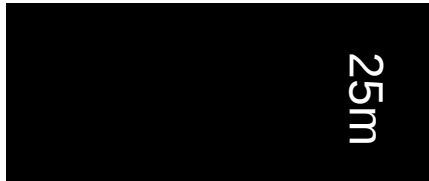
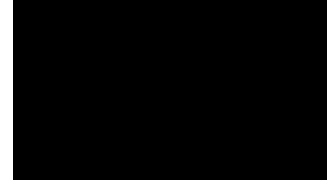
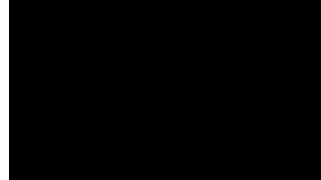
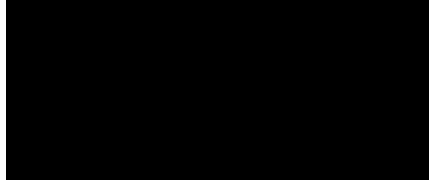
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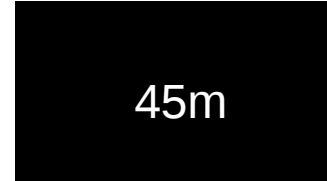
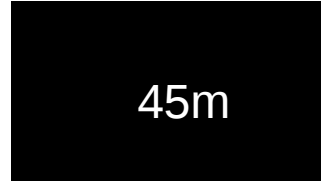
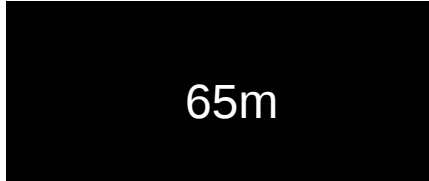
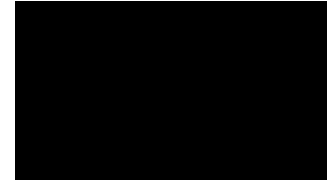
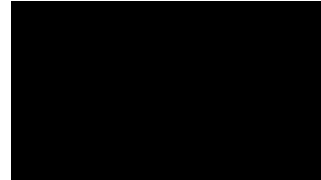
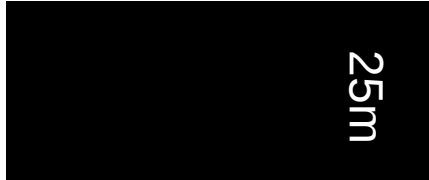
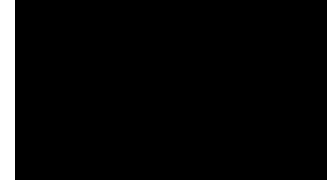
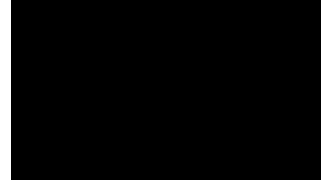
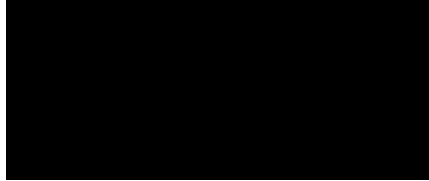
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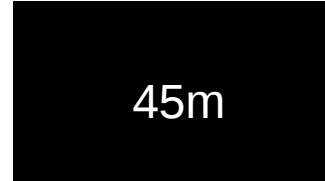
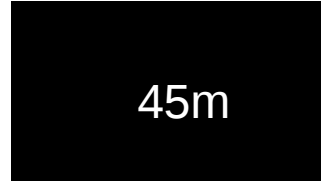
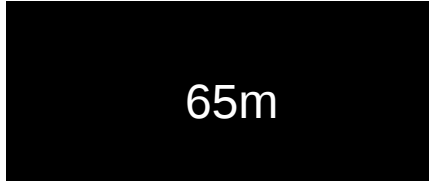
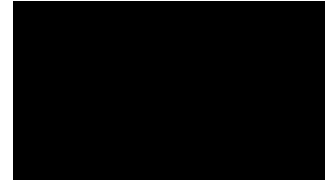
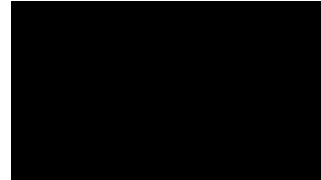
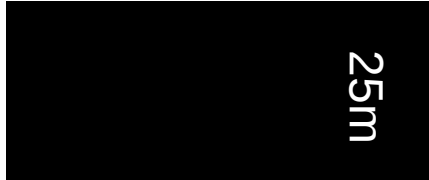
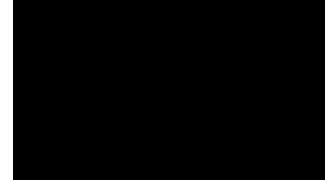
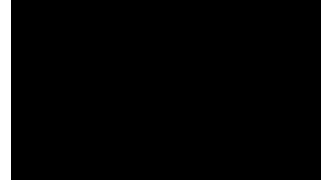
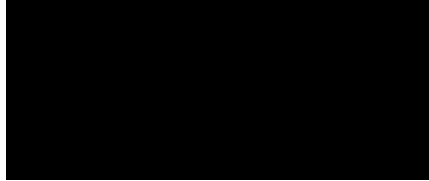
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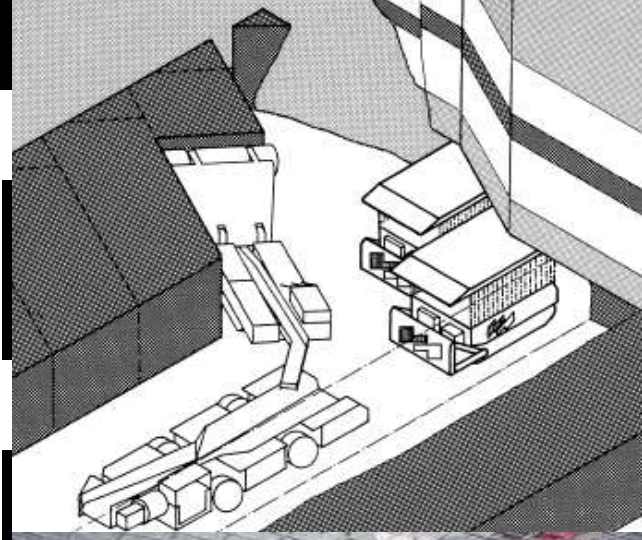
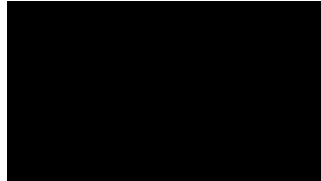
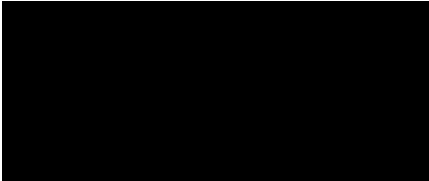
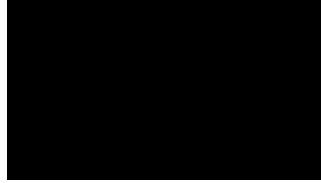
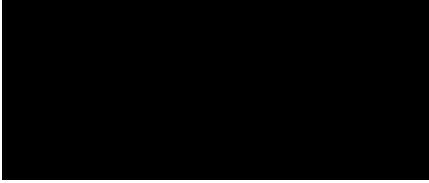
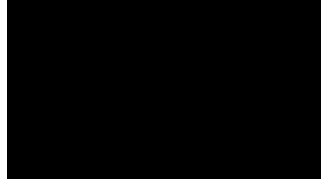
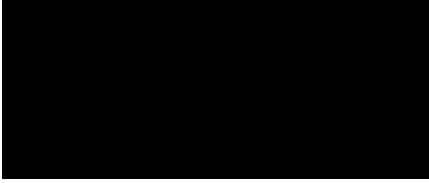
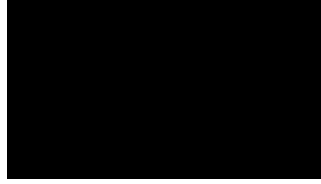
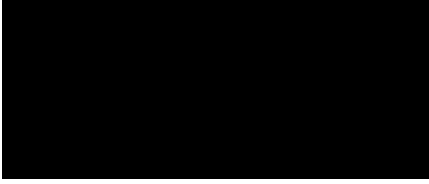
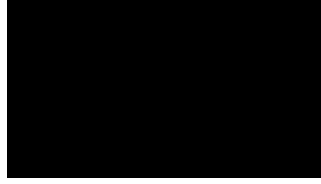
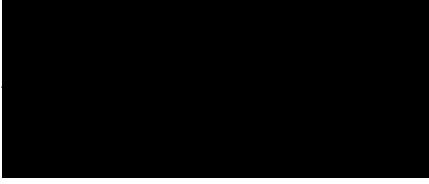
Barrier Pillar



Barrier Pillar

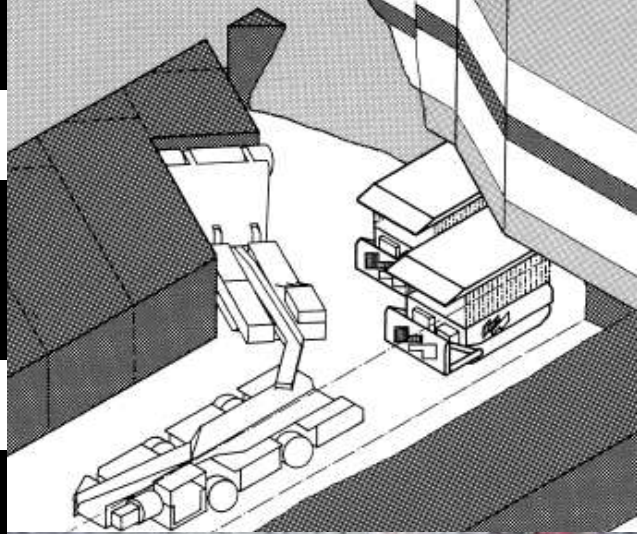
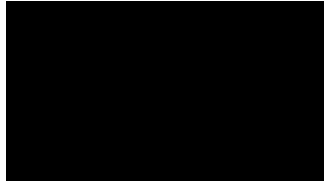
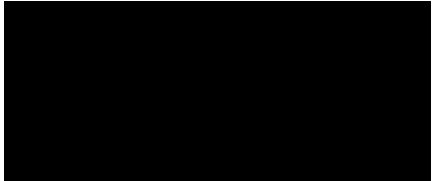
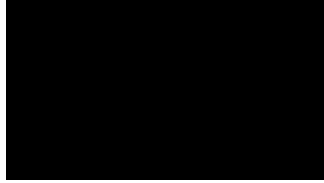
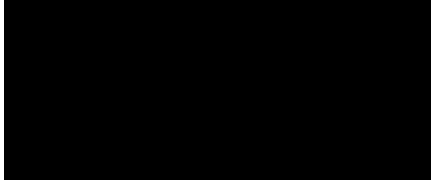
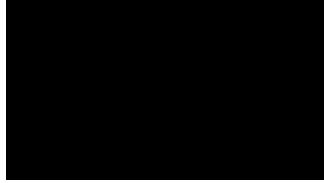
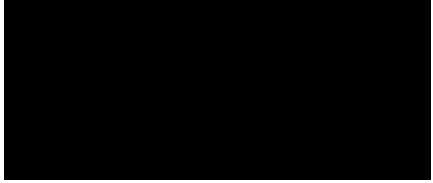
SECOND WORKINGS

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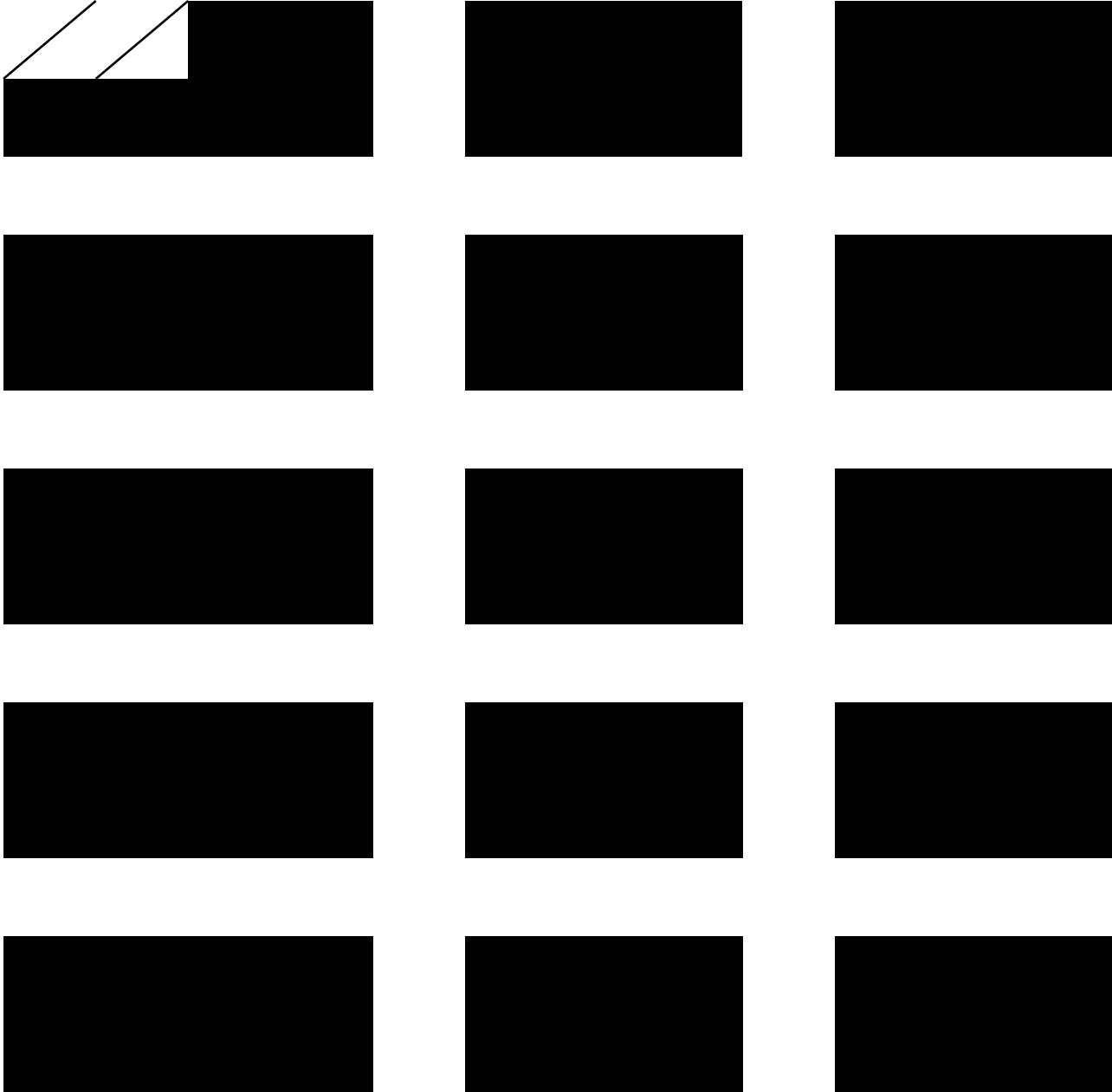


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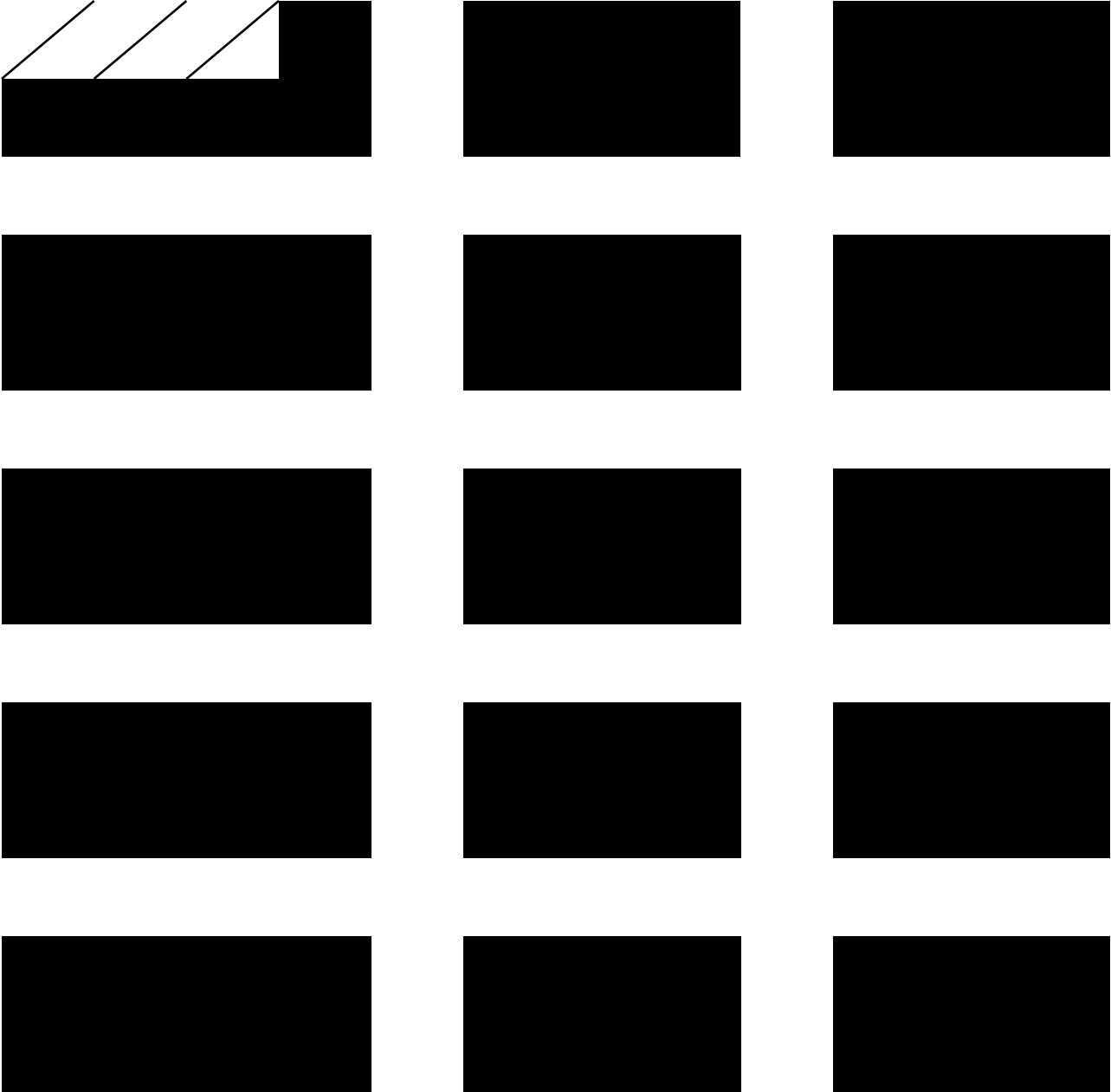


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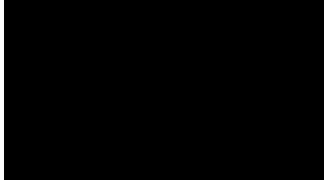
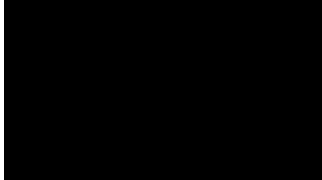
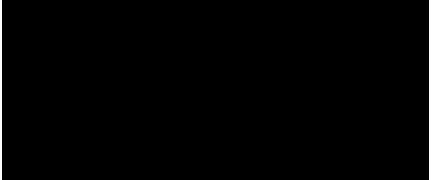
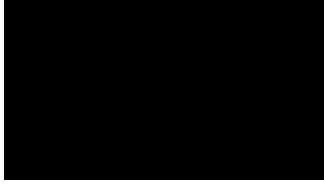
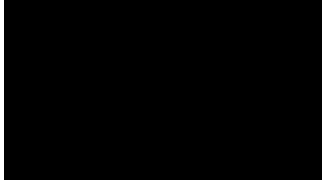
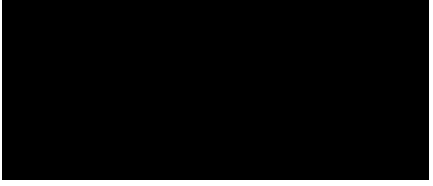
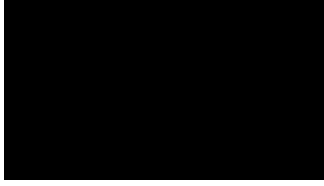
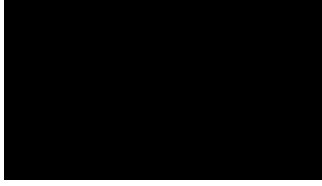
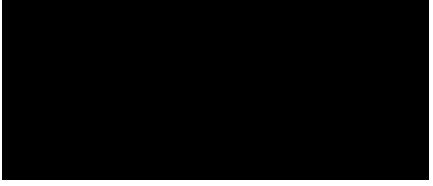
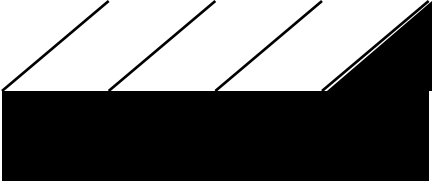
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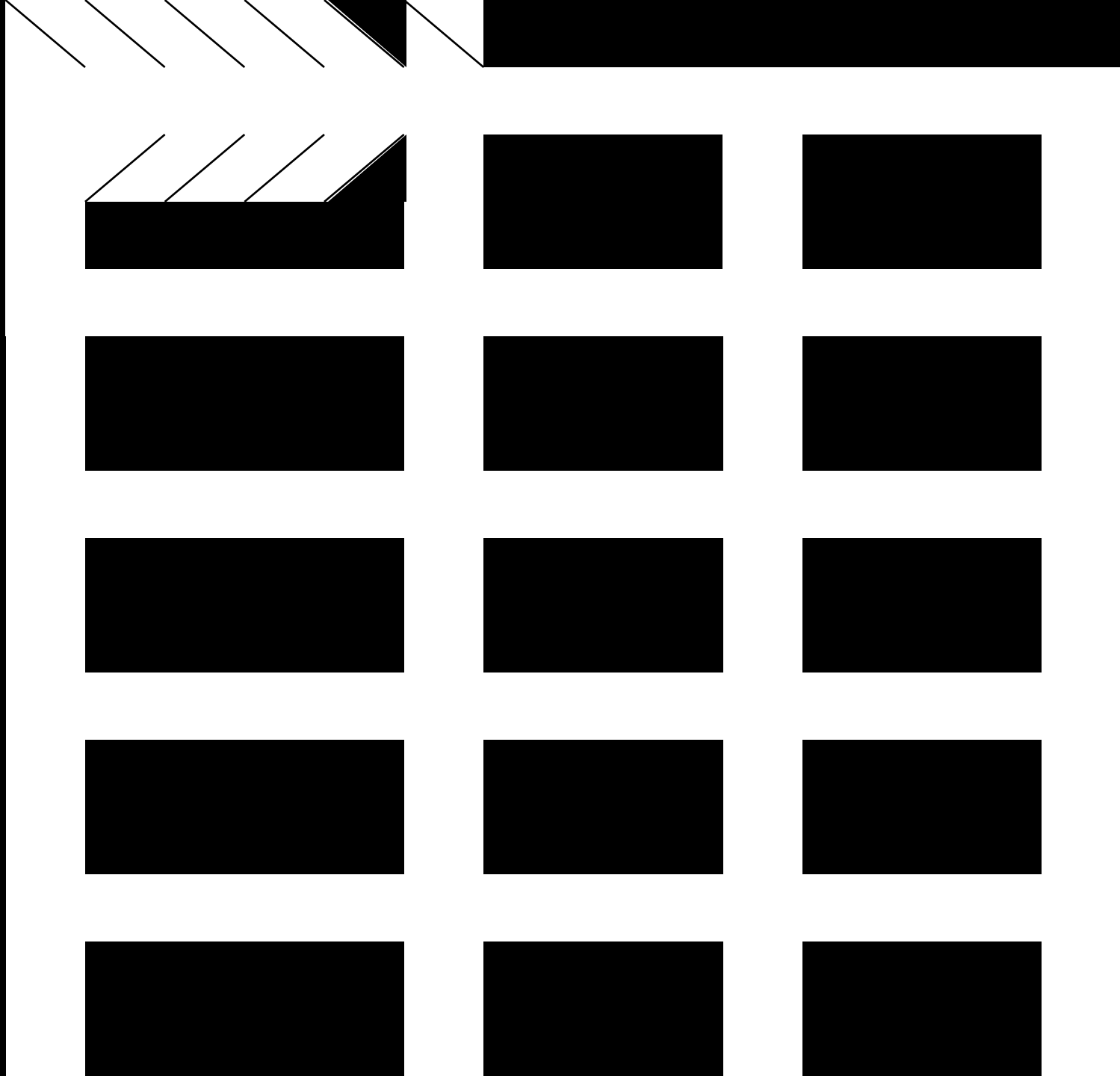
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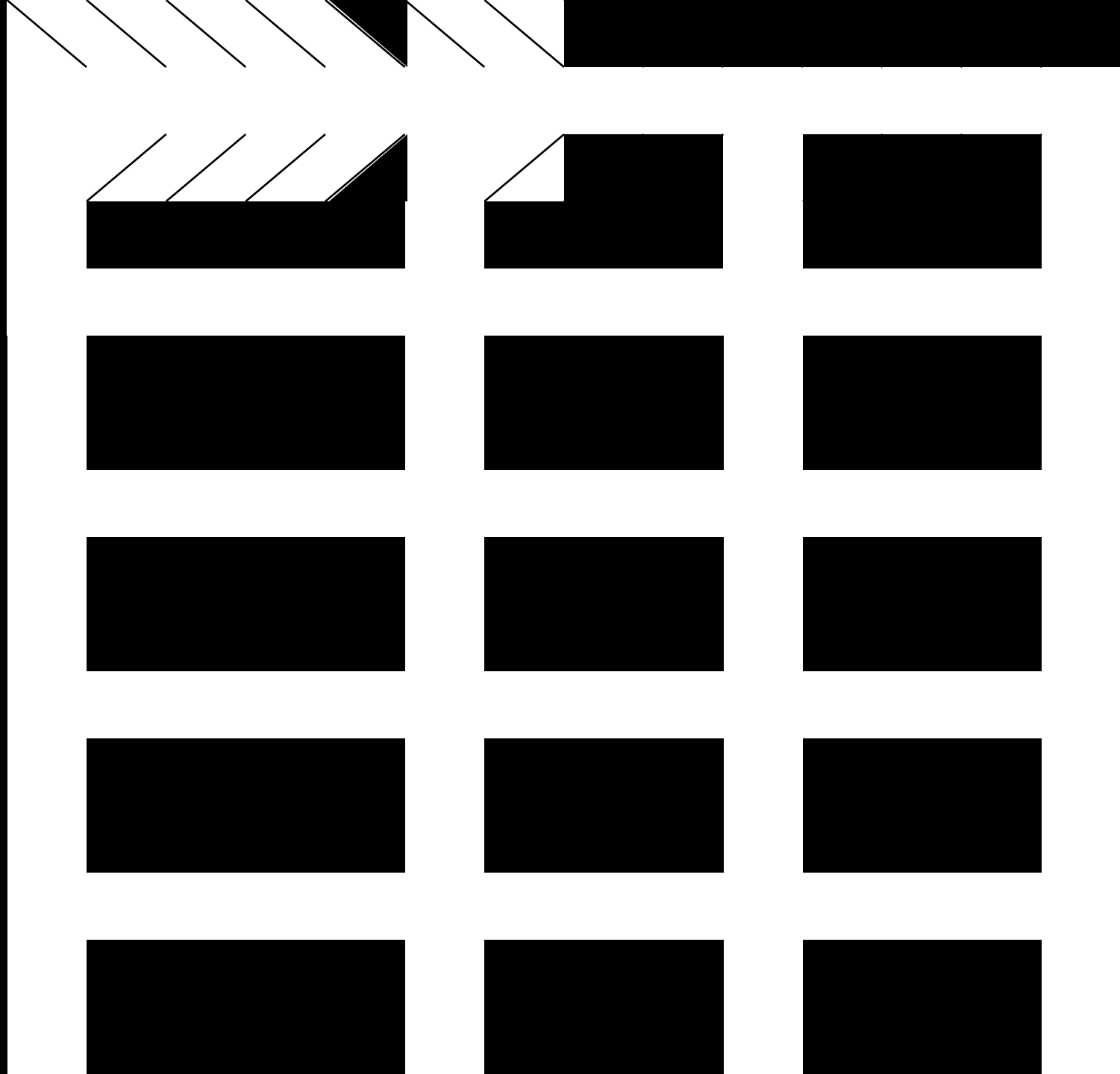
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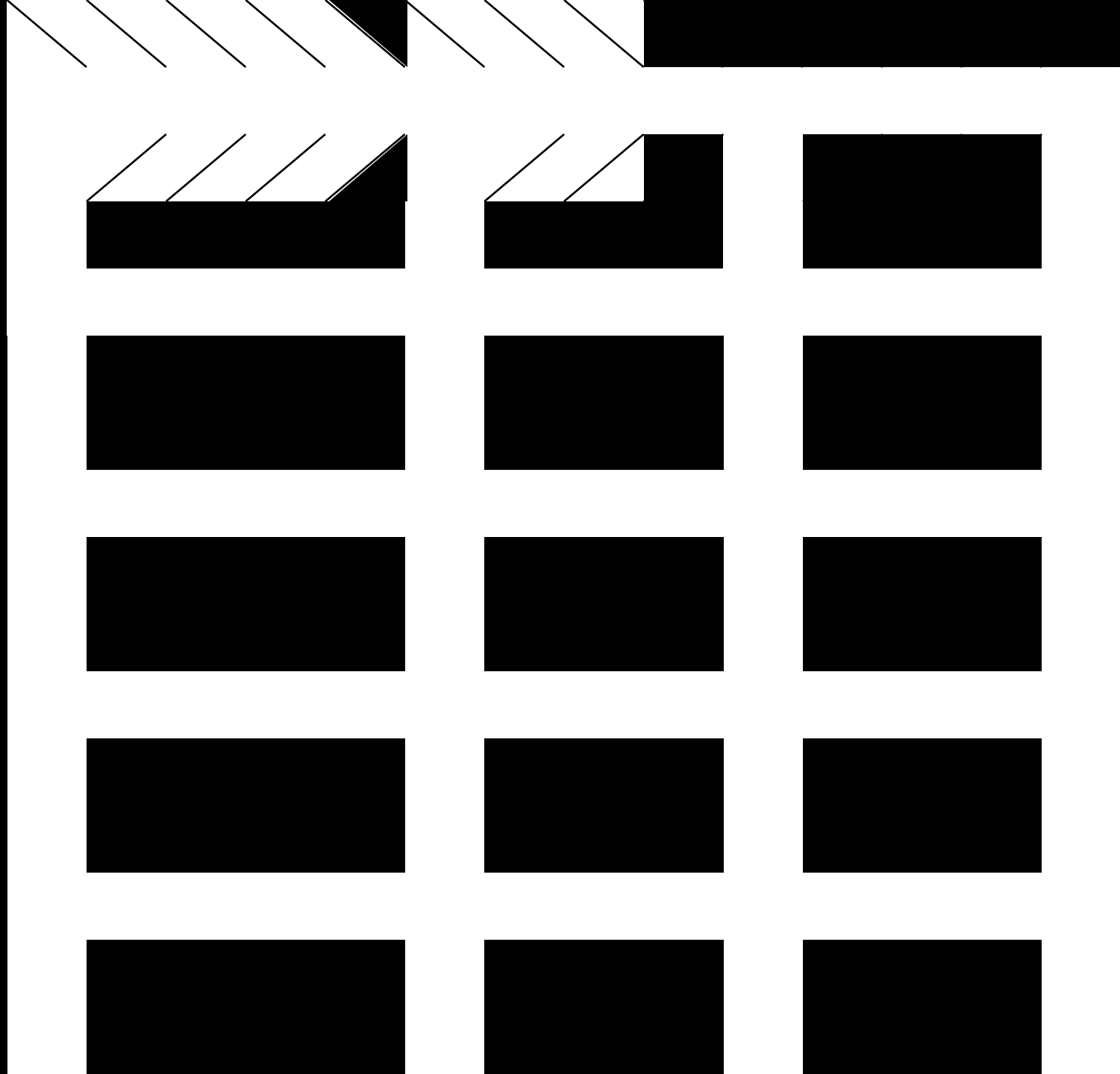
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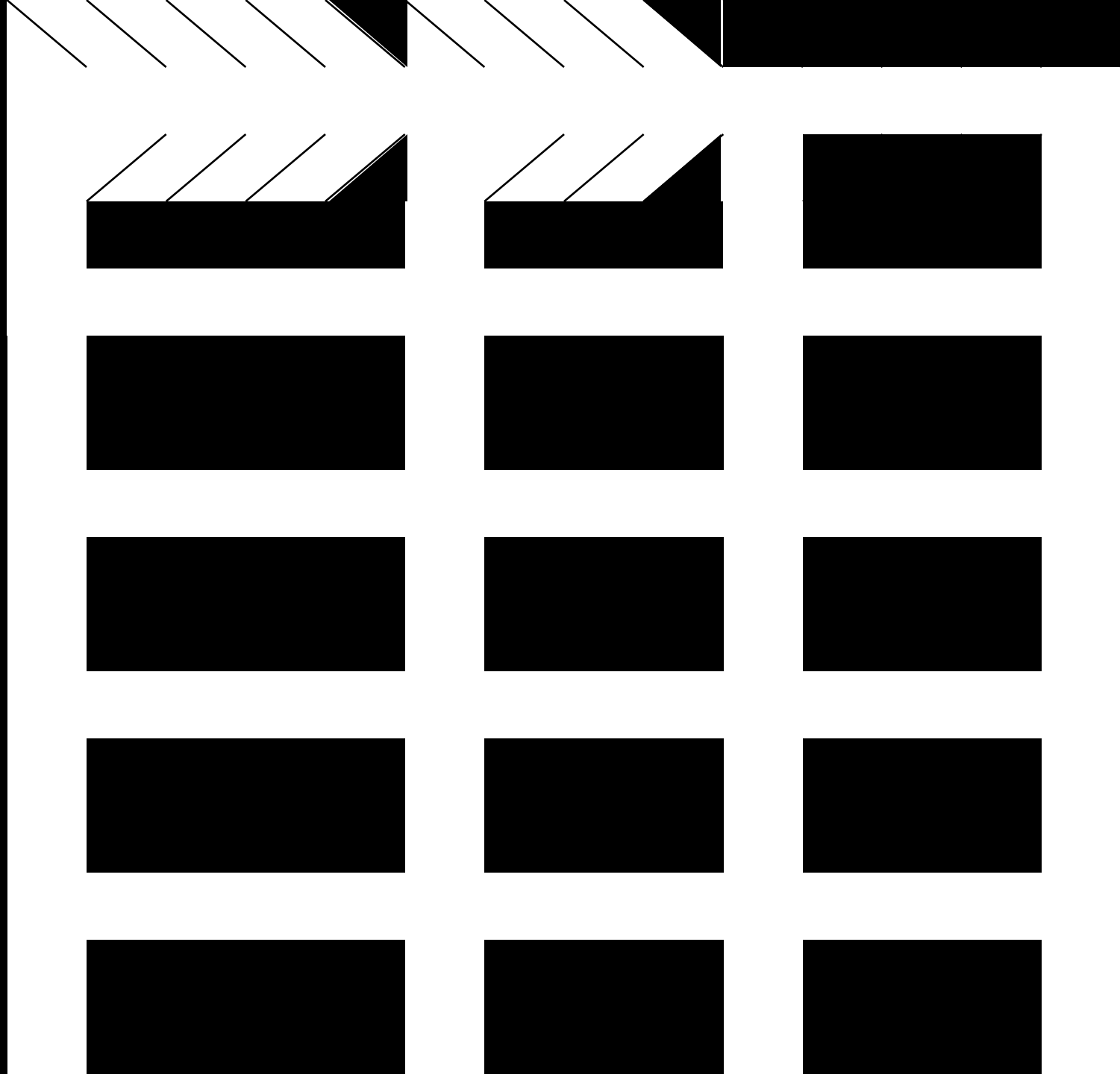
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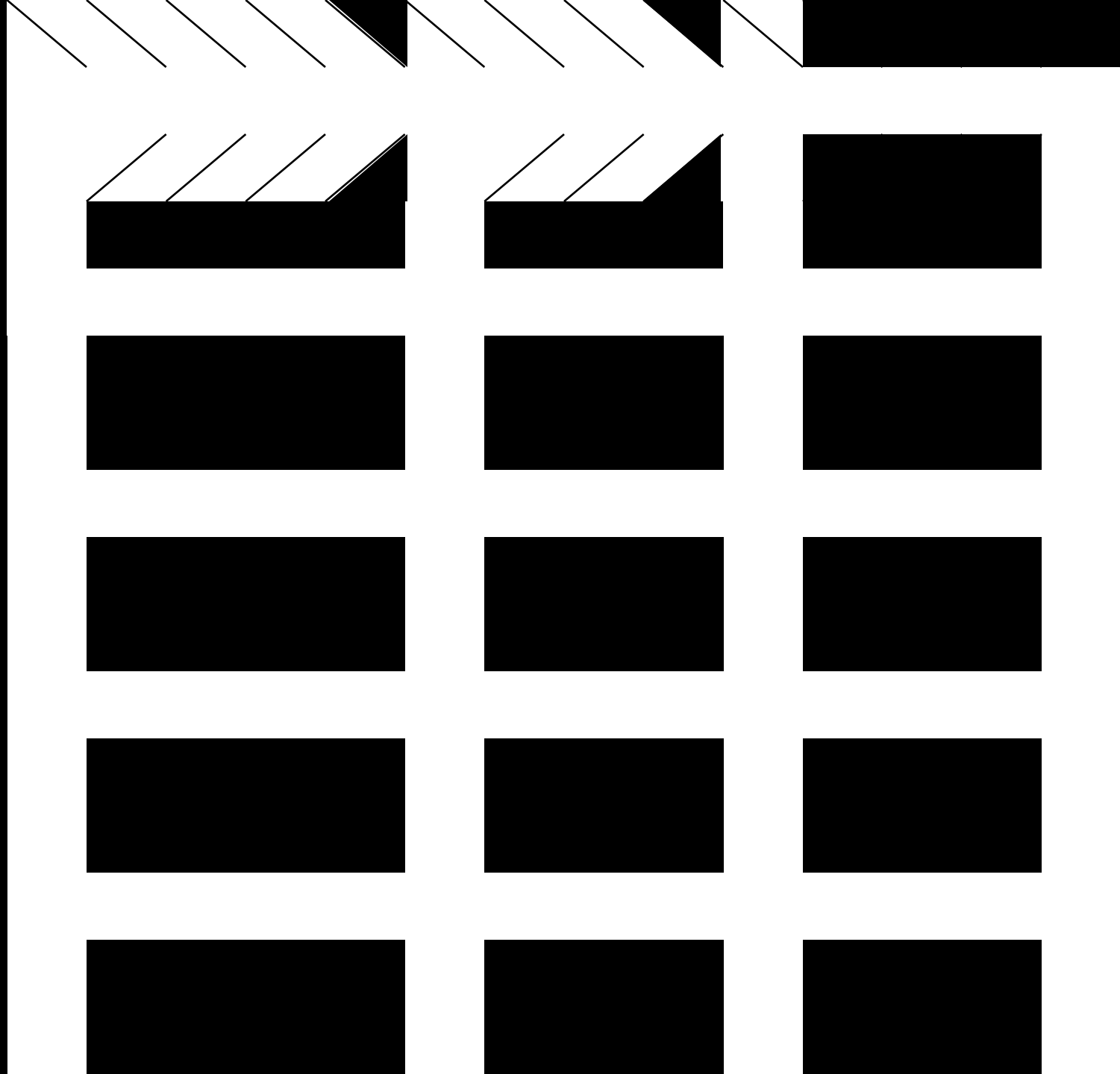
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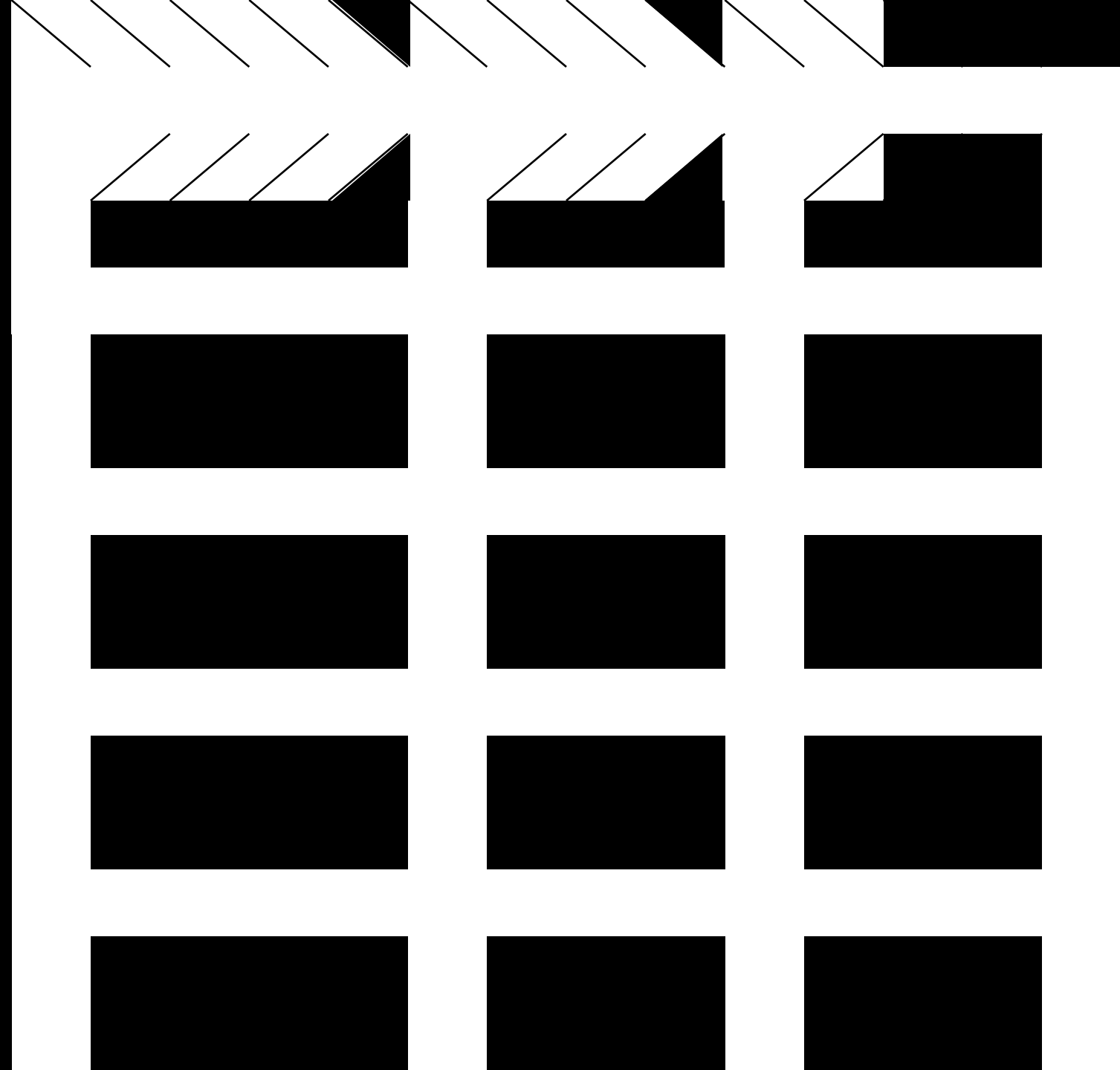
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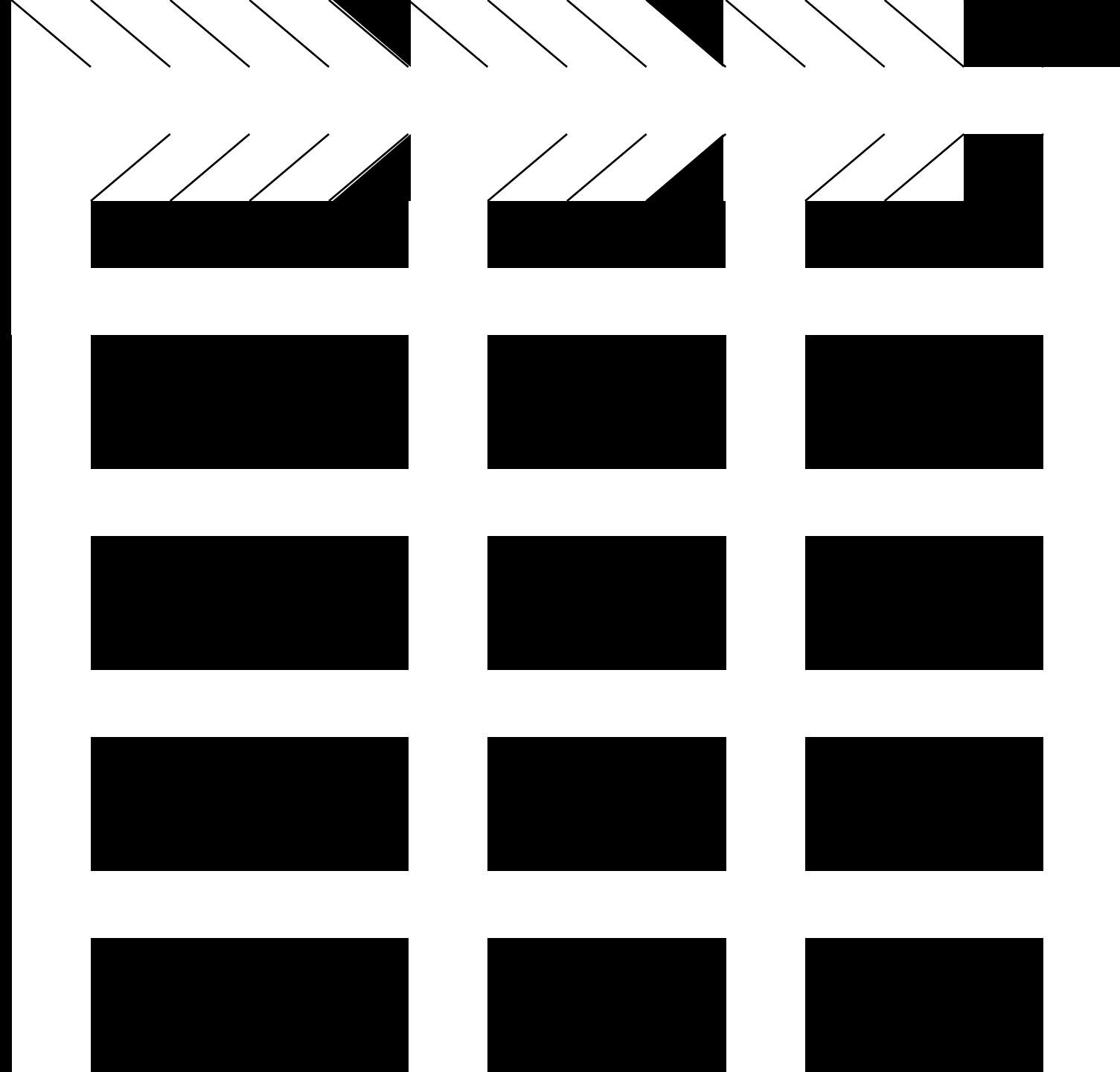
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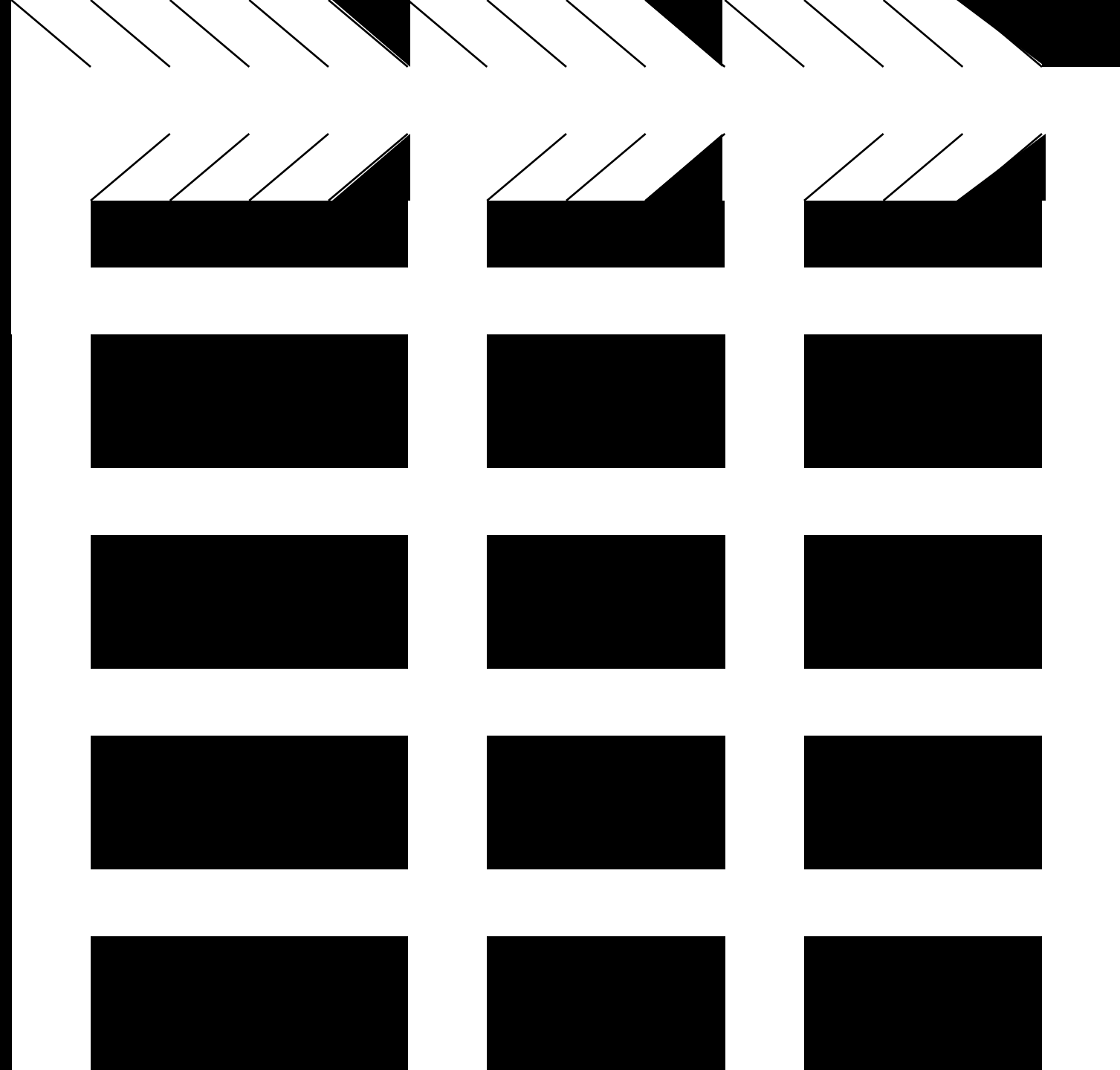
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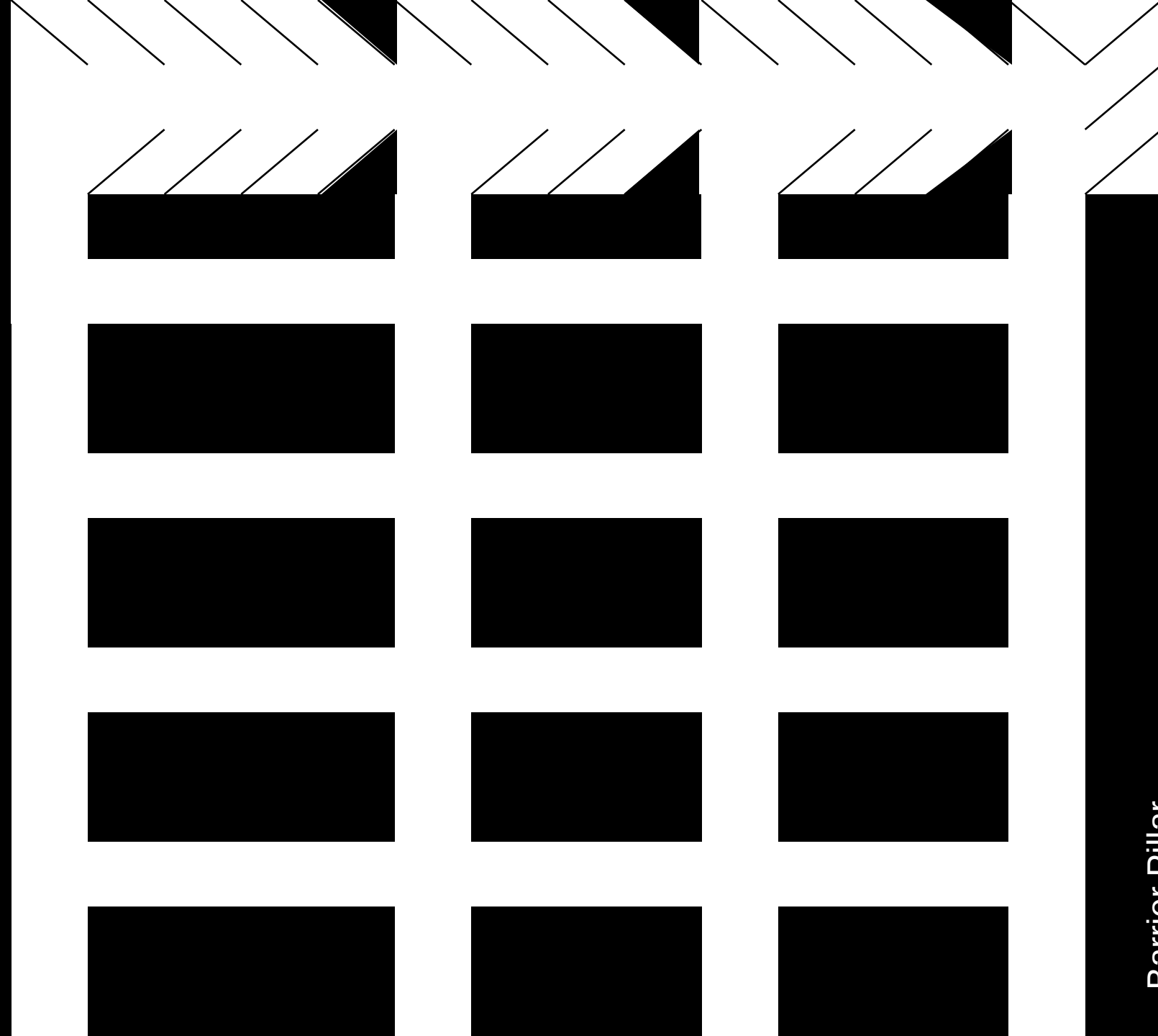
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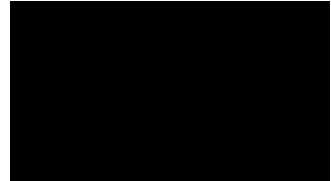
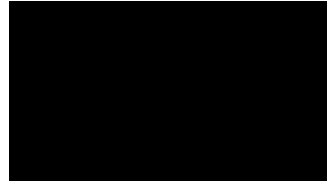
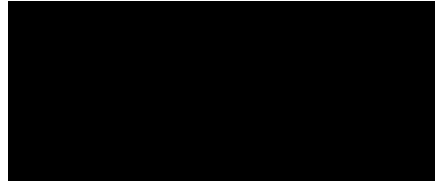
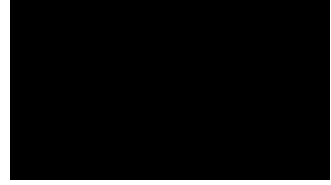
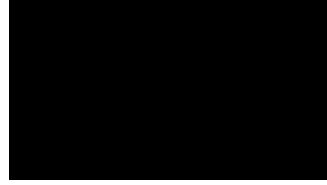
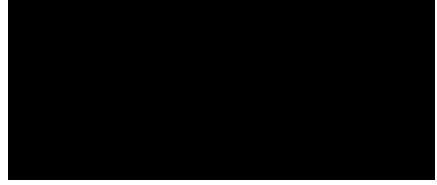
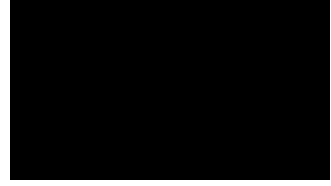
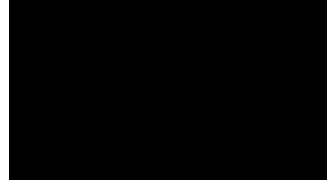
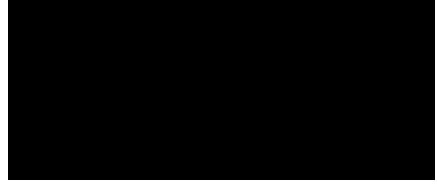
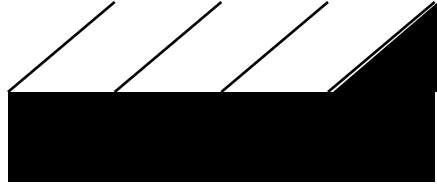
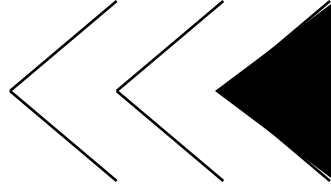
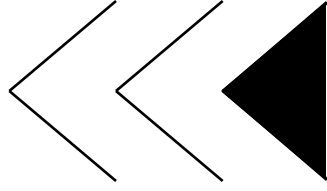
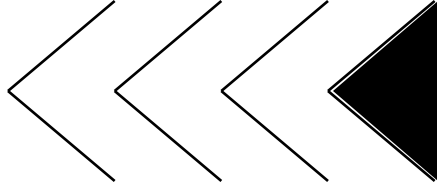
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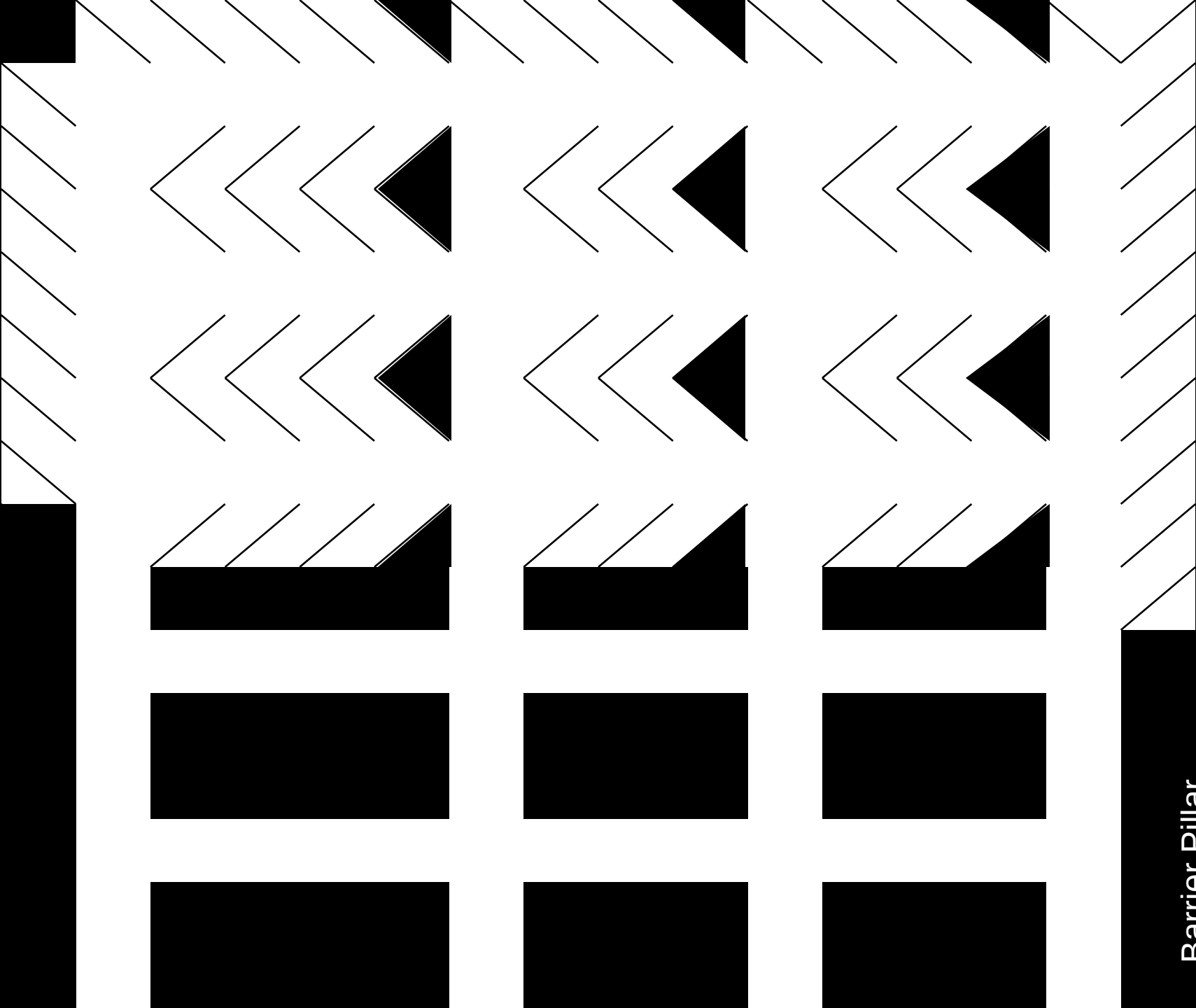
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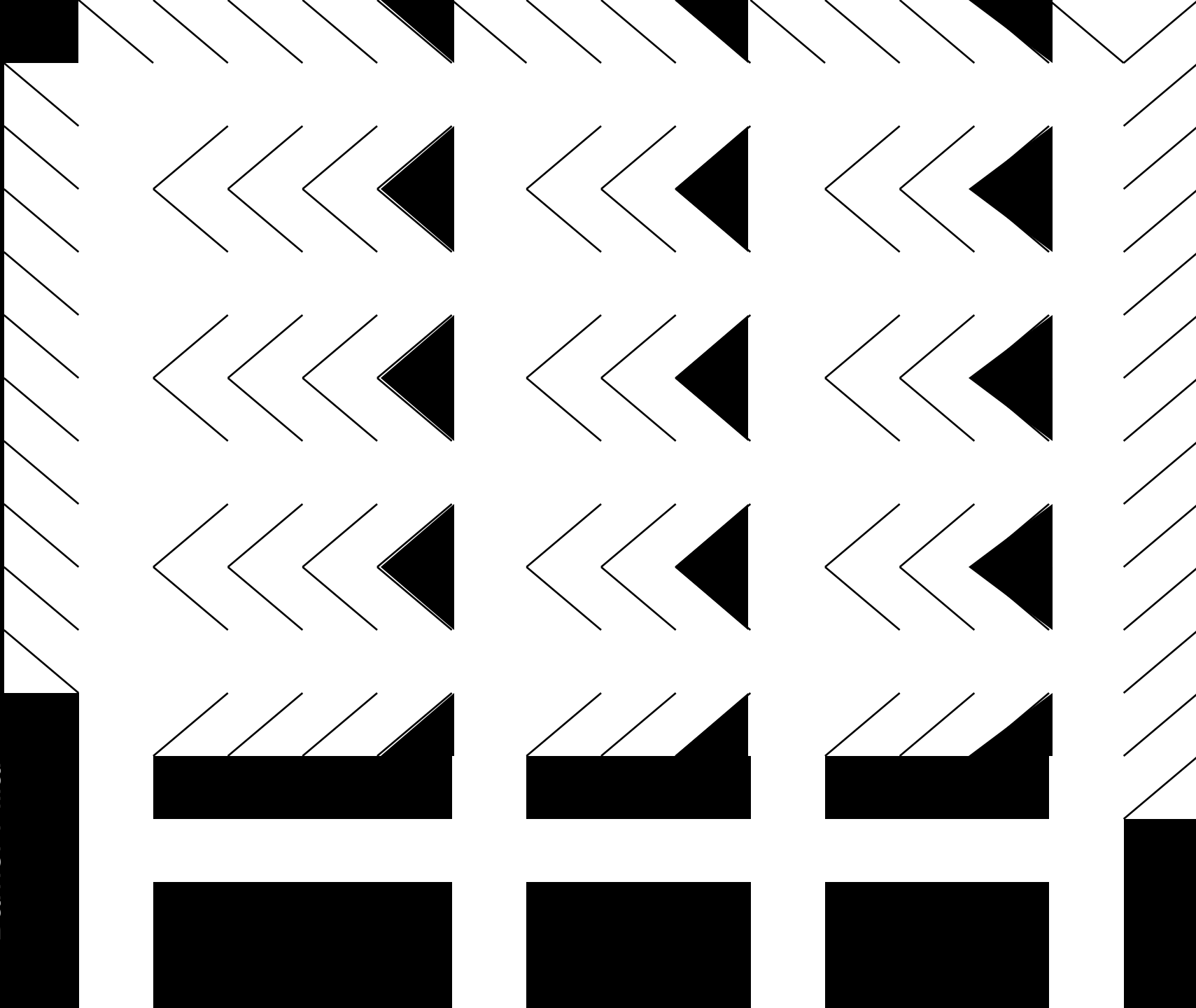


Barrier Pillar



Barrier Pillar

Barrier Pillar



Barrier Pillar

*This area is the goaf
that results in
subsidence on the
surface*

Barrier Pillar

Barrier Pillar

Surface Features

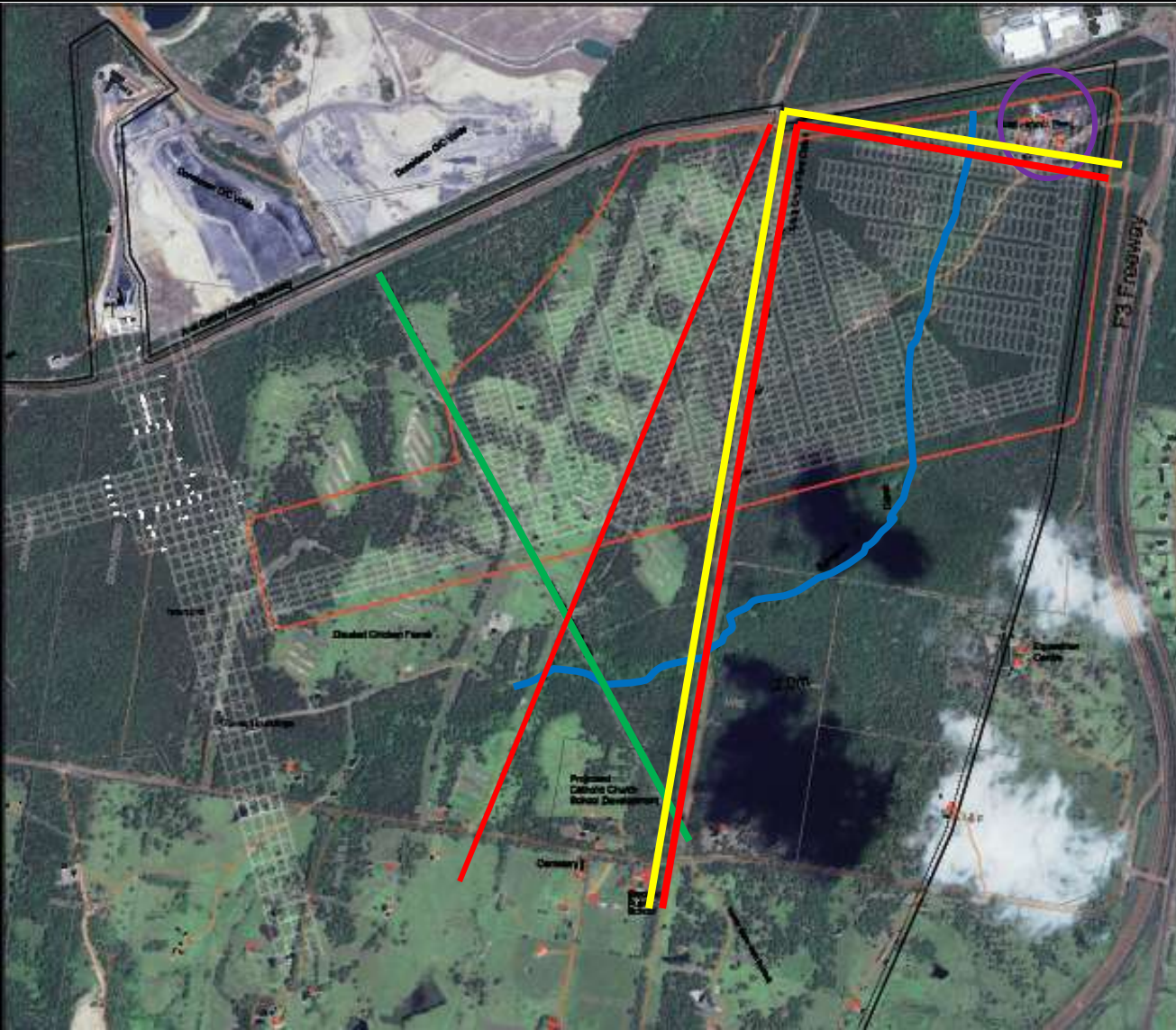
Abel Mine Lease- Full ML Area

- Pambalong Nature Reserve
- Black Hill cemetery
- Cliff Lines
- Private property and residences (100+)
- Numerous dams (approx 175)
- Black Hill school
- Church and cemetery
- Viney, Blue Gum, Long Gully, Buttai Creeks
- Boral Asphalt Plant (Black Hill Depot)
- Catholic Diocese Land
- C&A land (Black Hill Land Pty Ltd)
- Transgrid 330kV
- EA 132kV power line
- Rural 11kV power lines
- Aboriginal Artefacts
- Telstra/Optus Fibre optic cables
- Telstra copper comms cables
- Hunter water pipelines
- Agility gas pipeline
- Public Roads
- State survey marks
- Overlying mine workings
- Disused Richmond Vale railway line
- Black Hill & Stockrington Quarries

Abel Mine Lease- SMP Area 1

-
-
-
-
- One dam
-
-
- Viney Creek
- Boral Asphalt Plant (Black Hill Depot)
- Catholic Diocese Land
- C&A land (Black Hill Land Pty Ltd)
- Transgrid 330kV power line
- EA 132kV power line
- Rural 11kV power lines
- No Major Aboriginal artefacts
- Optus Fibre optic cable
- Telstra copper comms cables
- Hunter water pipeline

SMP Area 1 – Key surface features



- Viney Creek
- Transgrid 330kV Power Line
- EA 132kV Power Line
- Hunter Water buried pipeline
- Optus Fibre Optic cable
- Boral Hot Mix plant

Surface Environmental Assessment

- Surface inspections and surveys conducted to identify features as part of EA Process
- Flora/Fauna surveys conducted to identify species and provide baseline monitoring
- Consultation with Landowners and Stakeholders
- Groundwater report commissioned including review of borehole information.
- Aboriginal & European heritage
- Other Archaeological heritage

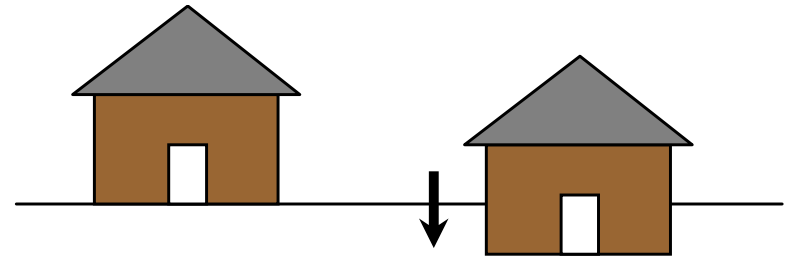
Subsidence Prediction Methodology

Several industry established empirical models were used to predict the maximum subsidence impact parameters and profiles for the given mining layouts. The predictions involved the following work:

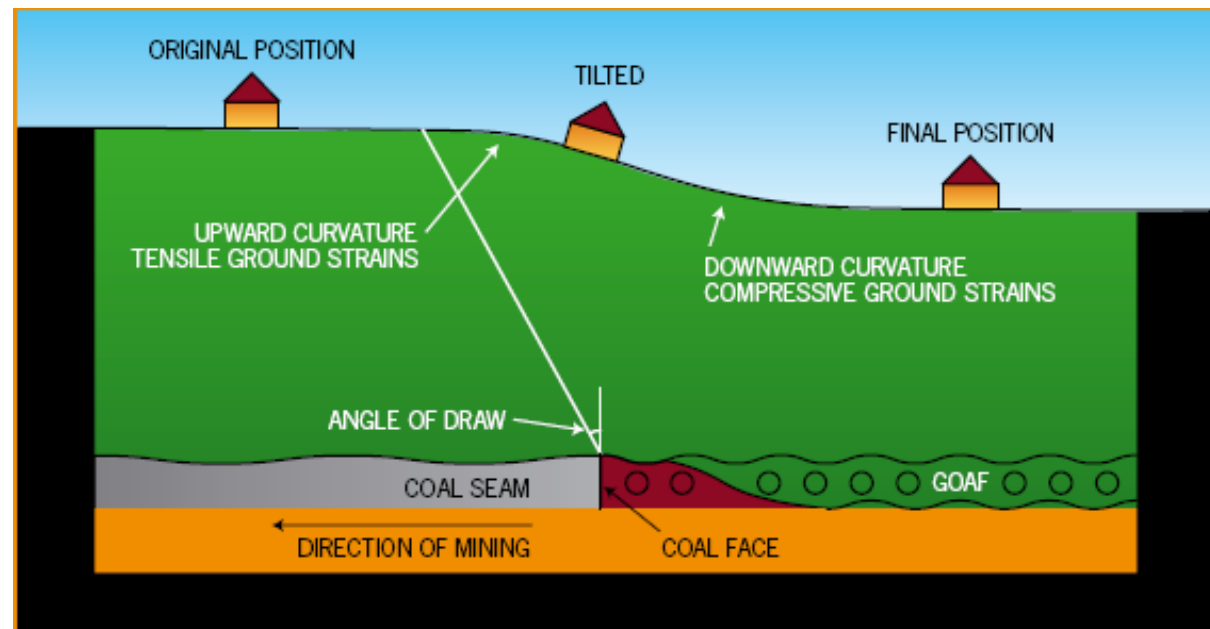
- (i) The development of a geotechnical model for the study area (no massive strata present).
- (ii) Prediction of maximum panel and barrier pillar subsidence and profiles using the DgS Modified **ACARP, 2003** subsidence model.
- (iii) Subsidence, tilt, strain, horizontal displacement contours using **SDPS**® 3-D influence function software.
- (iv) Post-mining topography, potential cracking width, ponding location and surface gradient change contours were estimated using **Surfer8**® contouring software.
- (v) Estimation of sub-surface fracturing heights above the panels using empirically based models in **ACARP, 2003, Forster, 1995** and **Mark, 2007**.

Subsidence Impact Parameters

- vertical subsidence (m)
rarely a direct concern, except
when adjacent to water bodies
or flat terrain with watercourses
(i.e. ponding)

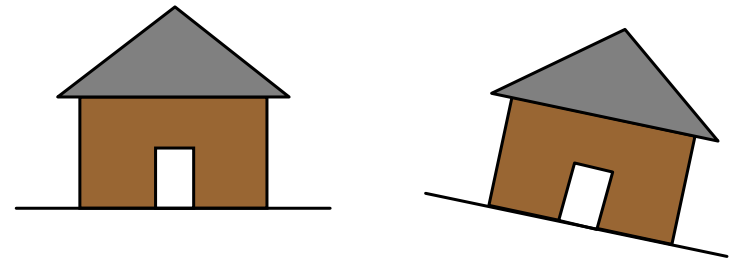


Final maximum panel subsidence ranges from 0.7 m to 1.8 m for the given mining geometries.

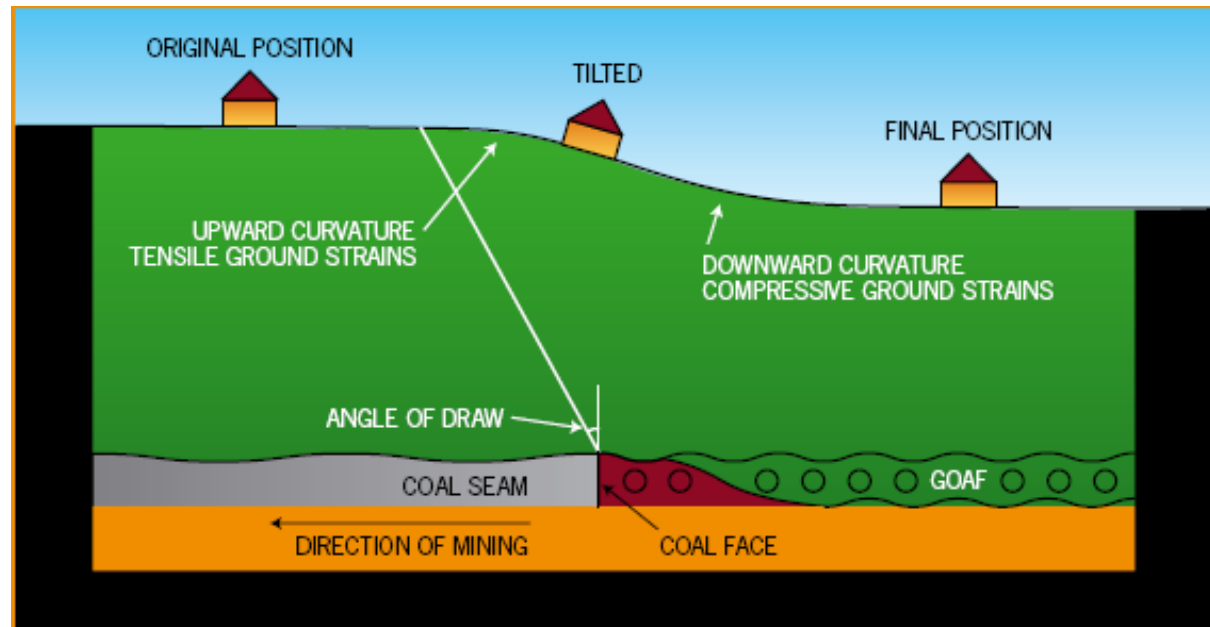


Subsidence Impact Parameters

- Tilt (mm/m)
differential subsidence
does not commonly cause
structural damage
affects structure usage

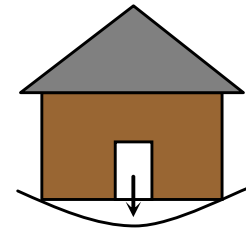


Final maximum panel tilt ranges from 12 to 65 mm/m (30 mm/m typical).

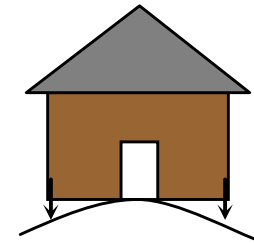


Subsidence Impact Parameters

- Curvature (bending)
differential tilt (mm/m^2)
major damage driver
structures deformed and
can crack, shear or buckle

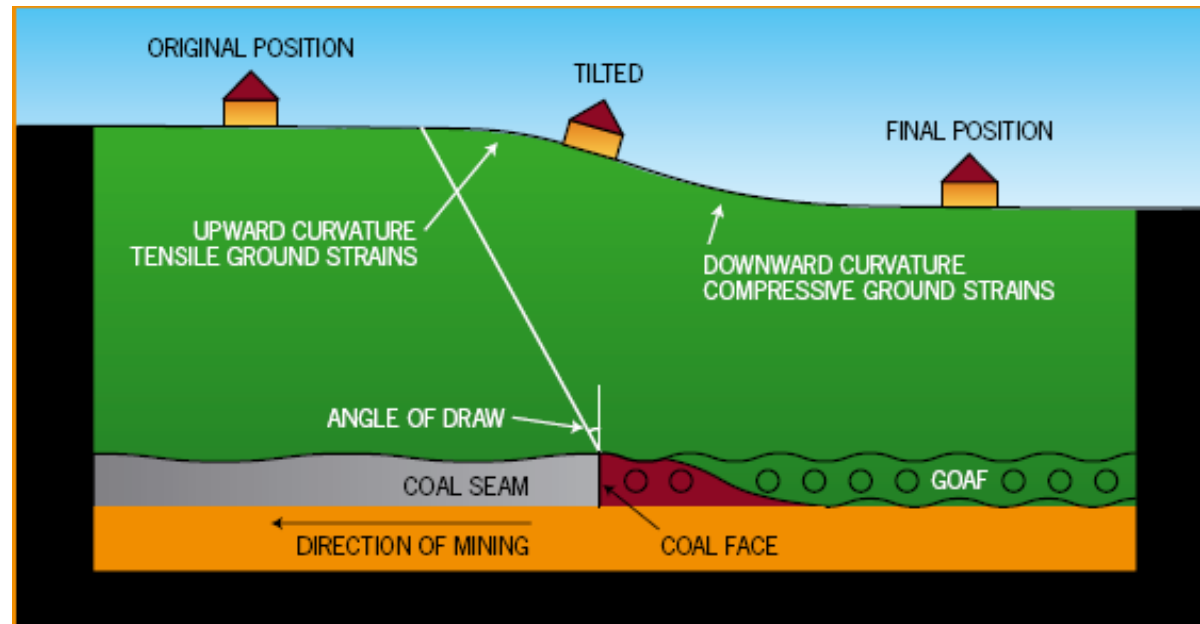


sagging



hogging

Final maximum panel hogging and sagging curvature ranges from 0.5 to 5.3 mm/m^2 or bending radii of 2 km to 250 m.



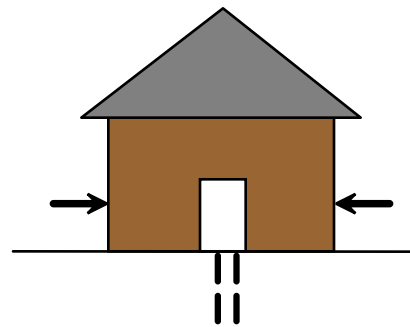
Subsidence Impact Parameters

- horizontal strain (mm/m)

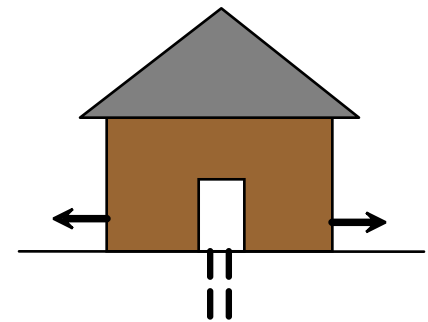
tensile or compressive

associated with curvature
and has similar damage
outcomes

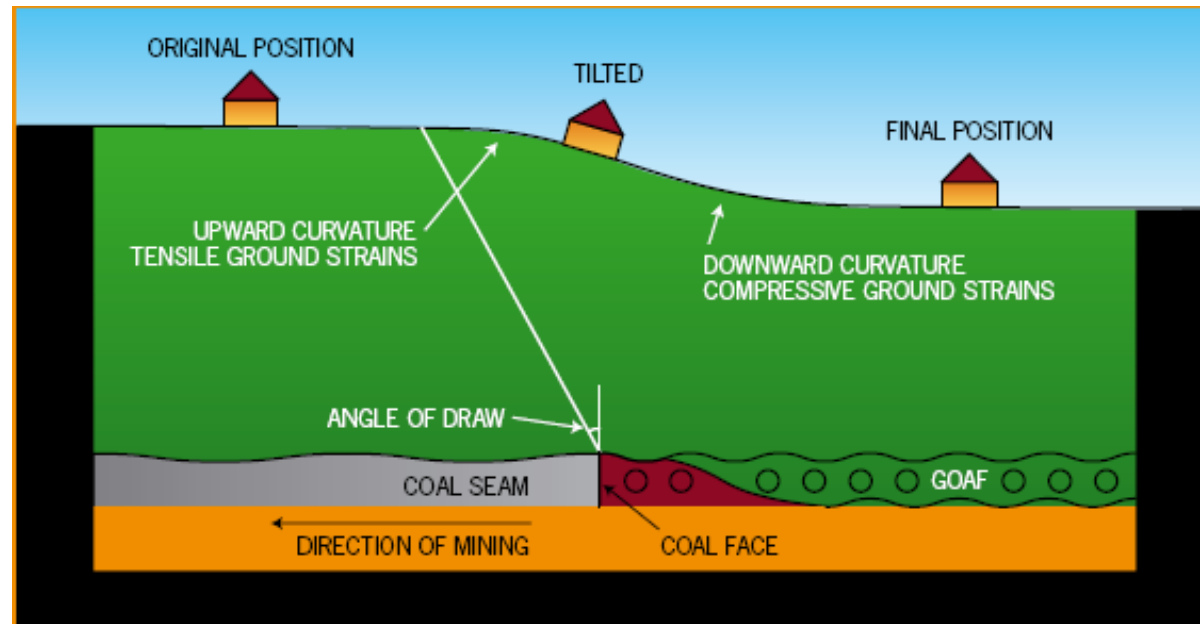
compressive



tensile



***Final maximum panel
tensile and
compressive strain
ranges from 3 to 39
mm/m (10 mm/m
typical)***



Subsidence Prediction Outcomes

For the 160 m wide panels with mining heights of 1.8 to 3.4 m and cover depths of 55 m to 140 m, the predicted key subsidence impact parameters include:

- Final maximum panel subsidence between 35% and 55% of the mining height

e.g. #1: 1.2m to 1.8m for a mining height of 3.4 m
e.g. #2: 0.7m to 0.9m for a mining height of 2.0 m
- Final barrier pillar subsidence from 0.04 m to 0.24 m
- Maximum possible surface cracking widths of between 50 mm and 240 mm and tapering to depths of 5 to 10 m (likely to be mitigated by surface clays/weathered shales). Most cracks likely to be 'self healing'.
- No cracking or ponding expected along Viney Creek, due to buffer zone.
- Engineered solutions required for man-made features.

Subsidence Prediction Outcomes (2)

- The **ACARP, 2003** model predicts that heights of continuous sub-surface fracturing for a 2.6 m mining height are within 10 m of the surface for cover depths <75m. The **Forster, 1995** model indicates a similar range of connective cracking heights (46m to 73m).

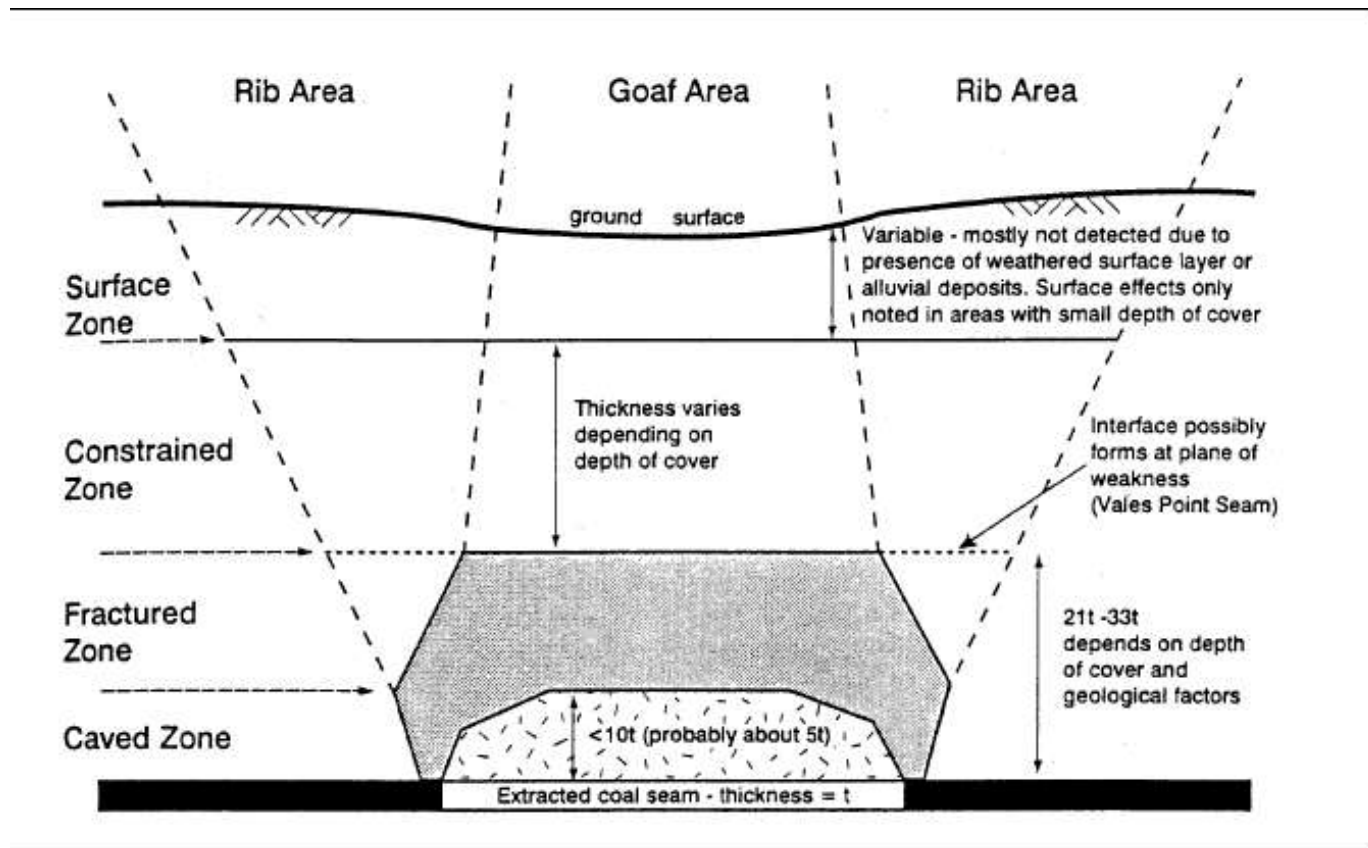
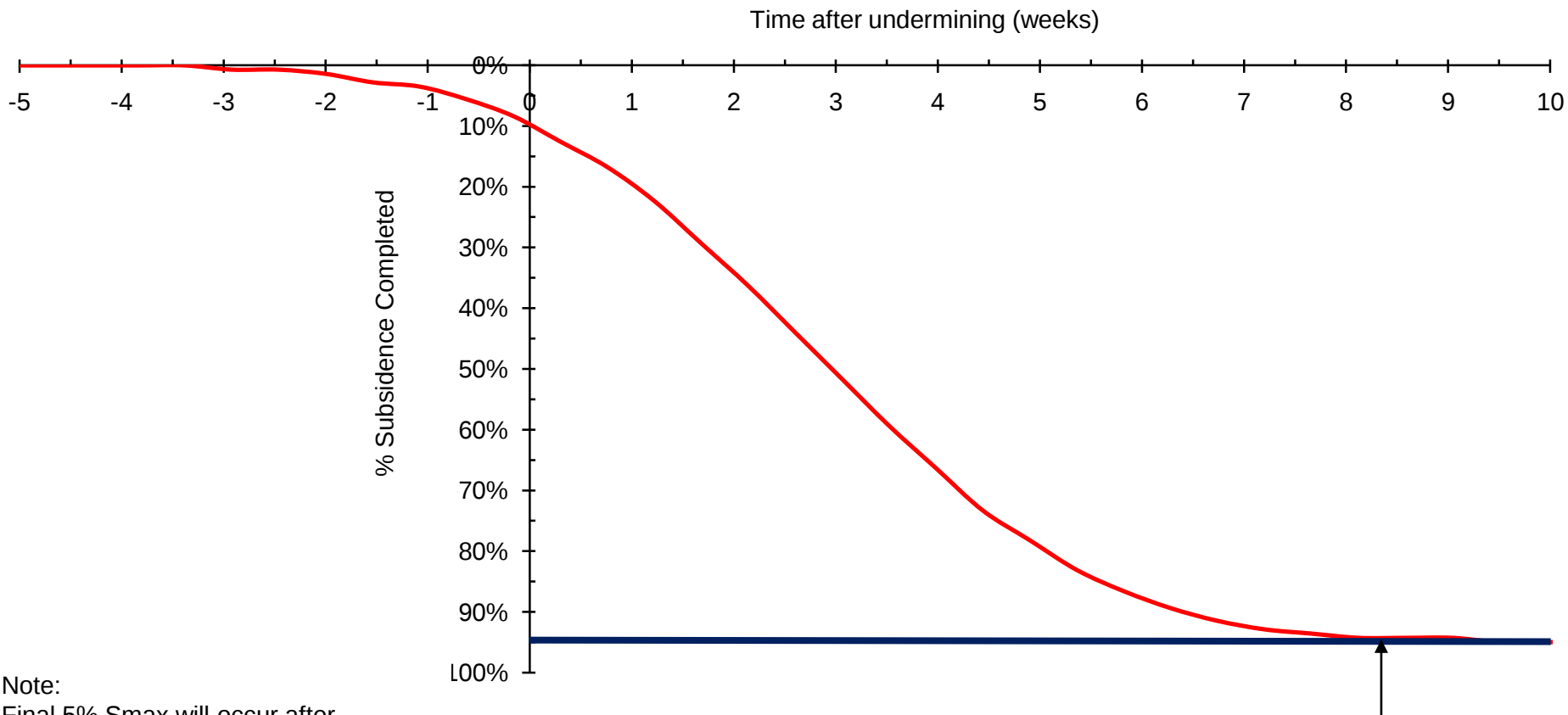


Fig. 1.33 Zones in the Overburden according to Forster (1995)

Abel Subsidence Development Rates

— Subsidence Development Rate for a Typical Abel Panel



Note:
Final 5% S_{max} will occur after
adjacent panels are extracted and
develop over similar time frames.

Effective Subsidence (i.e. 95% S_{max}) complete 8 weeks after undermining

Viney Creek

- ◆ Schedule 2 Creek (as per Strahler system)
- ◆ Viney Creek flows through the SMP area from south to north. It flows under John Renshaw Drive and eventually discharges into Woodberry Swamp, a wetland system of the Hunter River estuary
- ◆ Ephemeral flow
- ◆ Heavily vegetated, and in places is heavily choked with weeds and reeds
- ◆ Depth of cover 80-100m in subject area
- ◆ As per Project approval, protected by 40m barrier from stream banks to the 20mm vertical subsidence contour



Viney Creek

- The stream has a high capacity to reduce erosion effects from subsidence due to its significant natural and introduced (weed/reed) vegetative cover
- In accordance with Project Approval Donaldson may undertake further extraction within this barrier should further studies indicate that such extraction can take place without compromising specified environmental objectives
- Final degree of extraction will depend on an iterative monitoring / assessment / prediction of a suitable degree of extraction under the creek based on observation of prior mining in similar geomorphology / mining layout / depth of cover etc situations in prior panels away from the creek.
- Timing Panel 8



Transgrid 330kV double circuit steel towers



- Critical feed to Tomago area
- 6 suspension and 1 tension tower in SMP Area 1
- Key issues
 - Vertical displacements may reduce clearance from ground surface and lead to infringement of statutory requirements for clearance of transmission lines
 - Horizontal displacement and tilt may affect the alignment and tension of the transmission lines
- Management plan to be developed in consultation with Transgrid to ensure serviceability of power line
- Timing Panel 5

Transgrid 330kV double circuit steel towers

Cruciform footings

- Cruciform footings installed under suspension towers in 1982 in anticipation of future U/G Mining
- The footing acts to tie the legs of the tower together to prevent spreading and to prevent the transfer of ground strains into the structure itself
- The size of the footing is such that the mass can prevent overturing of the tower in the event of extreme loading
- Similar towers in Newcastle district have been subsided 2m
- MSB have reported that their success has led to significant reserves of coal beneath towers being mined



Energy Australia 132kV Power Line



- Installed 1960's
- Feeds to Beresfield area from Killingworth 330/132kV sub station
- Critical power supply
- Steel channel cross arm
- 3 power conductors and 2 Earth wires
- Spacing at ~200m across SMP area
- Management plan to be developed in consultation with EA to ensure serviceability of power line
- Timing Panel 3

Hunter Water Pipe line

- 500mm cast iron pipe installed late 1800's
- 200mm UPVC pipe installed 1992 to replace 500mm pipe in anticipation of mining subsidence
- Discussions being held with Hunter Water as to what ground movements the pipe can tolerate



Hunter Water Pipe line

- Management plan to be developed in consultation with Hunter Water to ensure serviceability of water main
- Timing- Panel 1



Optus Fibre Optic

- ◆ Installed adjacent to Transgrid 330kV line
- ◆ Installed early 1980's
- ◆ Cable directly buried underground
- ◆ Optus have own internal Management plan (similar to ones developed with other local mining companies)
- ◆ Donaldson Coal and Optus to work together on Management Plan
- ◆ Timing – Panel 5



Boral Black Hill Asphalt Plant & Depot

- ◆ Asphalt Plant 40kt /year capacity
- ◆ Spray Seal 5Ml/year capacity
- ◆ Designated as Principal residence
- ◆ Initial subsidence assessment completed
- ◆ First workings hazard management plan to be developed as part of SMP in consultation with Boral
- ◆ Timing Panel 13



Other infrastructure

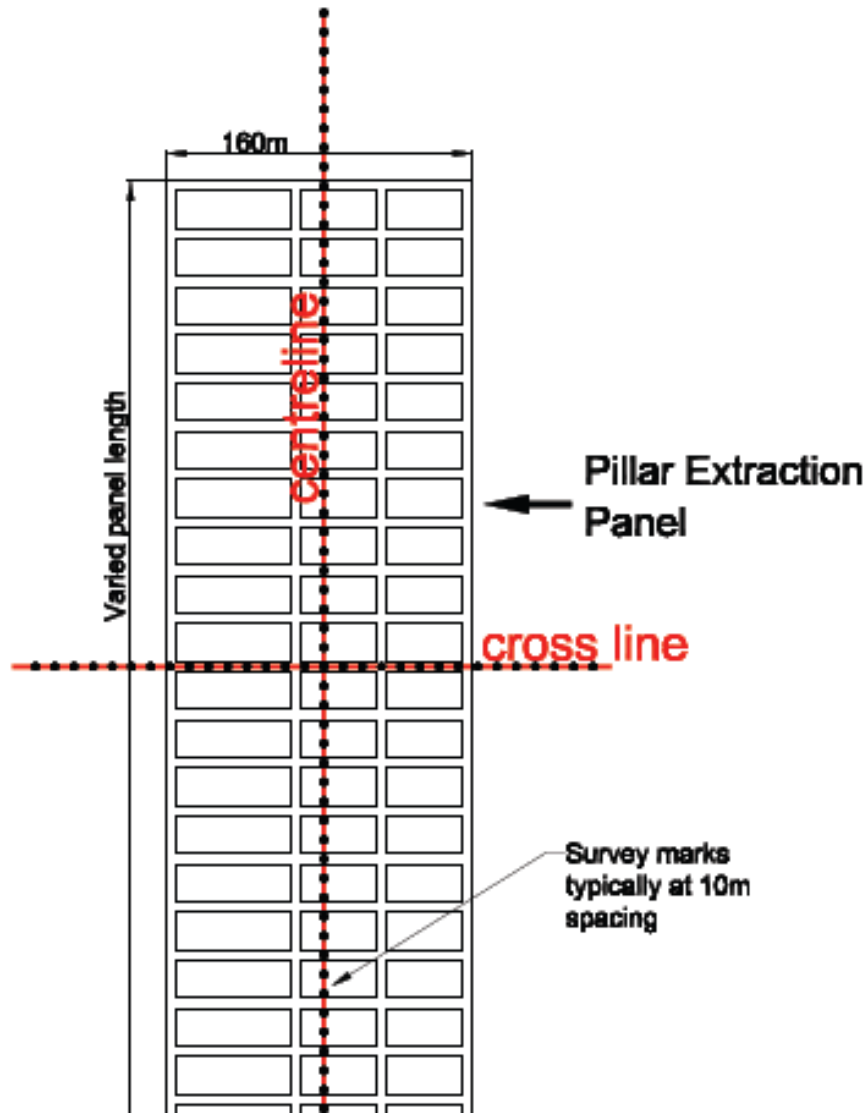
- ◆ Irrigation system on Catholic land for cattle agistment
- ◆ Fences/gates
- ◆ Cattle yards/Holding yards
- ◆ Access tracks
- ◆ Rural 11kV power line feed to Black Hill
- ◆ Telstra local copper cables



Proposed Monitoring

- Flora – specialist consultant
- Fauna – specialist consultant
- Groundwater – piezometers – specialist consultant
- Surface water- flow, water quality
- Subsidence surveys
- Visual inspections
- Photographic records

Subsidence Monitoring



Typical Subsidence Monitoring Program for Pillar Extraction Panels

- Approved by DPI-MR
- Panel length ranges from 190m to 550m
- Centre and cross line survey marks typically at 10m centres
- Removed after effective subsidence completed

Proposed Project Schedule

- Initial community and agency consultation- (June 09)
- Advertisement of intention to develop draft SMP (June 09)
- Responses from community and agencies (June, July 09)
- Risk Assessment (2,3 July 09)
- Preparation of SMP Application (May/June/July 09)
- Submit SMP Application (Aug 09)
- Advertise submission of SMP Application
- Display period and opportunity for community input
- Review of application (DPI-MR then Inter Agency Review Committee)
- Determination – approval sought for commencement of pillar extraction in early 2010

Donaldson Coal
Abel Mine
SMP STAKEHOLDER MEETING
ABEL AREA 1

24 June 2009