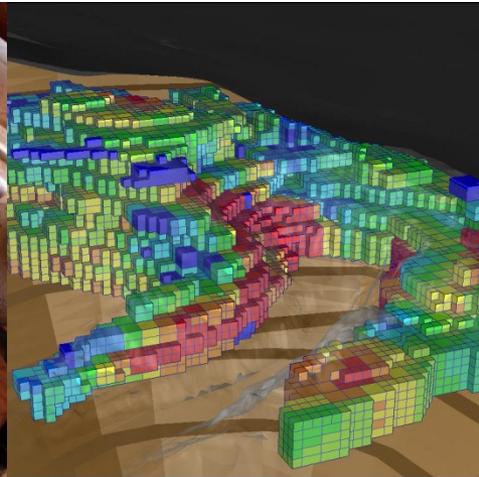




# GCX 5 Grade Control System

## Underground



# Overview

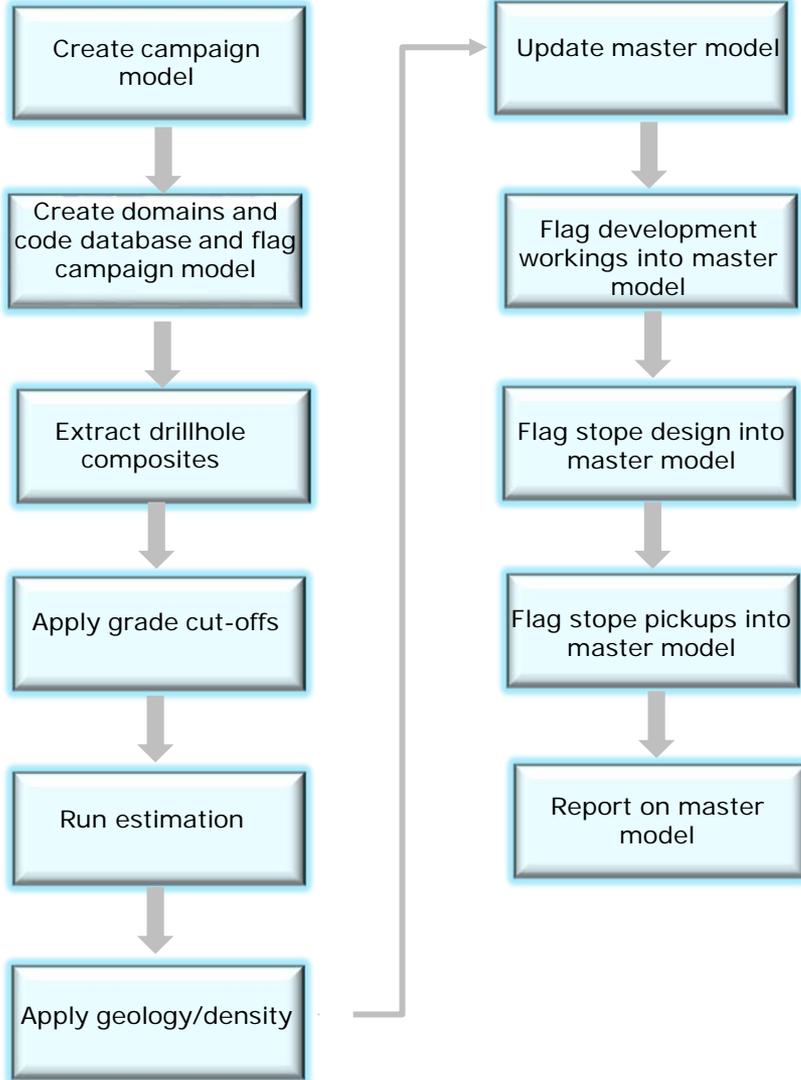
GCX 5 is an auditable grade control system designed for Surpac geological software. GCX 5 provides a logical workflow for grade control geologists to perform their daily tasks ranging from data integration, drillhole and model flagging, estimation and grade reporting; it is:

- Easy to use
- Decreases work time from assay return to stope reporting
- Based on Surpac functions and is not a 'black-box' system
- Has a logical step-by step process flow
- External controls for self-customisation
- Manages file naming and storage
- Contains various estimation methods
- Produces and stores audit files throughout the process
- Statistical and visualisation tools
- Affordable and short installation times
- High-quality and timely support

GCX is used in nearly 30 operations – open pit and underground - across various commodities in Australia, Africa and Asia.



# GCX 5 Process Flow

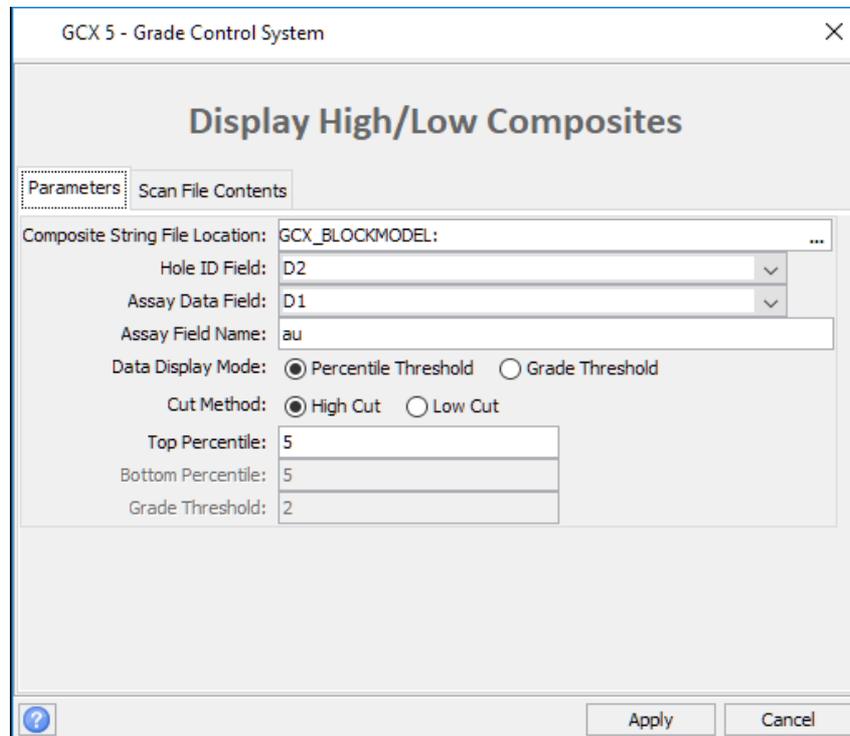


	001 - Create Campaign Model	
	005 - Apply Zones To Database	
	006 - Apply Zones To Campaign Model	
	2D Estimation	>
	3D Estimation	>
	011 - Apply Geology To Campaign Model	
	012 - Apply Density To Campaign Model	
	Model Validation	>
	013 - Add Campaign Model to Master Model	
<hr/>		
	029 - Setup Development and Stopping Folders	
	030 - Apply Development Pickup to Master Model	
	031 - Apply Stope Design to Master Model	
	032 - Apply Stope Pickup to Master Model	
	Optional Stope Filling	>
<hr/>		
	About GCX	



# Easy to Use

- Menu system within familiar Surpac environment
- Logical step-by-step process flow with easy to use forms
- Local site terminology incorporated as appropriate



The screenshot shows a software dialog box titled "GCX 5 - Grade Control System" with a close button (X) in the top right corner. The main heading is "Display High/Low Composites". Below the heading are two tabs: "Parameters" (which is selected) and "Scan File Contents". The "Parameters" tab contains the following fields and controls:

- Composite String File Location: GCX\_BLOCKMODEL: (with a browse button "...")
- Hole ID Field: D2 (dropdown menu)
- Assay Data Field: D1 (dropdown menu)
- Assay Field Name: au (text input)
- Data Display Mode:  Percentile Threshold  Grade Threshold
- Cut Method:  High Cut  Low Cut
- Top Percentile: 5 (text input)
- Bottom Percentile: 5 (text input)
- Grade Threshold: 2 (text input)

At the bottom left is a help icon (?), and at the bottom right are "Apply" and "Cancel" buttons.



# External Controls

- Attributes associated with material types, grade cut-offs, density, weathering and geological domaining are controlled by a series of editable Excel workbooks.
- Multi-element compatible – up to 20 elements

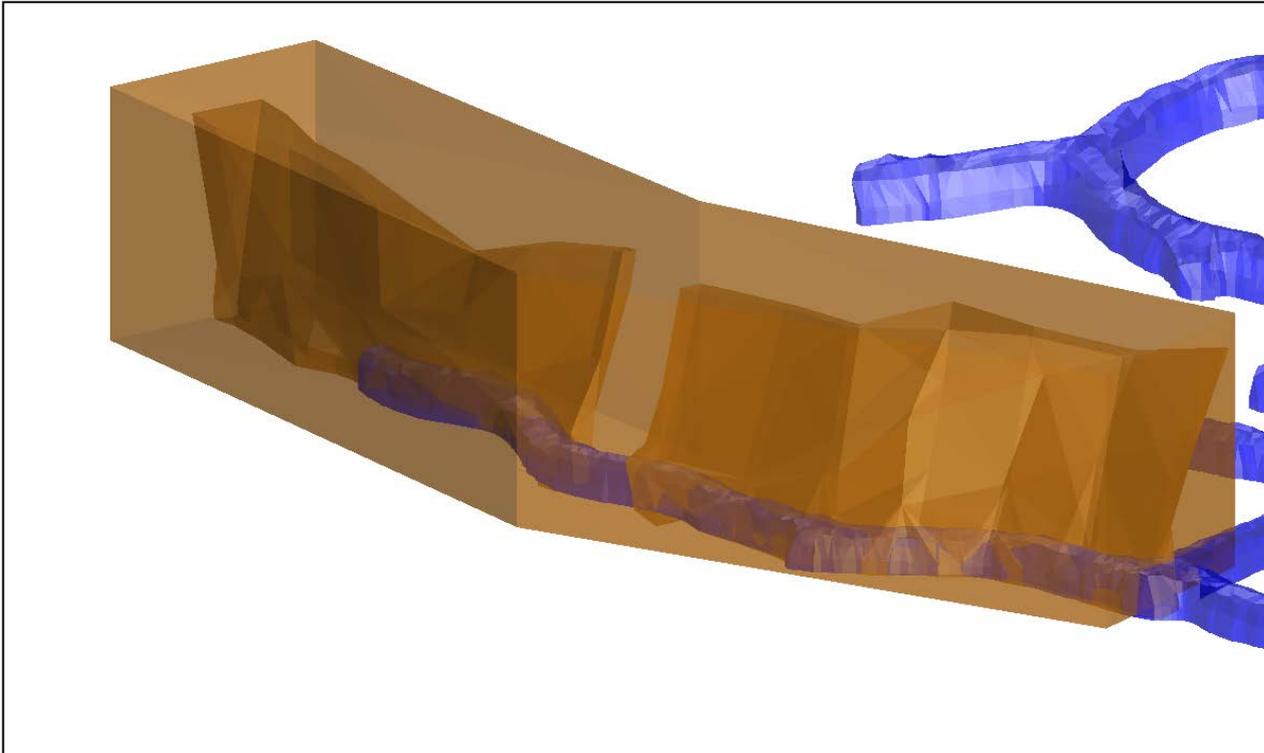
	Table	Element1_Field	Element2_Field	Element3_Field	Element4_Field	Element5_Field	Element6_Field	Element7_Field
Primary Database	Assay	Cu	Ag	Au	As	Pb	Zn	S
Secondary Database								
String File Field		d1	d2	d3	d4	d5	d6	d7
Blockmodel Attribute		cu_ok	ag_ok	au_ok	as_ok	pb_ok	zn_ok	s_ok
String File Field		d1	d2	d3	d4	d5	d6	d7
Blockmodel Attribute		cu_ok	ag_ok	au_ok	as_ok	pb_ok	zn_ok	s_ok
String File Field		d1	d2	d3	d4	d5	d6	d7

	Cu Low Cut	Cu High Cut	Ag Low Cut	Ag High Cut	Au Low Cut	Au High Cut	As Low Cut	As High Cut
<b>Zonecode</b>	<b>%</b>	<b>%</b>	<b>ppm</b>	<b>ppm</b>	<b>ppm</b>	<b>ppm</b>	<b>ppm</b>	<b>ppm</b>
1001	0	100	0	600	0	100	0	999999
1002	0	100	0	600	0	100	0	999999
1003	0	100	0	600	0	100	0	999999
1004	0	100	0	600	0	100	0	999999
1006	0	100	0	600	0	100	0	999999
1007	0	100	0	600	0	100	0	999999
2011	0	100	0	200	0	100	0	999999
2012	0	100	0	200	0	100	0	999999
2013	0	100	0	200	0	100	0	999999
2041	0	100	0	200	0	100	0	999999
2042	0	100	0	200	0	100	0	999999
2043	0	100	0	200	0	100	0	999999



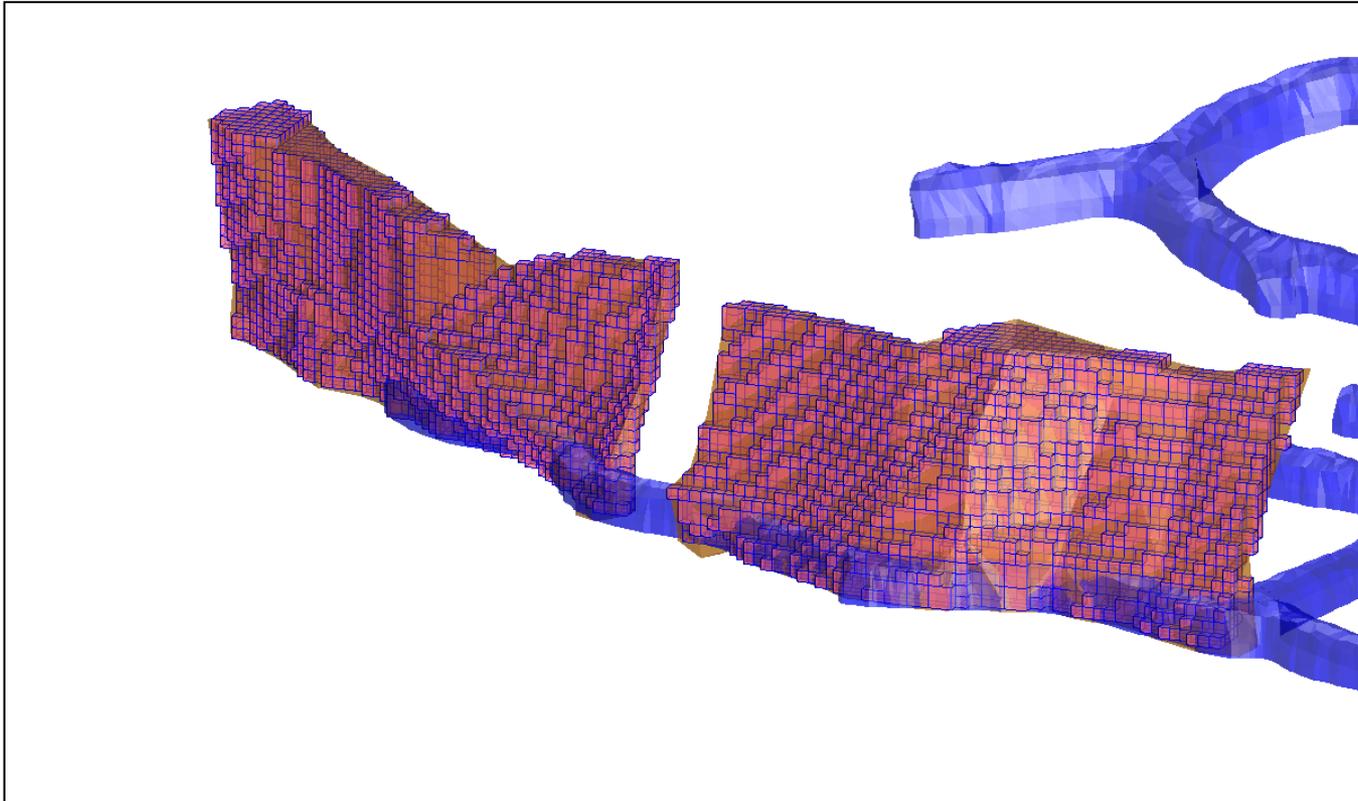
# Campaign model area

- Defined using a polygon
- Use of smaller master model sub-set speeds up processing



# Domain wireframing and model flagging

- Visualisation of drilling data can be customised to suite e.g. assays, rocktypes, material types etc. or a combination
- Campaign model stamped, database flagged and drill hole composites generated according to user controlled domains



# Composite validation, generation and grade cuts

- Extreme grades at either end of the sample population can be displayed and outputted according to user generated inputs

GCX 5 - Grade Control System

### Display High/Low Composites

Parameters: Scan File Contents

Composite String File Location: GCX\_BLOCKMODEL: ...

Hole ID Field: D2

Assay Data Field: D1

Assay Field Name: au

Data Display Mode:  Percentile Threshold  Grade Threshold

Cut Method:  High Cut  Low Cut

Top Percentile: 5

Bottom Percentile: 5

Grade Threshold: 2

Apply Cancel



### High Grades

1	Hole Id	cu
2	BRC480002025	5.2784
3	BRC490006005	5.1501
4	BRC490006005	5.1271
5	BRC480002024	5.0181
6	BRC495006031	4.8258
7	BRC480002024	4.8014
8	BRC480002008	4.7782
9	BH49033P044	4.7700
10	BH49033P044	4.7700
11	BH49033P044	4.7700
12	BH49033P044	4.7700
13	BH49033P044	4.7700
14	BRC475001047	4.6725
15	BRC475001132	4.5858
16	BRC480002008	4.5675

Apply Cancel



- Drill hole composite intervals and top-cuts can be altered\adjusted by the user



# Estimation

- Based on Cube's Estimation Management System – ECX.
- ECX used successfully in numerous code-compliant resource estimations for many commodities around the globe.
- Easy to use, repeatable and auditable.
- Estimation parameter inputs are managed and adjusted using Excel.
- Different estimation scenarios can be run and inputs recorded for later use
- Available estimation methodologies including; OK, IDW, and dynamic search neighbourhoods.



# Estimation

- 3D and 2D estimations are available and can be conducted within the same block model.
- 2D estimation allows more accurate, reliable and useable data for narrow lode deposits.

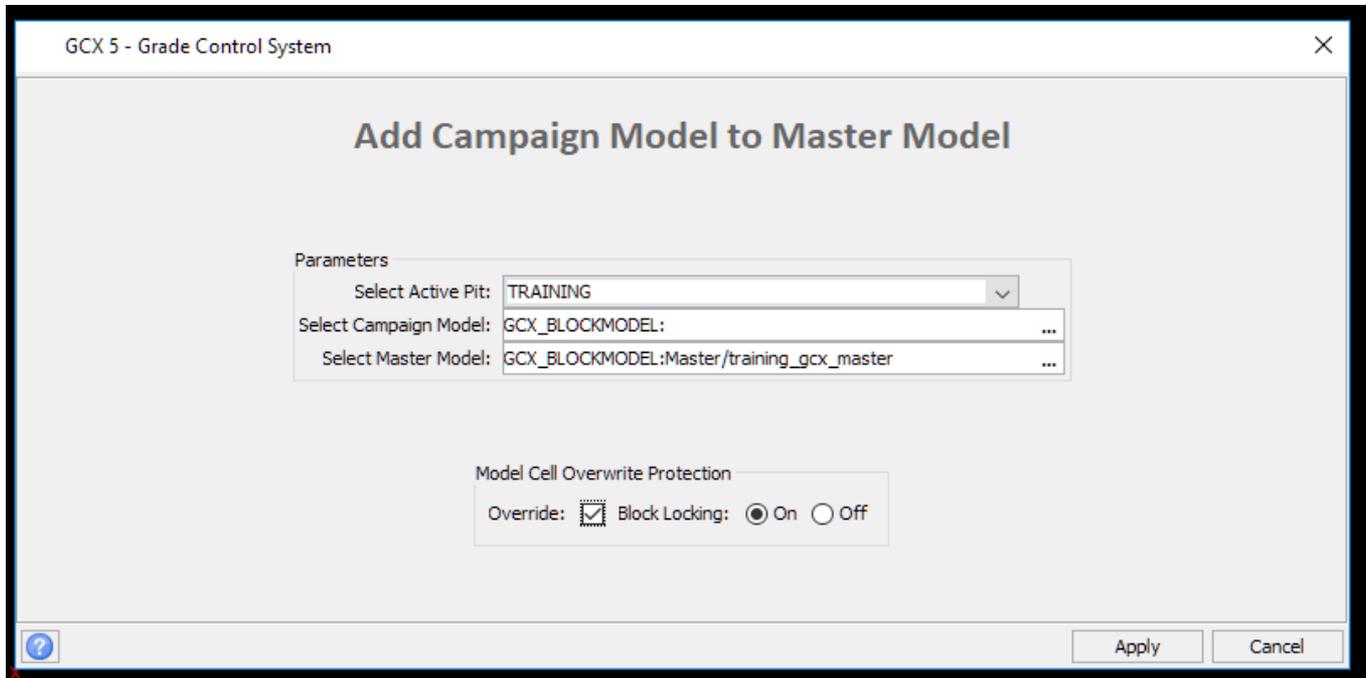


- Outputs a range of useful geostatistical metadata e.g. Slope of Regression, Kriging Efficiency, Kriging Variance, Number of informing samples, etc.



# Update master model

- Master model acts as a repository for all applicable grade control information
- Master model updated from campaign model in one step – with overwrite checks to maintains integrity of model

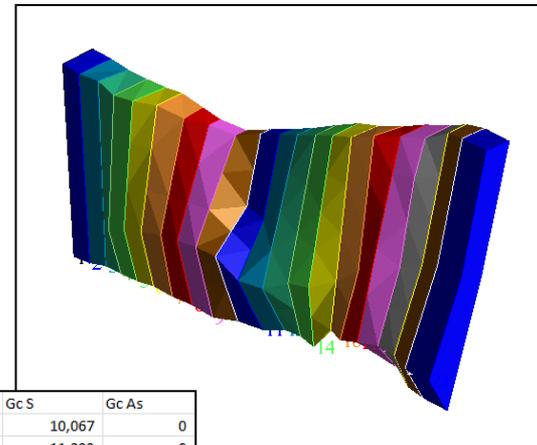
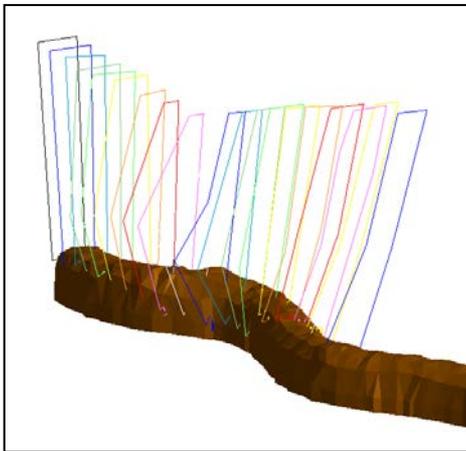


The screenshot shows a software dialog box titled "GCX 5 - Grade Control System" with a close button (X) in the top right corner. The main heading is "Add Campaign Model to Master Model". Below this, there is a "Parameters" section with three fields: "Select Active Pit:" with a dropdown menu showing "TRAINING", "Select Campaign Model:" with the text "GCX\_BLOCKMODEL:" and a browse button "...", and "Select Master Model:" with the text "GCX\_BLOCKMODEL:Master/training\_gcx\_master" and a browse button "...". Below the parameters is a "Model Cell Overwrite Protection" section with "Override:" checked and "Block Locking:" set to "On" (radio button selected) and "Off" (radio button unselected). At the bottom left is a help icon (question mark in a circle), and at the bottom right are "Apply" and "Cancel" buttons.



# Stamping and Reporting of Stope Design

- Designs and actual pickups are stamped into the Master model
- Variety of reports created – including overbreak and underbreak



Stope Id	Ring	Volume	Tonnes	Gc Au	Gc S	Gc As
c_625_1000	21	248	695	4.09	10,067	0
	20	178	498	4.09	11,299	0
	19	137	383	3.37	10,293	0
	18	170	476	3.35	11,632	0
	17	152	427	4.61	20,518	0
	15	143	399	6.49	28,823	0
	16	137	383	4.74	20,033	0
	14	137	383	6.17	30,570	584
	13	139	388	5.79	23,196	672
	12	135	377	6.58	22,021	1,977
	11	125	350	7.99	24,113	2,238
	10	127	355	7.41	21,028	3,777
	9	162	454	6.95	19,447	4,025
	8	125	350	6.23	19,929	4,681
7	141	394	6.65	19,659	4,913	
6	178	498	6.01	18,219	5,007	
5	217	607	6.84	20,623	6,472	
4	168	470	5.64	16,841	5,730	
2	143	399	6.29	20,164	6,580	
3	137	383	6.35	19,395	6,553	
Sub Total		3,096	8,668	5.69	18,859	2,654
Grand Total		3,096	8,668	5.69	18,859	2,654



# Included Options

- Face draping of images or hand generated maps
- Grade distribution graphics display
- Grade tonnage curves
- Block model validation
- DTM creation tools
- Plus others...



# GCX for Open Pits

GCX 5 is also available for Open Pit mines





# About Cube

Cube Consulting provides specialist consulting services and software systems to the global mining industry. We are a quality team of geologists and mining engineers with a wide range of skills and experience, applicable from advanced exploration projects through to operational mines across multiple commodities.

Established in 2000 in Perth, Western Australia, Cube Consulting has grown to become a world class mining services company, working with our customers to add value to their projects through considered and practical advice.

We provide:

- Geological Services based on extensive operational and field based experience
- Mine Engineering Consulting Services supporting sound commercial decisions
- Technology solutions focused on Mine Grade Control and Reconciliation

Our goal is to ensure our customers succeed through practical and professional advice.

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