

SurfaceIQ Manual

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Intro

This is a manual on all the features available with SurfaceIQ. SurfaceIQ is an addin to SpatialXL and all our other spatial products that allows you to build and work with surfaces of various kinds.

To see if you have SurfaceIQ look in the Application Menu> View Addins:





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Drag a column header here to group by that column										
	Name		Enabled							
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►	SurfaceIQ		✓							
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The tools and features available from SurfaceIQ are to be found in the **Surfaces** tab:



We will start by covering the features in the **Build** section of the tab:



Build

From Points

First we have the **From points** tool which will build a surface from selected points in your scene:



As the first step always, we start by selecting the elements in the scene that we would like to build a surface out of:

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You can then go ahead and click **From points**. Now, any surface you create will be drawn to any layer that you have set as active, if you have no layer set as active then you will be prompted to create a new layer, you will just be asked to choose the projection and then your new layer will be created for you:

Choose layer projection				x
The data to load has no projection associated with it. Please choose a projection for the data.				
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Well known text				
Use scene projectio	n	Use selected	l projectio	n



Your surface has been created and you can then turn off the points layer and rotate the surface to see it clearly. To rotate a surface or any 3D object simply choose one of the **Snap** tools by clicking here at the bottom of the spatial pane:



Then hover your mouse over your surface until the cursor turns into a star figure (this means it has found a point to snap to) and then hold down ctrl and click and drag to rotate your surface around:



From start points

Next is the **From start points** tool which will build a surface from the start points of selected elements only:



First select the elements:



Then click **From start points** and your surface will be created:



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From end points

Next is the **From end points** tool which will build a surface from the end points of selected elements only:



First select your elements:



Then click From end points and your surface will be created:



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Between start and end points

Next we have the **Between start and end** tool which will build a surface between the start and end points of selected elements:



First select the elements:



Then click **Between start and end** and your surface will be created:





From linestrings

The next tool is the **From linestrings** tool which will build a surface from selected linestrings:



Select the linestrings:



Then click **From linestrings** and your surface will be created:



SpatialXL		*	×
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Closed from linestrings

The next tool is the **Closed From linestrings** tool which will build a closed surface from selected linestrings:



Select the linestrings:



Then click **From Closed linestrings** and your surface will be created:



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Build Wall

The next tool is the **Build wall** tool which allows you to create a wall with various parameters:

🗳 Closed From linestrings								
📣 Build wall								
📥 Build dump								
Build a wall								
Open the build wall tool.								

Clicking on it brings up the following dialogue:

						×
Crest Elevation:	250.000	*)raw Baseline
Minimum Height:	5.000	+		Copy fr	om selecte	Close Wall
Baseline Height:	1.000	* *				Create Wall
X	Y	Z	Crest W	Vidth	Left Slope	Right Slope
•						

Crest Elevation is the height of the top of your wall in meters:

Build Wall				×
Crest Elevation:	250.000] Draw Baseline
Minimum Height:	5.000	* *	Copy from selecte	Close Wall
Baseline Height:	1.000	-		Create Wall

Minimum Height is the minimum height in meters that you set that the wall can go:

Build Wall			x
Crest Elevation:	250.000	-	Draw Baseline
Minimum Height:	5.000	*	Copy from selecte Close Wall
Baseline Height:	1.000	-	Create Wall

Baseline Height is the height in meters of the drawn baseline above the bottom of the wall; if it is set at zero then the wall will just start exactly at the baseline:

Build Wall	×
Crest Elevation: 250.000	Draw Baseline
Minimum Height: 5.000	Copy from selecte Close Wall
Baseline Height: 1.000	Create Wall

To start drawing your baseline you can tick on **Draw Baseline** and then click in your scene to draw and double click to finish:

Build Wall	×
Crest Elevation: 250.000	🔽 Draw Baseline
Minimum Height: 5.000	Copy from selecte Close Wall
Baseline Height: 1.000	Create Wall



The coordinates of your baseline are now in the grid below:

Minimum Height: 5.000			÷	Copy from selecte		Close Wall	
Base	eline Height: 1.	000	÷			Create Wall	
	X	Y	Z	Crest Width	Left Slope	Right Slope	
►	-22.438283	-61.304596	0	10	0		
	-98.568175	87.7497168	0	10	0		
	56.8970766	119.003040	0	10	0		
	56.8970766	119.003040	0	10	0		
	56.8970766	119.003040	0	10	0		
*							

And you can now set the **Crest Width**, **Left Slope** and **Right Slope** (the slopes are expressed in units of horizontal distance divided by height, so if you have a 4 meter high wall and choose 1 meter horizontal distance then this would be 1/4=0.25 as your slope; smaller numbers means a steeper slope, bigger numbers will give you a more gradual slope):

Minimum Height: 5.000		000	÷	Copy f	rom selecte	Close Wall
Baseline Height: 1.000		000				
	x	Y	z	Crest Width	Left Slope	Right Slope
	-22.438283	-61.304596	0	15	0.1	
	-98.568175	87.7497168	0	15	0.1	
	56.8970766	119.003040	0	15	0.1	
	56.8970766	119.003040	0	15	0.1	
1	56.8970766	119.003040	0	15	0.1	
*						
Wall	will be clipped	by selected su	rface if any			

You can now click **Create Wall**, your wall will be drawn to any layer you have set as active, if you have none set as active then a new layer will be made for you and you will be prompted to choose the projection:



Your wall has now been created and you can rotate it around to inspect it:





If you want your wall to be closed you would click **Close Wall** which will add extra geometries in the grid(for the closing of the wall):

Crest Elevation: 250.000							
linir	mum Height: 5	.000	÷	Copy	/ from selecte	Close Wall	
Baseline Height: 1.000			•			Create Wall	
	х	Y	Z	Crest Width	Left Slope	Right Slope	
	-55.29434	-34.05810	0	15	0.1	0	
	-127.4173	38.064945	0	15	0.1	0	
	-59.30117	112.59210	0	15	0.1	0	
	59.378143	92.318595	0	15	0.1	0	
	104.97911	18.030763	0	15	0.1	0	
	36.189401	-43.13420	0	15	0.1	0	
	36.189401	-43.13420	0	15	0.1	0	
Þ	36,189401	-43.13420	0	15	0.1	0	
	-55.29434	-34.05810	0	15	0.1	0	
*							

Then you would click **Create Wall** and a closed wall will have been created for you:

B	Build Wall							
	Crest Elevation: 250.000							
Minimum Height: 5.000		•	Copy	y from selecte	Close Wal	I		
Baseline Height: 1.000			1.000	▲ ▼			Create Wa	I
		х	Y	Z	Crest Width	Left Slope	Right Slope	
		-55.29434.	34.05810	0	15	0.1	0	
		-127.4173.	38.064945	0	15	0.1	0	
		-59,30117.	112.59210	0	15	0.1	0	
		59,378143.	92.318595	0	15	0.1	0	
		104.97911.	18.030763	0	15	0.1	0	
		36,189401.	43.13420	0	15	0.1	0	
		36,189401.	43.13420	0	15	0.1	0	
	►	36,189401.	43,13420	0	15	0.1	0	
		-55.29434.	34.05810	0	15	0.1	0	
	*							-
1	Wall	will be clippe	ed by selected s	urface if any				





When creating your baseline you don't have to use the **Draw Baseline** option, if you have a linestring layer already in your scene that you would like to use as the baseline then simply select the linestring and then click **Copy from Selected** and the geometries will be pasted in:



Build	uild Wall						
Crest Elevation: 250.000							
Mini	mum Height: 5.0	000	÷	Copy from selecte			
Baseline Height: 1.000			•				
	x	Y	Z	Crest Width	Left Slope	Right Slope	
+	-20,539133	-37.320839	18,1311099	10	0	(
	-111.89277	37.1518994	0	10	0	(
	-51,706945	108.025116	0	10	0	(
	19.2315714	112,329860	0	10	0	(
*							
Wall	will be clipped	by selected sur	face if any				
		,	,				

One last point is that if you are creating your wall on an already existing surface then you can choose to have the wall clipped by that surface if you want by selecting the surface before creating the wall:
В	uild	Wall					x					
(Crest Elevation: 250.000											
Minimum Height: 5.000 Copy from selecte Close Wall												
I	Baseline Height: 1.000											
		x	Y	Z	Crest Width	Left Slope	Right Slope					
	►	-20,539133	-37,320839	18,1311099	10	0	0					
		-111.89277	37.1518994	0	10	0	0					
		-51.706945	108.025116	0	10	0	0					
		19.2315714	112,329860	0	10	0	0					
	*											
					•							
١	Nall	will be clipped	by selected sur	face if any 🤇								





And as you can see the wall has been clipped by the surface.

Build Dump

The next tool is the **Build dump** tool which allows you to create a dump with various parameters:



Clicking on it brings up the following dialogue:

Build Dump					x			
Crest Elevation:	250.000				raw Baseline			
Slope:	0.010		[Сору	from selecte			
Baseline Height:	0.000				Create Dum			
X		Y	Z					
*								
Dump will be clip	Dump will be clipped by selected surface if any							

Crest Elevation is the height of the top of your dump in meters:

Build Dump			×
Crest Elevation: Slope:	100.000	Elevation of crest of dump	Draw Baseline Copy from selecte
Baseline Height	: 1.000		Create Dum

You can then specify the **Slope** for the dump (the slope is expressed in units of horizontal distance divided by height, so if you have a 4 meter high dump and choose 1 meter horizontal distance then this would be 1/4=0.25 as your slope; smaller numbers means a steeper slope, bigger numbers will give you a more gradual slope):

Build Dump				×
Crest Elevation:	100.000	-		Draw Baseline
Slope:	0.010			Copy from selecte
Baseline Height:	1.000	Slope of dur	np. 0 is vertical, else its units	sideways per unit down

Baseline Height is the height in meters of the drawn baseline above the bottom of the dump; if it is set at zero then the dump will just start exactly at the baseline:

Build Dump			×
Crest Elevation:	100.000	*	Draw Baseline
Slope:	0.010		Copy from selecte
Baseline Height:	1.000		Create Dum
X		Height of drawn baseline above bottor	n of dump

To start drawing your baseline you can tick on **Draw Baseline** and then click in your scene to draw and double click to finish:

Build Dump	×
Crest Elevation: 100.000	🗹 <mark>Draw Baseline</mark>
Slope: 0.010	Copy from selecte
Baseline Height: 1.000	Create Dum

SpatialXL		*	×
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The coordinates of your baseline are now in the grid below:

Crest Slope:	Elevation:	100.000			Build Dump ×										
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Dasell	ine Height:	1.000	+				Create	Dum							
)	X		Y		Z										
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	-1	02.521399853801		-34.3633406432749				30							
	-183.400347222222			12.8160453216374				30							
	-18	81.153709795322		89.2017178362573				30							
	-1	01.398081140351		140.874378654971				30							
	6	8.2230445906433		106.051498538012				30							
	6	8.2230445906433		106.051498538012				30							
	6	8.2230445906433		106.051498538012				30							
*															
Dump will be clipped by selected surface if any															

You can now click **Create Dump**, your dump will be drawn to any layer you have set as active, if you have none set as active then a new layer will be made for you and you will be prompted to choose the projection:

Build	Build Dump x									
Crest Elevation: 100.000			* *			Draw Baseline				
Slop	e:	0.010	÷			Copy from selecte				
Base	eline Height:	1.000	* *			Create Dum				
	X		Y		Z					
•	5	0.2499451754387		-64.6929459064328		30				
	-1	02.521399853801		-34.3633406432749		30				
	-1	83.400347222222		12.8160453216374		30				
	-1	81.153709795322		89.2017178362573	30					
	-1	01.398081140351		140.874378654971		30				
	6	8.2230445906433		106.051498538012		30				
	6	8.2230445906433		106.051498538012		30				
	6	8.2230445906433	6433 106.051498538012			30				
*	*									
Dum	np will be clip									

Choose layer projection		x
The data to load has no projection associated with it. Please choose a projection for the data.		
World_Mercator ~	SRID:	þ 🖨
☐ Well known text		
Use scene projection	Use selected	projection

Your dump has now been created and you can rotate it around to inspect it:





When creating your baseline you don't have to use the **Draw Baseline** option, if you have a linestring layer already in your scene that you would like to use as the baseline then simply select the linestring and then click **Copy from Selected** and the geometries will be pasted in:

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Slop	e:	0.010	÷	Copy from selecte						
Base	eline Height:	1.000	•	Create Dum						
	x		Y	Z						
۱.	-1	9.0688396583203	-27.6603449400105	30						
	-1	55.744556924883	2.09969027125715	30						
	-1	63.460121609285	96.8909135367762	30						
	-7	6.5169490882539	130.444756342085	30						
	29.4289955007825		103.504254694836	30						
	-1	9.0688396583203	-27.6603449400105	30						
*										
Dum	np will be clip	oped by selected s	urface if any							

If you are creating your wall on an already existing surface then you can choose to have the wall clipped by that surface if you want by selecting the surface before creating the wall:

Build Dump ×										
Crest Elevation: 100.000			100.000	-				Draw Baseline		
S	Slope:		0.010		+			Copy from selecte		
В	Baseline Height:		β0.000					Create Dum		
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	Þ	-1	9.06883965832	03	-27.6603449400105			30		
		-1	55.7445569248	33	2.09969027125715			30		
		-163.460121609285			96.8909135367762			30		
		-76.5169490882539			130.444756342085			30		
		29.4289955007825			103.504254694836			30		
		-1	9.06883965832	03	-27.6603449400105			30		
	*									
D	Dump will be clipped by selected surface if any									





And as you can see the wall has been clipped by the surface.

Build surface between strings

The next tool is the **Build surface between strings** tool which is seen as the first little icon here:



This tool allows you to build a surface between a pair of linestrings.

First select your linestrings:



Then click the **Build surface between strings** tool and your surface will be created:





Build surface between closed strings

The next tool is the **Build surface between closed strings** tool which is seen as the second little icon here:



This tool will build a surface between a pair of selected closed linestring elements where one is enclosed by the other.

First select the linestrings:



Then click the **Build surface between closed strings** tool and your surface will be created:

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I can the select the next two closed linestrings:

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And click the **Build surface between closed strings** tool to build the next surface:





These last two tools are useful for creating surfaces where if you just used the **From linestrings** tool the surface might not be created so accurately. Here you can step by step create each part of the surface by only making a surface between two closed linestrings at a time.

Operations

Merge

The first tool in the Operations section of the Surfaces tab is the **Merge** tool which allows you to merge selected surfaces together:



First select your surfaces:





Then click Merge and your surfaces will have been merged:



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Explode

The next tool is the **Explode** tool which will separate each facet of a surface into its own separate surface:



Select the surface you want to explode:



Then click the **Explode** tool and your surface will have been exploded:



Explode to connected

The next tool is the **Explode to connected** tool which will separate the parts of a surface, that are not physically touching in space but which are connected and form one surface, into separate surfaces:



First select the surface:



Then select the **Explode to connected** tool and the components will have been separated into two different surfaces:



Flip

The next tool is the **Flip** tool which will flip the orientation of facets of a surface so that the surface can be exported to another system or so that it can merge with another surface:



First select the surface:



Then click the **Flip** tool and your surface facets will have been flipped in orientation (**Note**: this is not a change you would physically see but it does occur):



Close

The next tool is the **Close** tool which will close a selected surface:



First select the surface:



Then click Close and your surface will be closed:



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Contour/Section

The next tool is the **Contour/Section** tool which allows you to create contours/sections for any surface:


First select your surface:



Then open the tool which will bring up the following dialogue:

Contouring / Section properties					
Direction X:	0.000	Start Level:	0.000 🛉 🗌 Pick		
Y:	0.000	Interval:	10.000		
Z:	1.000	Count:	10 📫		
	Pick Flip	End Level:	100.000 🛉 🗌 Pick		
Make clo	sed polygons	Compute From Selected			
Choose dir	ection and if needed start/e	Contour			

First you can choose the direction of the contours/sections (in this example I will leave it at the default):

Contouring / Section properties						
Direction X:	0.000	-	Start Level:	0.000	Pick	
Y:	0.000	-	Interval:	10.000	-	
Z:	1.000	-	Count:	10 🜲		
	Pick	Flip	End Level:	100.000	🗧 🗌 Pick	
Make cl	Make closed polygons				Compute From Selected	
Choose direction and if needed start/end levels					Contour	

Optionally you can tick on the **Pick** box and click in your scene to choose your directions:

Contouring /	Section properties		x		
Direction X:	0.000	Start Level:	0.000		
Y:	0.000	Interval:	10.000		
Z:	1.000	Count:	10 📫		
	Pick Flip	End Level:	100.000		
Make clo	osed polygons	Compute From Selected			
Click on first direction point in scene					

Clicking the **Flip** button will reverse the directions:

Contouring /	Section prop	erties			x
Direction X:	0.000	-	Start Level:	0.000	🖨 🗌 Pick
Y:	0.000	-	Interval:	10.000	
Z:	-1.000	-	Count:	10 🜲	
	Pick	Flip	End Level:	100.000	Pick
Make clo	sed polygons			Compute From	Selected
					Contour

Next you can choose the level at which you would like the contours/sections to start:

Contouring / Section properties					
Direction X:	0.000	-	Start Level:	0.000	🗧 🗌 Pick
Y:	0.000	-	Interval:	10.000	÷
Z:	1.000	*	Count:	10 🜲	
	Pick	Flip	End Level:	100.000	🗧 🗌 Pick
Make closed polygons			Compute From Selected		
Choose direction and if needed start/end levels Contour					

Optionally you can tick on the **Pick** box and then click in your scene to choose the **Start Level**:

Contouring /	Section prope	erties			x
Direction X:	0.000	-	Start Level:	0.000	E Pick
Y:	0.000	-	Interval:	10.000	÷
Z:	1.000	÷	Count:	10 🜲	
	Pick	Flip	End Level:	100.000	🗧 🗌 Pick
Make clo	Make closed polygons				Selected
Click on start level point in scene Contour					

Then choose how much of an interval you would like between each contour/section:

Contouring / Section properties						
Direction X:	0.000	-	Start Level:	0.000	≑ 🗌 Pick	
Y:	0.000	÷	Interval:	5.000	*	
Z:	1.000	▲	Count:	10 🜲		
	Pick	Flip	End Level:	50.000	🖨 🗌 Pick	
Make closed polygons				Compute From Selected		
Choose direction and if needed start/end levels Contour						

Then choose how many contours/sections you would like to be made:

Contouring / Section properties						
Direction X:	0.000		Start Level:	0.000	🖨 🗌 Pick	
Y:	0.000		Interval:	5.000		
Z:	1.000	-	Count:	6		
	Pick	Flip	End Level:	30.000	🜩 🗌 Pick	
Make clo	Make closed polygons				Selected	
				[Contour	

Next you can choose what level you would like the contours/sections to end at (this will be adjusted automatically on changing the **Count** field):

Contouring / Section properties ×						
Direction X:	0.000	-	Start Level:	0.000 🖨 🗆 Pick		
Y:	0.000	*	Interval:	5.000		
Z:	1.000	* *	Count:	6		
	Pick	Flip	End Level:	30.000 Pick		
Make clo	Make closed polygons			Compute From Selected		
				Contour		

Optionally you can tick on the **Pick** box and click in your scene to choose the **End** Level:

Contouring /	Section prop	erties			x
Direction X:	0.000	-	Start Level:	0.000	Pick
Y:	0.000	-	Interval:	5.000	-
Z:	1.000	÷	Count:	6	
	Pick	Flip	End Level:	30.000	😫 🗹 Pick
Make clo	Make closed polygons				elected
Click on end level point in scene					

Clicking on the **Compute From Selected** button will compute start and end levels from the selected surface (if the parameters you have entered in make sense, then nothing will change):

Contouring /	Section prope	rties			x
Direction X:	0.000	-	Start Level:	0.000	🜩 🗌 Pick
Y:	0.000	-	Interval:	5.000	*
Z:	1.000	-	Count:	6 🜲	
	Pick	Flip	End Level:	30.000	🜩 🗌 Pick
Make clo	Make closed polygons				Selected
					Contour

Finally click Contour:

Contouring /	Section prope	erties			x
Direction X:	0.000	-	Start Level:	0.000	🖨 🗌 Pick
Y:	0.000	-	Interval:	5.000	•
Z:	1.000	-	Count:	6 🜲	
	Pick	Flip	End Level:	30.000	😫 🗌 Pick
Make clo	Make closed polygons			Compute From S	elected
					Contour

Your surface has now been contoured:



If you want to make closed polygons between levels instead of contours then make sure to have **Make closed polygons** ticked on before contouring:

Contouring /	Section prope	rties			×
Direction X:	0.000	* *	Start Level:	0.000	🜩 🗌 Pick
Y:	0.000	-	Interval:	6.000	* *
Z:	1.000	÷	Count:	5	
	Pick	Flip	End Level:	30.000	🜩 🗌 Pick
Make clo	sed polygons			Compute From Se	elected
Choose dir	ection and if n	eeded start/e	nd levels		Contour

Cut and fill

The next tool is the **Cut and fill** tool which will calculate how much one surface cuts (goes into) and fills (goes over) another:



You would need a base surface and an over or underlying surface to do this operation:



Then you would open the tool which brings up the following dialogue:

Base Surfaces New Surfaces Perimeter Levels Result Surfaces	Cu	t and Fill							x				
Drag a column header here to group by that column Geometry Type T = Add Selected Clear	Bas	e Surfaces	New Surfaces	Perimeter	Levels	Result Surfaces							
Geometry Type	Dra	Drag a column header here to group by that column											
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First select your base surface:



Then in the **Base Surfaces** tab click **Add Selected** to put in the geometries of the base surface:

Cu	t and	Fill						×
Bas	e Surf	aces New Su	faces	Perimeter	Levels	Result Surface	s	
Dra	g a co	lumn header he	re to g	roup by that	: column			Q
	Geom	letry	Layer		Lengt	th	Area	Volume
т	=		RBC		=		=	=
•	+	TIN Z(((268	BaseS	urface		0	97158.4670870002	28040.5032270371
		~						
		42						
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	Add	Selected	Cle	ar				
			Cito					

Next select your over or underlying surface:

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Then go to the **New Surfaces** tab and click **Add Selected** to put in the geometries for the surface:

Cut	t and Fill				×							
Bas	e Surfaces New Sur	<mark>faces</mark> Perimeter Le	evels Result Surfaces	S								
Dra	Drag a column header here to group by that column											
	Geometry	Layer	Length	Area	Volume							
Ŧ	=	RBC	=	=	=							
•	H TIN Z(((274	TopSurface	0	99817.084291657	164509.713664492							
												
	Add Selected	Clear										

Next, optionally, if you only wanted to do the cut and fill operation within a certain perimeter then you would select the polygon that defines such a perimeter on the surface and then add it in here by the **Perimeter** tab:

Cut and Fill				×
Base Surfaces	New Surfaces	Perimeter	Levels	Result Surfaces
Perimeter Ge	ometry			
				^
				~
Add Selec	cted Cle	ear	Zoom	

Next, in the **Levels** tab, if you just want to do the cut and fill operation on one level then click **Cut and Fill** (The **Cell Size** is by default 10 but can be changed, these are the cells used between the surfaces in doing the calculation, the smaller the cell the more precise the calculation):

(Cut a	nd Fill							x
B	lase (Surfaces	New Surfaces	Perimet	ter Levels	Result Su	urfaces		
		ID		From		То		Cut	Fill
	*								
		0		Min:		Max:		Total:0.00	Total:0.00
							_		
		Size: 10	0.0	0	Clear	Auto Set	Cu	t and Fill	

Cu	t and Fill					x
Ba	se Surfaces	New Surfaces Perim	eter Levels	Result Surf	faces	
	ID	From		То	Cut	Fill
	• 1	1577.67		1598.16	5891.57	142003.46
3	*					
	1	Min:1,577.67	Max:1	l,598.16	Total: 5,891.57	Total: 142,003.46
(Cell Size: 1	0.0	Clear	Auto Set	Cut and Fill	
Cut	t and fill co	mplete				.:

The elevations **From** and **To** are populated together with the square meters for the **Cut** and **Fill**.

In the **Result Surfaces** tab are the resulting Cut and Fill surfaces together with their volumes, to create a layer out of these click **Create Layer**:

Cu	t and Fill							x
Bas	e Surfaces	New Surfaces	Perimeter	Levels	Result Surfaces			
Dra	g a column h	neader here to g	roup by that	column				Q
	Geometry	1	Cut/Fill		Volume		Closed	
т	=		RBC		=			
•	TIN Z(((24	55.63 -2888	Cut			4106.300		
	TIN Z(((250	05.63 -2888	Fill			286.360		
	Create Laye							
Cut	and fill cor	mplete						



You can then theme this layer to clearly see the cut and fill:

Layer Properties	- New Layer X
General	Themes Colours Thickness/Size Heat Map Images ImageSizes Charts Scene Tips
Data	
Styling	Colour Column: Type
Text	
Thematics	Colour based on text values Colour based on number ranges
Links	Choose Unique Colours Clear Sort Ascending Sort Descending
Projection	Value Colour
Input Transform	Cut 0, 236, 255 -
Event Scripts	Fill 255, 75, 193
Editing	
ОК	Apply Cancel
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If you want to do the cut and fill on levels then you can set this in the Levels tab by clicking Auto Set and then putting in the number of levels you want by Number of levels:

Cut and Fill							
Base Surfaces	New Surfaces	Perimeter	Levels	Result Su	Infaces		
ID		From		То		Cut	Fi
*							
	Au In Fr To N	to calc leve terval: om: o: umber of lev OK	els 2 [1578 7els: 10	3		Calc O	
0		Min:		Max:		Total:0.00	Total:0.00
Cell Size: 1	0.0	Clea	ar	Auto Set	Cut	and Fill	

Then click **OK** and then **Cut and Fill** and your results are now on levels:

Surfaces	New Surfaces	Perimeter	Levels	Result Su	rfaces	
ID	F	rom		То	Cut	Fill
1	157	7.67		1579.72	211.24	20235.06
2	1579	9.72		1581.77	2917.72	52449.90
3	158	1.77		1583.82	2762.60	42871.00
4	1583	3.82		1585.87	0.00	17733.18
5	1583	5.87		1587.92	0.00	7086.92
6	1583	7.92		1589.96	0.00	1560.93
7	1589	9.96		1592.01	0.00	66.46
8	1593	2.01		1594.06	0.00	0.00
9	1594	4.06		1596.11	0.00	0.00
10	1596	5.11		1598.16	0.00	0.00
10	Min:1,57	7.67	Max:	1,598.16	Total:5,891.57	Total: 142,003.46
Size: 10	0.0 🖨	Clea	r	Auto Set	Cut and Fill	
	urfaces ID 1 2 3 4 5 6 7 8 9 10 10 Size: 1	urfaces New Surfaces I ID F 1 1577 2 1579 3 1583 4 1583 5 1583 6 1583 7 1583 8 1592 9 1594 10 1596 Size: 10.0	ID From 1 1577.67 2 1579.72 3 1581.77 4 1583.82 5 1585.87 6 1587.92 7 1589.96 8 1592.01 9 1594.06 10 Min:1,577.67	urfaces New Surfaces Perimeter Levels ID From 1 1577.67 2 1579.72 3 1581.77 4 1583.82 5 1585.87 5 1585.87 6 1587.92 7 1589.96 3 1592.01 9 1594.06 10 1596.11 10 1596.11 10 1596.11 10 1596.11 10 1596.11 10 1596.11 10 1596.11 10 1596.11 10 1596.11 10 10 1596.11 10 10 1596.11 10 10 10 1596.11 10 10 1596.11 10	urfaces New Surfaces Perimeter Levels Result Surfaces ID From To 1 1577.67 1579.72 2 1579.72 1581.77 3 1581.77 1583.82 4 1583.82 1585.87 5 1585.87 1587.92 6 1587.92 1589.96 7 1589.96 1592.01 8 1592.01 1594.06 9 1594.06 1598.16 10 Min: 1,577.67 Max: 1,598.16 Size: 10.0 Clear Auto Set	urfaces New Surfaces Perimeter Levels Result Surfaces ID From To Cut 1 1577.67 1579.72 211.24 2 1579.72 1581.77 2917.72 3 1581.77 1583.82 2762.60 4 1583.82 1585.87 0.00 5 1585.87 1587.92 0.00 6 1587.92 1589.96 0.00 7 1589.96 1592.01 0.00 8 1592.01 1594.06 1596.11 0.00 10 Min:1,577.67 Max:1,598.16 Total:5,891.57 Size: 10.0 Clear Auto Set Cut and Fill

Edit

Delete Facets

The **Delete Facets** tool allows you to delete facets of a surface:

<mark>≮</mark> ≰ 20 ⊠	
Edit	-12
Delete	Facets

Before using this tool make sure that your surface layer has **Editable** ticked on in its Layer Properties box:

Layer Properties	- Surface	×
General	Description: Surface	
Data	Display Layer (Will render on Map, otherwise just holds data) Reload	
Styling	Display from Scale: 0	
Text		
Thematics		
Links	Selectable Snapable Editable Include in legend Background layer	
Projection	Mnemonic Display	
Input Transform	Image: Change Clear Dimension: 3	
Event Scripts		
Editing		
Colour Palette		
ОК	Apply Cancel	

Select the tool and then click on the facets of your surface that you want to delete:





Delete Vertex

The **Delete Vertex** tool allows you to delete vertices from your surface:



Make sure **Editable** is ticked on in the layer before using the tool:

Layer Properties	- Surface X
General	Description: Surface
Data	Display Layer (Will render on Map, otherwise just holds data) Reload
Styling	Display from Scale: 0 + to: 6,000,000 +
Text	Transparency:
Thematics	
Links	\square Selectable \square Snapable \square Editable \square Include in legend \square Background layer
Projection	Mnemonic Display
Input Transform	Image: Change Clear Dimension: 3
Event Scripts	
Editing	
Colour Palette	
ОК	Apply Cancel

Select the tool and then click on the vertices you would like to delete from your surface:





Flip Edge

The next tool is the Flip Edge tool which allows you to flip the edges of a surface:



Make sure **Editable** is ticked on in the layer before using the tool:

Layer Properties	- Surface	<
General	Description: Surface	
Data	Display Layer (Will render on Map, otherwise just holds data) Reload	
Styling	Display from Scale: 0 + to: 6,000,000 +	
Text	Transparency:	
Thematics		
Links		
Projection	Mnemonic Display	
Input Transform	Image: Change Clear Dimension: 3	
Event Scripts		
Editing		
Colour Palette		
ОК	Apply Cancel	

Select the tool and then click on the edges you want to flip in your surface:

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Trim Surface

The Trim Surface tool can be used to trim off unwanted parts of a surface:



First select the surface you want to trim:



Then open the Trim tool which will bring up the following dialogue:

Trim Surfac	e		x
Distance:	<u> </u> 1.0000	-	Trim Selected

Here you are choosing the distance of edges of the facets of your surface beyond which you would like the facets to be trimmed. For example, here I want any facets with edges over 100 meters long to be trimmed, once you have entered in your distance click **Trim Selected**:

Trim Surfac	e		x
Distance:	100.0000	* *	Trim Selected





And as you can see my surface has been trimmed.

Extract

The Extract section of the Surfaces tab has tools to extract the boundaries of surfaces and also to split surfaces.

Split equal volumes



The Split equal volumes tool allows you to split one or more surfaces that you select, into equal volumes based on the parameters you set.

First, select the surface or surfaces using one of the selection tools:


Next, you will need to make sure you have an active layer for the split surfaces to go into. You can make an existing layer active (by right clicking on the layer and selecting "Active") or add a new one.

To add a new one, you can click the "Add layer" button in the quick access toolbar:

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Then, give the layer a name in the Description field of the Layer Properties box, then in the Data tab choose the layer to be created with an ID and Description column, then click Create and OK on the Layer Properties box:

New Layer	>	<
General	Description: Split Blocks	
Data	✓ Display Layer (Will render on Map, otherwise just holds data) Reload	٦
Styling	Display from Scale: 0 🔹 to: 6 000 000 000 🜩	
Text	Transparency: - +	
Thematics	🛩 Selectable 🕑 Snapable 🗌 Editable マ Include in legend 🔲 Background layer	
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Event Scripts	Mnemonic Display	
Editing	Image: Change Clear	
All Properties		
Colour Palette		
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New Layer			×
General			
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Finally, make the newly added layer Active, by right clicking on the layer and selecting "Active", so it can receive the surfaces we will split:



You can now open the Split equal volumes tool. It will bring up the following dialogue:

Split surfaces into equal volumes	×
Direction (x y z):	Scene Y axis Scene Z axis
Maximum volume: 0,00	
Ready	Split

The Direction (x y z) field can be specified manually, or you can get the Y or Z axis of your current scene by clicking the "Scene Y axis" or "Scene Z axis" button.

I will click the "Scene Y axis" button so that the direction of the split is in my Y axis direction:



Next, you will specify the maximum volume of each split section when the surface is split.

Using the Inspector tool I can see the volume of my current surface is approximately 300,000 m3 and so I will put a maximum volume of 100,000.



I can now go ahead and click the "Split" button and my surface will be split accordingly:

Split surfaces into equal volumes x						
Direction (x y z):	-0.995086482752251 -0.0645554€ Scene Y axis	Scene Z axis				
Maximum volume:	100000,00					
Split 1 surfaces into 4 parts		Split				

The split has now been done. To see the result, first clear your selected items in the scene:



Then turn off your original layer with the surface so that only the layer with the new split surface is showing.

Then using one of the selection tools you can now select each part of the surface that it has now been split into:



If you go to the Selection tab and click "Isolate Selected" it will then just show the exact section that you have selected:







To reshow the hidden items simply click the "Rest Hidden" button in the Selection tab:



If you right click on the split surfaces layer you will see the data table for it with the 4 split sections that it was split into.

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	~	Main							
	Filter (Colum Refre	Graphics Ins sh	 Inplace ~ Delete Properties 	C Zoom Zoom and Highlight	 Highlight All Un Highlight All Highlight Selected 	[] Un Highlight Selected	Copy	Print	
Ŭ	Filte	er	Edit	Ū	Selection		Output		^
Dra	g a colu	umn heade	er here to group b	y that column					Q
	ID	Descripti	on						
Ŧ	=	RBC							
•									

You can then capture IDs and Descriptions for the different split surfaces by typing them in the Layer Data Grid. For more data on working in the data grid please refer to the Layer Data Grid Guide.

Split



The "Split" tool will allow you to do a manual split of a surface that you select.

It will by default do the split in the Y axis direction and it will allow you to see what the volume split would be when you click on different parts of the surface before you go ahead and do the split.

First, select the surface or surfaces using one of the selection tools:



Next, you will need to make sure you have an active layer for the split surfaces to go into. You can make an existing layer active (by right clicking on the layer and selecting "Active") or add a new one.

To add a new one, you can click the "Add layer" button in the quick access toolbar:



Then, give the layer a name in the Description field of the Layer Properties box, then in the Data tab choose the layer to be created with an ID and Description column, then click Create and OK on the Layer Properties box:

New Layer		×
General	Description: Split Blocks	
Data	Display Layer (Will render on Map, otherwise just holds data)	Reload
Styling	Display from Scale: 0 + to: 6 000 000 000 +	
Text	Transparency: - +	
Thematics	🗸 Selectable 🧹 Snapable 🗌 Editable 🗹 Include in legend 🗌 Background layer	
Projection	Read Only Data Read Only	
Input Transform	🕑 Publish 🛛 🕑 Publish Readonly 🛛 🕗 Publish Data Readonly	
Event Scripts	Mnemonic Display	
Editing	Image: Change Clear	
All Properties		
Colour Palette		
ОК	Apply Cancel	

New Layer	×
General	
Data	Layer type: None ~
Styling	Settings
Text	Columns Initialization
Thematics	Create
Projection	Laver Columns
Input Transform	Field Name Type
Event Scripts	Geometry
Editing	$ 44 + 4 \text{ Record 1 of } 3 + 33 + 34 + 7 \neq 4 \neq$
All Properties	Geometry Extraction
	 Autoload Fit on Autoload Dynamic Load Connections Choosepredefined connection settings:
Colour Palette	
ОК	Apply Cancel

Finally, make the newly added layer Active, by right clicking on the layer and selecting "Active", so it can receive the surfaces we will split:

Layers	< 🍉 🕈 🗙			
Description				
- 🗸 🛛 🕸 S	plit Blocks			
≻⊽• 🗙	Properties			
	View Data			
	Isolate			
0	Zoom fit			
\times	Remove layer			
	Save +			
*	Selection +			
	Theme			
\odot	Text Labels			
R	Bookmarks +			
đ	Сору			
ĥ	Paste			
	Advanced +			
\checkmark	Active			
X	Update from worksheet			
-	Move to worksheet			
A	RouteXL >			

You can now open the "Split" tool.

Split surfaces manually						
	Volumes	Replace	Кеер			
Above:	0,00		\checkmark	Show volumes or	n dick	
Below:	0,00		\checkmark			
Ready					Split	

The "Above" field will show what the volume of the higher elevation section of the surface split will be and the "Below" field will show the volume of the lower elevation section of the split.

Check on the "Show volumes on click" box and then as you click on different parts of your surface the volumes will populate. Once you are happy with the Above and Below breakdowns you can go to the next step.



The "Replace" and "Keep" checkboxes work as follows. You can choose to have either of the two halves of the surface *replace* that part in the original whole surface. You can also choose to keep only one of the halves of the surface or both. If you have "Replace" checked on for either part, then the "Keep" checkboxes will not apply and just the section that replaces will be kept.

In this example I will keep both parts and will not replace the original surface.

Split surfaces manually x							
	Volumes	Replace	Кеер				
Above:	104505,30	•	\checkmark	Show volumes or	n dick		
Below:	203943,41		\checkmark				
Ready					Split		

You can then go ahead and click the "Split" button and the newly split surfaces will be added to your active layer.

Then using one of the selection tools you can now select each part of the surface that it has now been split into:



If you go to the Selection tab and click "Isolate Selected" it will then just show the exact section that you have selected:





To reshow the hidden items simply click the "Rest Hidden" button in the Selection tab:



If you right click on the split surfaces layer you will see the data table for it with the 2 split sections that it was split into.

You can then capture IDs and Descriptions for the 2 split surfaces by typing them in the Layer Data Grid. For more data on working in the data grid please refer to the Layer Data Grid Guide.

đ	T Layer Data: Split Blocks					• –		×	
[v	Main							
~	Filter	Graphics	🎲 Inplace 🗸	Q Zoom	🧮 Highlight All		🖒 Сору	😳 Print	
	Colum	nns	😢 Delete	📿 Zoom and Highlight	📘 Un Highlight All	🚦 Un Highlight Selected	Tepy Html	_	
₩.	Refre	sh	🔓 Properties	👑 Pan	🛋 Highlight Selected		Export to Exc	el Entre Pivot	
	Filte	er	Edit		Selection		Outpu	:	^
Dra	g a col	umn heade	er here to group b	y that column					Q
	ID	Descripti	on						
т	=	RBC							
	1	Section1							
0	2	Section2							

Tips and Extra Information

Volumetrics

You can get volume and other measurements of your surfaces in a couple of ways.

Selection

Simply select the surface using one of the selection tools. Then, click on the Selected Items box where it shows the number of selected items:



This will bring up data about the selected object including Area and Volume. Units are by default always in meters.

Se	Selected Objects ×									
Dra	Drag a column header here to group by that column									
	Geo Layer Length Area Volume									
Ŧ	=	RBC	=		=		—			
+	∃	Extruded Surfaces		0,0000		80 573,8306		871 155,1169		

Inspector Tool

You can use the Inspector tool to get detailed measurement information about your surface.

Launch the Inspector tool, then click on the surface in the scene and the Inspector window will populate with information about the selected object. Then go to the Measurements tab of the Inspector window and you will see detailed measurement information about the object. Units are by default always in meters:



1 Item Properties 1 of 2	
Main P Search	
Copy Geometry Edit Geometry	
Edit Selection Navigation	^
Data Linked Data Measurements Geometry Profile Vertices Images	
Measurements	
Length (metre)	0,000
Area (metre2)	80 573,831
Volume (metre3)	871 155,117
Centroid X	593 687,986
Centroid Y	1 216 816,760
Centroid Z	217,456
Dip Direction (degrees)	45,9119
Dip (degrees)	4,7281
Vertices	118370
Geometries	1
Bounds	593522.31731556
Valid	~
Closed	1
Ready	

Adding Columns in the Layer Data Grid

If you want to actually store the volume or area etc. information in the data table of the surface layer, you can add a column as follows.

Right click on the layer and select "View Data":

≻ 🗸 ● 👄 Extruded Surfaces								
	⋇	Properties						
		View Data						
		Isolate						
	Q,	Zoom fit						
	\times	Remove layer						

Right click in the column header area of the grid and select "Add Stored Column":



Give the column a name and make sure it is of a number type; Double Precision is normally a good type to choose for number columns:

Column Propert	ies x
Column Properties	Initial Values
Column Name:	Volume
Type:	Double Precision
Width:	-1
Format:	~
	🗌 Read Only 🖌 Visible 🗌 Required 🗌 Key 🗌 Unique
	Lookup values from a layer or list
	ОК

Go to the Initial Values tab and drop down on "Insert Calculation", then choose the calculation you want such as "Volume (m3)":

Column Properties		x
Column Properties Initial Value	S	
Insert Column 👻	Insert Calculation 🔹 Check	
	Selected	
	Visible	
	Length (m)	
	Length (km)	
	Area (m2)	
	Area (km2)	
	Volume (m3)	
	Distance (m)	
· · · · ·	VertexCount	
	lsClosed	ОК
	Constant Trans	

Finally, click OK and the column will be added:

	-
Column Properties	ĸ
Column Properties Initial Values	
Initial Value Expression	
Insert Column 🔻 Insert Calculation < Check	
Manager.ProjectionData.ToCartesian(Row.Geometry).Volume()	
	1
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1	-			Layer Data: Extruded Surfaces	6	3 —		×
	- Main	₽ Search						
v	Filter Graphics	s 🎼 Inplace	e v 🔍 Zoom	📕 Highlight All	C) Co	ру		
	Columns	🙁 Delete	Q Zoom	and Highlight 🛛 🙀 Un Highlight All 🛛 🚦 Un Highlight Select	ted 🔚 Co	py Html	Print	
ii.	Refresh	🔓 Proper	ties 👋 Pan	Highlight Selected	Exp	port to Exce	el	
	Filter	Edit		Selection		Output		^
Dra	g a column hea	der here to gro	up by that colum	1				Q
	Geometry	Id	Volume					
т	=	RBC	=					
•	TIN Z (((593	Тор	308448,714					
	TIN Z (((593	Bottom	871155,116					
				•				

You can then add more columns following the steps above for other calculations such as Area.

Warning: If your layer is externally referenced, meaning it is pointing to a file stored elsewhere on your computer and not internalized into the project, then when you add new columns to the layer data grid they will not automatically be remembered the next time you reopen your project and the file is reloaded. You will either need to save the layer by right clicking and selecting Save>Save Layer Data, in order to save the new columns back to the original external file, or alternatively, you will need to internalize the layer so that it is no longer externally referenced by right clicking on it and selecting Advanced>Make Internal.

DirectX

When using SurfaceIQ to create various surfaces the best renderer to use is DirectX. This renderer is higher performance than GDI Plus and shows a smoother surface whereas GDI plus will show the triangulated irregular network on the surface:





To set the renderer go to **Scene Properties**:

Spatial	XL								
AB	Data	View	Draw	Edit	Selection	Tools			
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Main View									
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Scene Properties									
	Carl Stand Barran								

And in the **Display** tab by **Renderer** you can choose the renderer:

Scene properties ×							
Display	Background Colour:	White		Ŧ	Flip colours same		
Projection	Show Axes:						
Perspective	Renderer:	DirectX	~				
Performance	Fill mode:	OpenGL GDIPlus					
Editing	Show Crosshair:	DirectX	2	I			
Coordinate Grid	Crosshair colour:	Red	<u></u>	Ŧ			
Scene Tips	Crosshair thickness:	1	÷				
Legend/Scale	Draw time limit (s):	3	÷				
	L						
	Save for all scenes	Apply		OK	Cancel		

Snapping Depth



In using any of the snapping tools sometimes you might find that you are unable to locate a point to snap to on your surface and in this case it means your snapping depth is set too low. To fix this go to **Scene Properties**, **Editing** tab, and by **Snapping depth** you can change this to a higher amount:



Scene properties ×						
Display	Active depth:	0.00	* *			
Projection	Selecting resolution:	3 ‡				
Perspective	Snapping depth:	100.00	÷			
Performance	Vertical tolerance:	1000.00	* *			
Editing						
Coordinate Grid						
Scene Tips						
Legend/Scale						
	Save for all scenes	Apply	ОК	Cancel		

Scene prop	Scene properties ×						
Display	Active depth:	0.00 ‡					
Projection	Selecting resolution:	3 ‡					
Perspective	Snapping depth:	1,000,000]				
Performance	Vertical tolerance:	1000.00 ‡]				
Editing							
Coordinate Grid							
Scene Tips							
Legend/Scale							
	Save for all scenes	Apply	ОК	Cancel			

Coordinate Grid

In your scene you can turn on a coordinate grid which can be useful when working with surfaces, to do so got to **Scene Properties**, **Coordinate Grid** tab:

Spatial	XL							
AB	Data	View	Draw	Edit	Selection	Tools		
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Main View								
	L 👀 🕅	S 🔅	《《 》 III	- 🏀 -	*			
Scene Properties								
· I I A CONTROLLING								

Scene properties X					
Display	Show Coordinate Grid:				
Projection	Width:		1.000 🌻	Set to current view	
Perspective	Height:		1.000 🌻	1 1 1 1	
Performance					
Editing	XAxis		PrimeThought.Spatial.VU.Dis		
Coordinate Grid	> YAxis		PrimeTh	nought.Spatial.VU.Dis	
Scene Tips	Layout			<u>∧</u> .	
Legend/Scale					
Save for all scenes Apply OK Cancel					

Make sure to have **Show Coordinate Grid** ticked on and then you can choose various settings for the grid below, when done click **OK**:

Scene properties X					
Display	Show Coordinate Grid: 🔽				
Projection	Width:	2.000 🗘 Set to current view			
Perspective	Height:	2.000 ‡			
Performance	ταγούτ	~			
Editing	> Base	000			
Coordinate Grid	Subintervals	~			
	SubintervalColour	Gray -			
Scene Tips	SubIntervalSize	1			
Legend/Scale	XSubIntervals	1			
	YSubIntervals	1			
Save for all scenes Apply OK Cancel					



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