# Setting up an Arc Hydro based Geoprocessing Service

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Prepared by

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## 1. Prerequisites

### 1.1. Software

- ArcGIS Desktop 10.2.x with Spatial Analyst extension.
- ArcGIS Server 10.2.x with Spatial Analyst extension.
- Arc Hydro Tools 10.2 (64bit): install the Arc Hydro Tools 10.2 for ArcGIS 10.2 by running the msi file on a computer having ArcGIS Desktop and ArcGIS Server 10.2.

## 1.2. Post Installation

#### 1.2.1 Toolbox

• Copy the Arc Hydro Tools toolbox installed by the setup under the ArcGIS Desktop toolboxes folder into the server toolbox folder so that the server can have permissions to access the tools from the Arc Hydro toolbox used in the published service. (If you have a prior version of Arc Hydro installed, make sure that the tool boxes are replaced by the installation program with the latest toolboxes. Some times during uninstall/install, the toolboxes are not deleted and not updated).





#### **1.2.1 ArcGIS User Permissions**

• Give permissions to the ArcGIS user to the WaterUtils folder and subfolder both under c:\program files and C:\Program Files (x86).

Permissions for WaterUtils		×			
Security					
Object name: C:\Program Files (	Object name: C:\Program Files (x86)\ESRI\WaterUtils				
Group or user names:					
& CREATOR OWNER					
SYSTEM					
& Administrators (CHRISTINED	8\Administrators)				
👗 ArcGIS Server Account (CHF	RISTINED8\arcgi	s)			
& Users (CHRISTINED8\Users)	)				
StrustedInstaller					
	Add	Remove			
Permissions for ArcGIS Server Account	Allow	Deny			
Full control					
Modify					
Read & execute	<b>V</b>				
List folder contents	<b>V</b>				
Read	<b>V</b>				
Leam about access control and pe	ermissions				
ОК	Cancel	Apply			

Figure 1-3 - arcgis Permissions on C:\Program Files (x86)\ESRI\WaterUtils

Permissions for WaterUtils		_	x
Security			
Object name: C:\Program Files	ESRI\WaterUtils		
Group or user names:			
& CREATOR OWNER			۱ ۲
& SYSTEM			
Administrators (CHRISTINED	8\Administrators)		
ArcGIS Server Account (CHF	RISTINED8\arcgis	)	
& Users (CHRISTINED8\Users	;)		
🚜 TrustedInstaller			
	A <u>d</u> d	<u>R</u> emove	
Permissions for ArcGIS Server Account	Allow	Deny	
Full control		A	
Modify			
Read & execute	<b>V</b>		
List folder contents	<b>V</b>		11
Read	<b>V</b>		
Learn about access control and p	emissions		
ок	Cancel	Apply	

Figure 1-4 – arcgis Permissions on C:\Program Files\ESRI\WaterUtils

# 2. Setting up the data used by the geoprocessing service

- Copy the input data used by the service in a directory (e.g. c:\DelineationData).
- Give read access to the arcgis user to the directory and to its content on the disk as well (arcdelinebelongs to the Users group).
- Give yourself full control to the directory and to its content as well.

🗼 Delineati	onData	Propertie	es			×
General S	haring	Security	Previous Vers	sions C	Customize	
Object nar	Object name: C:\DelineationData					
Group or u	iser nam	es:				
& Authe	enticated	Users				
SYST &	ГЕМ					
Admir	nistrator	s (CHRIST	INED8\Admini	strators)		
A Users	s (CHRIS	STINED8\	Users)			
To change	e permis	sions, click	: Edit.		<u>E</u> dit	
Permission	is for Us	ers		Allow	Deny	
Full con	trol					
Modify						
Read &	execute	;		$\checkmark$		=
List fold	er conte	nts		$\checkmark$		
Read				$\checkmark$		
Write						*
For special click Adva	l permiss inced.	sions or ad	vanced setting	js,	Ad <u>v</u> ance	d
Learn abo	ut acces	ss control a	and permission	<u>s</u>		
		0	К	Cancel		pply

**Figure 2-1 – Permissions to Data** 

# 3. Setting up the delineation service

## 3.1. Running the Batch Watershed Processing Tool in ArcMap

- Open a new ArcMap document and add the input data required by the model you want to create. To test the local delineation, add the following input layers:
  - Fdr
  - Str
  - Catchment
  - AdjointCatchment
  - DrainageLine (to help with display only not used in delineation)
- Save the map in the input data folder (e.g. Delineation.mxd in this example)



Figure 1-3-1. Input Data for Local Delineation Service.

• Reset the default target location for Arc Hydro to the database containing the input Catchment feature class using ApUtilities > Set Target Locations and selecting the HydroConfig node in the target location.

🔮 Set target loc	ations for HydroConfig	×		
Application	Map Level Map Name: Layers	•		
Raster Data:	C:\DelineationData\	<b>2</b>		
Vector Data:	:\DelineationData\tutorial.gdb			
	OK Help Cancel			

**Figure 3-2 – Setting Target Location to input geodatabase** 

If you do not have an existing BatchPoint feature class, you can create one using the Batch Point Generation tool (🙁) on the Arc Hydro Tools toolbar.

• Click the Batch Point Generation tool and enters BatchPoint for example as the name of the output Batch Point feature class to create. Click OK.

🔮 Batch Point	Generation
Batch Point	BatchPoint
<u>0</u> K	Help Cancel

The Batch Point feature class is generated in the target vector location and is added into the Table of Contents of ArcMap.



**Figure 3-3 – Batch Point Feature Class** 

• Click on a Drainage Line feature to create a new Batch Point feature.



**Figure 3-4 – Batch Point Generation** 

- In the Catalog window, open the Arc Hydro Tools toolbox under System Toolboxes.
- Browse to the Batch Watershed Delineation Tool located in the Watershed Processing toolset.



**Figure 3-5 – Batch Watershed Delineation Toolset** 

- Double-click the tool to open it.
- Enter the name of the output watershed and watershed point and click OK to run the tool.

Batch Watershed Delineation			x
Input BatchPoint			~
BatchPoint		- 🖻 🖻	
Input FlowDirGrid		_	
fdr		- 🖻 🖻	
Input StreamGrid			
str		- 🖻	
Input SnapStreamGrid (optional)			
str		- 🖻	J
Input Catchment			,
Catchment		I 🖻	J
Input AdjointCatchment			,
AdjointCatchment		I 🖻	J
Clear Existing Features (optional	)		
Watershed			1
Output WatershedPoint			J
WatershedPoint		<b>2</b>	]
			Ŧ
	OK Cancel Environments	Show Help >	·>

**Figure 3-6 – Batch Watershed Delineation User Interface** 

The tool creates the watershed and watershed point and Geoprocessing Results window shows a successful completion of the Batch Watershed Delineation tool.

## 3.2. Publishing the service using ArcGIS Server

• In the Geoprocessing Results window, right-click Batch Watershed Delineation and select Share As > Geoprocessing Service.



Figure 3-7 – Sharing Geoprocessing Service

• Select Publish a service and click Next.



Figure 3-8 – Publish a service

• Select an existing connection in the Publish a Service window or click on to create a new connection if needed.

Choose a connection Select an existing Server type:	connection or create a ne	w one		•
Select an existing Server type:	connection or create a ne	w one		•
Server type:	No Connection Set			
Service name				
BatchWatershed	Delineation			
		< Back	Next >	Cancel

Figure 3-9 – Choose a connection

• If you need to create a new connection, click and select the option "Publish GIS Service" the click Next.



**Figure 3-10 – Publish GIS Services** 

• Enter the Server URL and your user name and password and click Finish.

General		x
Server URL:	http://christined8:6080/arcgis	
	ArcGIS Server: http://gisserver.domain.com:6080/arcgis	
Server Type:	ArcGIS Server	
Staging Folder:	C:\Users\chri3244\AppData\Local\Temp\arcCB36\St	
	Use ArcGIS Desktop's staging <u>f</u> older	
Authentication		
User <u>N</u> ame:	siteadmin	
Pass <u>w</u> ord:	•••••	
	☑ Sa <u>v</u> e Username/Password	
About ArcGIS Server	connections	
	< <u>B</u> ack Finish Car	ncel

**Figure 3-11 – Creating Server Connection** 

The application will validate the new connection and select it in the Publish a Service window.

• Modify the service name if needed and click Next.

Publish a Service			×
Choose a connection			
arcgis on christin	ed8_6080 (publisher)		-
Server type:	ArcGIS Server		
BatchWatershed	Delineation		
Datchwatershed	Delineation		
		< Back Next >	Cancel

Figure 3-12 – New Connection Validated

• Select the folder for you service and click Continue.

Publish a Service	×
Publish service to folder © Use existing folder	[root]
Create new folder	
	< Back Continue Cancel

**Figure 3-13 = Publishing Folder** 

The Service Editor Window is displayed.

rvice Editor	Catholic Made	u 190	<u> </u>
Connection: arcgis on christin	ed8_6080 (publisher)	Service Name: 😰 Import 🐔 Add Result 🤕 Preview 🖌 Analyze	🚛 Publish 🧹
General	General		
Capabilities	General		
Geoprocessing	Service Name:	BatchWatershedDelineation	
Parameters	Connection:	http://christined8:6080/arcgis/admin	
Pooling			
Processes	Type of Server:	ArcGIS Server	
Batch Watershed Delineatior	Type of Service:	Geoprocessing Service	
Input Batch Point		Start service immediately	
Input Flow Direction Grid			
Input Stream Grid			
Input Snap Stream Grid			
Input Catchment			
Input Adjoint Catchment			
Clear Existing Features			
Output Watershed			
Output Watershed Point			
Item Description			
Sharing			

Figure 3-14 – Service Editor Window

• Click Analyze.

The Prepare window shows that 2 types of errors have been found:

- Data Source not registered (high severity)
- Tag missing (low severity)

Prepa	re					□ ×		
🙆 O E	😮 0 Errors    🚹 15 Warnings    🕕 0 Messages    Search Analyze Results							
	Severity	Status	Code	Description	Na Typ	pe Data		
🗉 🛆	High	Unresolved	24032	Data source used by Task Batch Watershed Delineation is not registered with the server and will be copied to the server. AdjointCatchment (14 items)				
Δ	Low	Unresolved	24059	Tags are missing	Bat Too	o Batc		
Status:	Complete			15/15 Items Show	only unresolv	ed items 🕅		

Figure 3-15 – Prepare Window

The arcgis user needs to have access to the data used by the service.

• Right-click one of the Data Source errors and select Show Data Store Registration Page.

Prep	are					
8	) Errors	15 Warnings	(i) 0 Me	ssages	Search Analyze Results	
	Severity	Status	Code	Descriptio	n	
Ξ 🥼	📐 High	Unresolved	24032	Data sourc	e used by Task Batch Watershed Delineation is not r	egi
-	- High	Unresolved	24032	Data sou	I. T.I. D.I.L. W.I. J.D.B	egi
	- High	Unresolved	24032	Data sou	Show Data Store Registration Page	egi
	- High	Unresolved	24032	Data sou	Help	egi
	- High	Unresolved	24032	Data sou	Сору	egi
Statu	- Hiah s: Complete	Unresolved	24032	Data soi	Select All	eai

Figure 3-16 – Show Data Store Registration Page

The Data Store window is displayed.

• Click next to Registered Folder.

Data Stores	
Data Store	
Registered Databases	
	+ -
	×
Registered Folders	
	×
About registering databases and folders	Validata All
	OK Cancel Apply

Figure 3-17 – Data Stores Window

• Enter Delineation Data as Name and browse to the Delineation Data folder. If your data is located on the same path on the ArcGIS Server machines, check the Same as published folder path, otherwise enter the appropriate path. Click OK.

Register Folder	×
Register Folder with the ArcGIS Server	
Register Folder         Register Folder with the ArcGIS Server         Name         DelineationData         Publisher folder path         C:\DelineationData         Server folder path         Image: Server folder	
DelineationData	
Publisher folder path	
C:\DelineationData	Add
Server folder path	
Same as publisher folder path	
C:\DelineationData	Add
About registering your data with ArcGIS Server	
ОК	Cancel

**Figure 3-18 – Register Folder Window** 

The folder is registered with the data store. Click OK to close the window.

Data Stores	×
Data Store	
Registered Databases	
	+ -
	×
Registered Folders	
✓ DelineationData	+
	×
About registering databases and folders	Validate All
	OK Cancel Apply

Figure 3-19 – Validated Data

• Click Analyze again.

Note that there is only one warning left.

• Right-click the warning and select Update Item Description.

Prepare			□ ×
🔞 0 Errors 🛛 🛕 1 Warn	ing 🚺 🚺 0 Messages	Search Analyze Results	R
Sev Stat Cod	e Description		N. T. D.
⚠️ Low Unr 24059 Tags are missin		Update Item Description Help	B T B
		Copy Select All	
Status: Comple	1/1 Items		Show only unresolved items

Figure 3-20 – Update Item Description

• Enter the appropriate tags. Click Analyze again.

Figure 3-21 – Editing Tags

There are no remaining warnings in the Prepare window.

• Click Input Batch Point and set its Input Mode to User Defined value.

onnection: arcgis on christii	ned8_6080 (publisher) Service	Name: 🖳 Impoi	t 🔊 Add Result	💓 Preview 🗸 Anal	yze 🤬 Publish 🥢
General	Input Batch Point				
Capabilities	Name: (required)	Input Batch Poin	ıt		
Geoprocessing					
Parameters	Description: (required)	Input Batch Poin features having	it features to proces IsDone=0 or Null.	s. Tool will process	<u>_</u>
Pooling					· ·
Processes	Type:	Required	Optional		
	Input mode:	User defined val	ue 🔻		
Batch Watershed Delineatior	Coometry Types	Point			
Input Batch Point	Geometry Type:	Point	-		
Input Flow Direction Grid	Schema:				
Input Stream Grid		Field Name	Alias	Field Type	
		Shape	Shape	Point	
Input Snap Stream Grid		OID	OID	OID	
Input Catchment		Descript	Name	Text	
Toput Adjaint Catchmont		BatchDone	BatchDone	Short	
Input Adjoint Catchment		SnapOn	SnapOn	Short	
Clear Existing Features		SrcType	SrcType	Short	
Output Watershed					
Output Watershed Point					
Item Description		🔲 Include featur	es		

Figure 3-22 – User Defined Value Input Mode

• Click Flow Direction Grid and set its Input Mode to User Defined value.

Connection: arcgis on christine	ed8_6080 (publisher) Service	Name: 🖳 Import 🛭 🐔 Add Result 🤕 Preview 🖌 Analyze	🚛 Publish 🧹	
General	Input Flow Directi	ion Grid		
Capabilities	Name: (required)	Input Flow Direction Grid		
Geoprocessing	Description: (required)	Input flow direction grid used to perform a local delineation with	*	
Pooling		the catchment containing the point to delineate.	~	
Processes	Type:	Required     Optional		
Batch Watershed Delineatior	Input mode:	Constant value		
Input Batch Point	Constant value:	fdr	*	
Input Flow Direction Grid				
Input Stream Grid				
Input Snap Stream Grid				
Input Catchment				
Input Adjoint Catchment				
Clear Existing Features				
Output Watershed				
Output Watershed Point				
Item Description				
Sharing		About task parameter settings		

Figure 3-23 – Constant Value Input Mode

- Set all other inputs to Constant Value as well.
- Click Publish.

The publishing process will return a message indicated that the service was successfully processed.



Figure 3-24 – Publishing Successfully Completed Message

The new service is displayed in the Catalog window under the ArcGIS Server connection.



• Save and close the map document.

# 4. Testing the geoprocessing service in ArcMap

- Open a new map document and add the Drainage Line feature class for reference.
- .Browse to the newly defined service and double-click it to open it.
- Click in\_batchpoint\_features and then click on the map on a drainage line feature. Click OK to execute the tool.

man Som	حر
DrainageLine: Vertex	) Solar
Batch Watershed Delineation	
BatchWatershedDelineation::in_batchpoint_features	
OK Cancel Environments Show Help >>	

**Figure 4-1 – Testing Watershed Delineation Service** 

The published model performs the delineation and generates the output OutputWatershed and Output WatershedPoint that are added to the Table of Contents of ArcMap.



Figure 4-2 – Delineated Watershed

# 5. Testing the geoprocessing service using the REST API

## 5.1. Testing the service using REST

• Open a browser and enter the start URL for the ArcGIS Server hosting the published geoprocessing service (e.g. <u>http://christined8:6080/ArcGIS/rest</u>, where christined8 is the name of the server).

This url allows accessing the Service Directory window listing the available services.



Figure 5-1 – Available Services

• Click on the new BatchWatershedDelineation (GPServer) service.

The geoprocessing service is asynchronous. It supports both the REST and the SOAP interface. It has one associated task, Batch Watershed Delineation, which is the geoprocessing tool you published.

a		TT 1	1 1			
Setting iin	an Arc	Hydro	based	geoproc	essino	service.
betting up	an m	iryuro	ouseu	Scoproc	coome	SULVICE

<u>File E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp			• X
SatchWatershedDelineatio × +			
Contristined8:6080/arcgis/rest/services/BatchWatershedDelineation/GPS V C C C Ask Search	☆自	+	<b>⋒</b> ≡
ArcGIS REST Services Directory	Lo	gin   <u>Ge</u> t	: Token
Home > services > BatchWatershedDelineation (GPServer)	Help	API Ref	erence
JSON   SOAP			
BatchWatershedDelineation (GPServer)			
Service Description: Performs batch watershed delineations.			
Tasks:			
<u>Batch Watershed Delineation</u>			
Execution Type: esriExecutionTypeAsynchronous			
Result Map Server Name:			
MaximumRecords: 1000			
Child Resources: Info			
٠			•

• Click the Batch Watershed Delineation task.

The window describes the service and its parameters, as well as the supported API and operation (at the end).

e <u>E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	2
S Task: Batch Watershed Deli × +	
🗧 🕙 christined8:6080/arcgis/rest/services/BatchWatershedDelineation/GPServer, 🤜 C 🖉 - Ask Search 🛛 🔎 🟠 📋 🐥 🏫	=
ArcGIS REST Services Directory Login   Get Token	
Home > services > BatchWatershedDelineation (GPServer) > Batch Watershed Help   API	_
Delineation Reference	
<u>NOSC</u>	
Tack, Patch Watershed Delineation	
Task: Datch watersneu Denneation	
Display Name: Batch Watershed Delineation	
Description: Performs batch watershed delineations.	
Category:	
Hein URL: http://christined8:6080/arcgis/rest/directories/arcgisoutput/BatchWatershedDelineation_GPServer	
/BatchWatershedDelineation/BatchWatershedDelineation.htm	
Execution Type: esriExecutionTypeAsynchronous	
Parameters:	
Parameter: in_batchpoint_features	
Data Type: GPFeatureRecordSetLayer	
Display Name Input Batch Point	
Description: Input Batch Point features to process. Tool will process features having IsDone=0 or	
NUII. Direction: esriCPDeremeterDirectionInput	

Figure 5-2 – Batch Water Delineation Task Description



Figure 5-3 - Batch Water Delineation Task – Supported Operation

• Click Submit Job. This is the operation associated to asynchronous task.

The Submit Job (Batch Watershed Delineation) window allows entering the parameter(s) required to execute the published geoprocessing service.

<u>File Edit View History Bookmarks</u>	<u>I</u> ools <u>H</u> elp				X
Christined8:6080/arcgis/rest/set	vices/BatchWatershedDelineation/GPServer, V C 🖉 🖉 - Ask Search	☆ 🖻	÷	⋒	≡
ArcGIS REST Services Direct	tory	Logir	<u>1   Get</u>	Toke	ם
<u>Home</u> > <u>services</u> > <u>BatchW</u> > <u>submitJob</u>	atershedDelineation (GPServer) > <u>Batch Watershed Delineation</u>		<u>Help</u> <u>Refe</u>	e   <u>AP</u> erence	
Submit Job (Batch	Watershed Delineation)				
Input Batch Point: ( <i>GPFeatureRecordSetLayer</i> )	<pre>"alias": "StcType" } ], "features": [], "exceededTransferLimit": false }</pre>	•			
Options:					
Output Spatial Reference:					
Process Spatial Reference:					
ReturnZ:	© True				
ReturnM:	© True				
Format:	HTML -				
Submit Job (GET) Submit	Job (POST)				

Figure 5-4 – Input Batch Point Parameters (with no coordinates)

• Identify valid x/y coordinates for you input point and replace "features" : [] with: "features" : [{ "geometry" : {"x" : -186172.806, "y" :756661.572}, "attributes" : {"BatchDone" : 0, "SnapOn" : 1}}]

Where x and y are the coordinates of the input point in the same coordinates as the underlying data supporting the delineation (e.g. Albers).

le <u>E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u>	ools <u>H</u> elp			×
🚳 Submit Job (Batch Watersh 🗙	+			
♦ ♦ ④ christined8:6080/arcgis/rest,	/services/BatchWatershedDelineation/GPS ▼ C Ø ▼ Ask Search	☆ 自	<b>↓</b> ∧	≡
ArcGIS REST Services Directo	ry	<u>Login</u>	Get Token	
<u>Home</u> > <u>services</u> > <u>BatchWat</u> <u>Delineation</u> > <u>submitJob</u>	tershedDelineation (GPServer) > <u>Batch Watershed</u>		Help   API Reference	
Submit Job (Batch )	Watershed Delineation)			
Input Batch Point: ( <i>GPFeatureRecordSetLayer</i> )	<pre>],     "features" : [{ "geometry" : {"x" : -186172.806,     "y" :756661.572}, "attributes" : {"BatchDone" : 0,     "SnapOn" : 1}}],     "exceededTransferLimit": false }</pre>	▲ ■ ■		
Options:				
Output Spatial Reference:				
Process Spatial Reference:				
ReturnZ:	🛇 True 🔘 False			
ReturnM:	○ True			
Format:	HTML -			
Submit Job (GET) Submit Jo	bb (POST)			

**Figure 5-5 – Input Batch Point Parameters** 

• Click Submit Job(GET).



**Figure 5-6 – Batch Watershed Delineation Job Status** 

• Click Check Job Details Again to obtain updated information on the Status.

The window contains the status of the job (esriJobSucceeded) as well as the Results in html format.

<u>Eile E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
Sob Details: jad511eed7649 × +	
🗲 🕝 christined8:6080/arcgis/rest/services/BatchWatershedDelineation/GPServer, 🔻 C 🖉 - Ask Search 👂 🟠 自	+ ♠ ≡
ArcGIS REST Services Directory	<u>Get Token</u>
Home > services > BatchWatershedDelineation (GPServer) > Batch Watershed Delineation > jad511eed764940188ad0c8a9b030dec7	Help   API Reference
JSON	
Job Details: jad511eed764940188ad0c8a9b030dec7 (Batch Waters Delineation)	shed
Job ID: jad511eed764940188ad0c8a9b030dec7	
Job Status: esriJobSucceeded	
Results:	
<ul> <li><u>out watershed features</u></li> <li><u>out watershedpoint features</u></li> </ul>	
Inputs:	
• <u>in_batchpoint_features</u>	

Figure 5-7 – Services Results

You can look on the server in the arcgisjobs directory for the folder associated to the job submitted (e.gjad511eed764940188ad0c8a9b030dec7).



#### Note

You can access directly the job submission page for the service by entering the following url <a href="http://christined8:6080/arcgis/rest/services/BatchWatershedDelineation/GPServer/Batch%20Watershed%20Delineation/submitjob">http://christined8:6080/arcgis/rest/services/BatchWatershedDelineation/GPServer/Batch%20Watershed%20Delineation/submitjob</a>

where:

Batch Watershed Delineation is the name of the task in the published geoprocessing service BatchWatershedDelineation.

Submit job is appended because the service is asynchronous.