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BlastLogic

BlastLogic Integration Service

Help Documentation

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The following conventions are typically used in training manuals and guides:

Example	Description
Design > **Object Edit**	Text in bold are commands or options selected from a menu, panel, or button.
Top Down or **Bottom-Up** design method	Text in bold is also used for emphasis, specific terms, tab names, column names, panel group names etc.
`<LEVEL>_SURVEY_POINTS>`	File names or extensions, variables, formulas, text entry, layers, triangulations, databases, scripts, macros, and data such as displayed in the **Report** window, are in `code` font.

Tip: Designates a hint such as an effective use of an option.

Note: Designates a point to draw attention to; an informational comment.

Important: Designates an alert to draw particular attention to.

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1. Introduction

The BlastLogic Integration Service (BLIS) is a server application that facilitates data exchange from third-party databases into the BlastLogic system. Using the BlastLogic Desktop client, you can select loaded drilling events by shift, associate the events with design holes, and validate the as-drilled data. BLIS has a web interface in which you can define source data and target BlastLogic sites.

This document is intended to assist in understanding the system architecture and determining the requirements for interfacing with third-party data sources.

The BlastLogic Integration Service is constrained by the following:

- **Timeliness**

  BLIS can be configured to poll a site-based drilling system every five minutes, but first, to indicate that drilling activities are completed on a given hole, you must constrain the system by the following:

  - Configuring the update frequency of the site-based drilling systems.
  - Ensuring the reliability of each system.

  > **Example:** If an event that flags the relocation of a drill rig from one hole to another was not recorded by a site-based drilling system, then BLIS would not consider drilling as completed until after some configured time period, longer than the polling interval. Hence, the transfer of this drilling data would be delayed.

- **Site operations**

  Optional site processes that affect accurate collection of drilling data may impact the accuracy and completeness of data acquisition. Where these are discovered during the course of implementation, improvements to site processes may be recommended.

  Fields in the imported drilling data that are missing or need to be derived or inferred will be transferred as null (that is, without a value) into the BlastLogic system. This may affect subsequent validation processes in the BlastLogic Desktop client.

  > **Example:** The hole diameter is important in the calculation of charge plans. If the source drilling data does not include a diameter measurement, the calculations within the BlastLogic system will use the design diameter value instead.

- **Source database queries**

To ensure smooth database querying, apply the following configuration:

- Configure BLIS to execute arbitrary queries directly against each source database.
- Create views in each source database to provide the same result as a direct query against the underlying database.
- Make data available in a data warehouse instead of providing direct access to the canonical source database.

  > **Note:** This may provide performance and reliability benefits on a large source database, but it can also result in increased lag time and operational overhead.

- Index source tables and implement views to ensure that query filtering on drill completion time is efficient.

  > **Note:** While Maptek can assist with developing queries, you must create and maintain the source system data views and staging tables.

2. Drilling Data Integration Requirements

The BlastLogic Integration Service (BLIS) can interface with drill navigation systems that make as-drilled data available in a relational database.

The following drill navigation systems have been successfully integrated on customer sites:

- Atlas Copco
- Caterpillar Aquila and Terrain
- FLANDERS ARDVARC
- Leica IMS/Tritronics and Jmineops
- Modular Mining ProVision
- ROCKMA
- Wenco (APS)

Support for other systems can typically be implemented by developing appropriate queries and views.

2.1 Drilling import definition

The BlastLogic system supports importing built-in and custom fields for imported drilling data.

2.1.1 Built-in fields for drilling events

The table below shows the supported built-in fields for drilling events in BlastLogic:

Import field	Data type	Description	Units	Sample	Required
id	Text	Uniquely identifies drilling events.		X8758A86R8	Yes
HoleName	Text	Hole name.		ABCD1234	No
CollarX	Decimal	Collar easting.	metre	10239.22	No
CollarY	Decimal	Collar northing.	metre	20392.45	No
CollarZ	Decimal	Collar elevation.	metre	104.3	No
Depth	Decimal	Drilled hole depth (as measured along the hole, not vertically).	metre	20.2	No
Diameter	Decimal	Hole diameter.	metre	0.5	No
Angle	Decimal	Hole angle.	degree	5.2	No
Bearing	Decimal	Hole bearing.	degree	11	No
Operator	Text	Drill operator's name.		John Smith	No
DrillMachine	Text	Drill rig identifier.		JKR-2	Yes
Comment	Text	Allows free text to be entered against the hole.		Touched coal	No
StartTime	Date-time	Hole drilling start date and time.	UTC	2015-03-20 13:45:10.000	No
CompletedTime	Date-time	Hole drilling completion date and time.	UTC	2015-03-20 13:55:29.001	Yes

Table 2-1 *Supported built-in fields for drilling events in BlastLogic*

2.1.2 Validation

The only import fields (from those listed in the Table 2-1 Supported built-in fields for drilling events in BlastLogic on the previous page) that are mandatory for BlastLogic are **Id**, **DrillMachine**, and **CompletedTime**. The hole name and/or collar position are also necessary to associate a drilling measurement with a design hole using the BlastLogic Desktop client.

Required fields aside, extracted records are never rejected by the BlastLogic Integration Service. The fields presented by the source system are expected to contain data of the appropriate type, such as numeric values in number fields, date and time values in date-time fields.

2.1.3 Transformation

BLIS requires the values from a source to be converted to the units specified in the Table 2-1 Supported built-in fields for drilling events in BlastLogic on the previous page.

Tip: Use the BLIS view adapter query to implement unit conversions and time zone offsets as required.

Important: The spatial coordinate system used by each source system must match the coordinate system configured for the target BlastLogic site.

2.2 Measure while drilling (MWD) import definition

The BlastLogic system supports importing built-in and custom fields for imported MWD data.

2.2.1 Built-in fields for drill measurement

The table below shows the supported built-in fields for drill measurement in BlastLogic:

Import field	Data type	Description	Units	Sample	Required
id	Text	Uniquely identifies the drilling event that owns the drill measurement.		X8758A86R8	Yes
Top	Decimal	The highest point of the drill measurement.	metre	11.3	Yes
Bottom	Decimal	The lowest point of this drill measurement.	metre	11.4	Yes

Table 2-2 *Supported built-in fields for drill measurement in BlastLogic*

2.2.2 Validation

All fields listed in the table in the Table 2-2 Supported built-in fields for drill measurement in BlastLogic on the previous page are mandatory. Other measurement data is imported into custom drill measurement properties defined in the BlastLogic Desktop client.

The fields presented by the source system are expected to contain data of the appropriate type, such as numeric values in number fields, date and time values in date-time fields.

A drill measurement will be rejected if any of the following is true:

- The top is deeper than the bottom.
- A new drill measurement overlaps an existing drill measurement.
- Two new drill measurements overlap each other. In that case, the first drill measurement will be imported and the second drill measurement will be rejected.

2.2.3 Transformation

BLIS requires the values from source to be converted to the units specified in the Table 2-2 Supported built-in fields for drill measurement in BlastLogic on the previous page.

> **Tip:** Use the BLIS view adapter query to implement unit conversions and time zone offsets as required.

2.3 Custom fields definition

You can create custom drilling properties using the BlastLogic Desktop client and then populate them using arbitrary fields that are made available as columns of the source system query.

The table below lists the supported custom property types and source column mappings:

	Source Query Column Types			
Drilling custom property type	**SQL Server**	**Oracle**	**PostgreSQL**	**Values**
Boolean	BIT INT VARCHAR(X) NVARCHAR(X)	NUMBER (1) VARCHAR(X) VARCHAR2(X)	boolean integer varchar(x) varchar(x)	1 == True, 0 == False Not 0 == True, 0 == False "True" == True, "False" = False "True" == True, "False" = False
Float	DECIMAL REAL FLOAT	FLOAT	real double	
String	VARCHAR(X) NVARCHAR(X)	VARCHAR(X) VARCHAR2(X)	varchar(x) varchar(x)	Must comply with the single and multi-line nature of the drilling custom property.
Select	VARCHAR(X) NVARCHAR(X)	VARCHAR(X) VARCHAR2(X)	varchar(x) varchar(x)	Must be a **Select** option identifier registered for the drilling custom property.
Multi-select	VARCHAR(X) NVARCHAR(X)	VARCHAR(X) VARCHAR2(X)	varchar(x) varchar(x)	Must be a comma separated list of **Multi-select** option identifiers registered for the drilling custom property.

Table 2-3 *Supported custom property types and source column mappings in BlastLogic*

Each data source query defines a number of columns, most of which are fixed columns directly supported by BLIS. These are mapped to built-in BlastLogic drilling event or drill measurement properties.

BLIS attempts to map all additional columns to custom properties by matching the column name to the custom property identifier. If a column in the source system does not correspond to a custom property in BlastLogic, the column will be ignored.

The mapping conventions are as follows:

- The name of the data view column must exactly match the BlastLogic drilling custom property identifier.
- **Select** and **Multi-select** option values must exactly match the BlastLogic drilling custom property option.
- As **Multi-select** option values are comma-delimited, BlastLogic custom drilling property schema **Multi-select** option values must not contain commas.
- The type of the source data query column must be convertible to the target custom property type (see table above for more information).
- Null values and empty strings will be ignored and excluded from the custom property values uploaded to the BlastLogic Server.
- Numeric (float) property values must be provided in SI units with respect to the target custom property dimension, but with the following exceptions:
  - **Temperature:** Degrees Celsius.
  - **Angle:** Degrees.

2.3.1 Accuracy

All date and time values maintained in the BlastLogic databases have at least millisecond precision. The **CompletedTime** column is principally used by the BlastLogic system to select drilling records, determine the working shift, and to infer the drilling order. Therefore, millisecond precision is sufficient and minor time drift should not have significant impact.

BLIS extracts drilling events and drill measurements from source systems by filtering on the **CompletedTime** column. The **Id** column is used to uniquely identify a drilling event. The **Id**, **Top**, and **Bottom** columns are used to uniquely identify a drill measurement. The **Id** column of a drill measurement is the identifier of the drilling event that owns the drill measurement.

There is no impact on accuracy in the event of a drill rig losing connectivity, buffering the drilling data and subsequently uploading it. The value of the **Id** column must be unique to each hole actually drilled and must be stable.

2.4 Source systems

Drill navigation source systems typically store their data in Oracle, SQL Server, or PostgreSQL databases. BLIS will connect to each source system using a connection string that may use Integrated Windows Authentication (using the service account identity) or explicit credentials.

2.4.1 Atlas Copco Surface Manager

Surface Manager stores drilling events in an SQL Server database that can be queried directly by BLIS. The view does not provide **Drill Depth**, **Angle**, or **Bearing** as such, so these are calculated by BLIS using the raw start and end point X, Y, and Z values. Times are specified in local time and must be adjusted to UTC using a view or the BLIS query. Additional fields, including **DrillBitId** and **AveragePenetrationRateInMetersPerMinute**, are available for populating custom drilling properties.

2.4.2 Caterpillar Aquila & Terrain

CAT Aquila and CAT Terrain can store drilling events using an SQL Server database or Oracle database that can be queried directly by BLIS. Hole profile averages, such as rate of penetration, torque, and air pressure, can be extracted from some CAT databases for populating custom drilling properties. Consumption data for drill bits and steels can be extracted from some CAT databases for populating custom drilling properties.

2.4.3 Leica IMS

Leica IMS typically stores drilling events in an SQL Server database that can be queried directly by BLIS.

2.4.4 Leica Jigsaw / Jmineops

Leica Jmineops stores drilling events in an SQL Server database that can be queried directly by BLIS. Angle and bearing are calculated from the toe and collar coordinates. Tags logged by the operator can be used to populate custom drilling properties such as top-of-coal and broken ground.

2.4.5 Modular Mining Provision

Version 2

Version 2 is implemented on a proprietary file system-based database that cannot be queried directly by BLIS. Modular have developed a custom module to export drill data to comma-separated values (CSV) files on a timer and BLIS can process these files. This provider is made available for legacy source support only. Only the basic built-in fields are available in the CSV files.

Version 3

Version 3 stores drilling events in an SQL Server database that can be transformed for querying by BLIS. Modular Mining Provision does not implement referential integrity in the database via foreign-key constraints. Querying such a database involves structural assumptions and additional validation steps, which can make extracting consistent and correct data challenging.

2.4.6 Wenco (APS)

The Wenco (APS) drill navigation system database includes a view named **mineApsViewDrillHolesOperator** that can be queried by BLIS to populate the built-in fields. Angle and bearing are calculated from the toe and collar coordinates.

2.4.7 Other

Other source systems that store drilling events in SQL Server, Oracle, PostgreSQL, or support ODBC, can usually be readily accessed by BLIS by developing a view adapter query that includes at least the required fields listed in the table in the 2.1.1 Built-in fields for drilling events on page 4.

Drill navigation system vendor assistance is generally required to develop such a query, and this should be ensured by the customer. Where required, contact Maptek for assistance. Maptek has a library of such queries developed for common source systems, which may shorten the development and testing process.

3. Custom Hole Property Integration Requirements

The BlastLogic Integration Service can update custom hole property values by polling relational databases using configurable `view adapter` queries. This can be useful for importing automated hole measurements (for example, temperature). The values can subsequently be visualised using the BlastLogic Desktop or Tablet clients or incorporated in charge rule calculations.

BLIS extracts hole property values from source systems by filtering on a **TimeStamp** column. To determine how far the query should look back in time for hole property changes, you need to configure the **look back** duration. BLIS will then compare the most recent value for each hole property over the look back period against the BlastLogic Server data. If any of the values are different, the BlastLogic Server hole property (or properties) are updated.

3.1 Query requirements

BlastLogic supports updating custom hole properties only, not built-in properties.

A query that you create must have the following characteristics:

- Be developed in the form of a `view adapter`.
- Return the required columns listed in 3.1.1 Required columns on the next page.
- Return at least one custom property column.

> **Note:** The values in the custom property columns are mapped to the custom hole properties.

> **Note:** Time stamp values must be in the UTC time zone. Source systems using local time values may be able to convert back to UTC using the `view adapter` query.

3.1.1 Required columns

The columns a query must return are as follows:

Import field	Data type	Description	Units	Sample
HoleId	int	The date and time that the hole drilling was started.	-	12345
TimeStamp	Date-time	The date and time of creating the custom hole property or the date and time of the last custom hole property update.	UTC	2015-03-20 13:55:29.001

Table 3-1 Columns that must be returned by a query

Note: The **HoleId** corresponds to the internal BlastLogic hole identifier, as exposed in the OData or Data Warehouse Holes feed.

3.1.2 Custom property columns

You can create custom hole properties in the BlastLogic Desktop application and populate them using column values in the source system query.

The table below lists the supported custom property types and source column mappings.

	Source Query Column Types	
Hole custom property type	**SQL Server**	**Values**
Boolean	BIT INT VARCHAR(X) NVARCHAR(X)	1 == True, 0 == False Not 0 == True, 0 == False "True" == True, "False" = False "True" == True, "False" = False
Float	DECIMAL REAL FLOAT	

	Source Query Column Types	
Hole custom property type	**SQL Server**	**Values**
String	VARCHAR(X) NVARCHAR(X)	Must comply with the single or multi-line nature of the drilling custom property.
Select	VARCHAR(X) NVARCHAR(X)	Must be a **Select** option identifier registered for the drilling custom property.
Multi-select	VARCHAR(X) NVARCHAR(X)	Must be a comma-separated list of **Multi-select** option identifiers registered for the hole custom property.

Table 3-2 *Supported custom property types and source column mappings*

BLIS attempts to map all optional columns to custom properties by matching the column name to the custom hole property identifier. If a column in the source system does not correspond to a BlastLogic custom hole property, the column will be ignored.

The mapping conventions are as follows:

- The name of the query column must exactly match the BlastLogic custom hole property identifier.
- **Select** and **Multi-select** option values must exactly match the BlastLogic custom hole property options.
- As **Multi-select** option values are comma-delimited, BlastLogic custom hole property schema **Multi-select** option values must not contain commas.
- The type of the source data query column must be convertible to the target custom property type (see the table above for more information).
- Numeric (float) property values must be provided in SI units with respect to the target custom property dimension, but with the following exceptions:
  - **Temperature:** Degrees Celsius.
  - **Angle:** Degrees.
- As BlastLogic does not support date and time custom properties as such, you need to convert the values to a string and target a string-type custom property to import date and time values.
- Null values will be applied to BlastLogic by deleting the property value for that hole.

3.2 Source system requirements

Source systems that store hole property values in SQL Server, Oracle, and PostgreSQL, or that support an ODBC driver, can usually be accessed by BLIS by developing a `view adapter` query that includes at least the required fields listed in the table in the Table 2-1 Supported built-in fields for drilling events in BlastLogic on page 4.

BLIS will connect to each source system using a connection string that may use Integrated Windows Authentication (using the service account identity) or explicit credentials.

3.3 Query example

The example below shows a case when a third-party system provides values for temperature, information on whether the hole is wet or not, and other notes.

	HoleId	TimeStamp	Temperature	IsWet	Notes
1	12345	2022-08-16 13:45:00.0000000	40	0	Heating up
2	12345	2022-08-16 16:00:00.0000000	32.3	1	Cooled down
3	33333	2022-08-16 14:00:00.0000000	41.2	0	NULL
4	33333	2022-08-16 15:10:00.0000000	40.3	0	NULL
5	33333	2022-08-16 19:33:00.0000000	39.8	0	NULL

Figure 3-1 Example query

A query that returns the above rows will result in the following:

- For the hole with id **12345**:
  - If a custom property **Temperature** of **float** type exists, the value will be set to 32.3.
  - If a custom property **IsWet** of **boolean** type exists, the value will be set to **True**.
  - If a custom property **Notes** of **string** type exists, the value will be set to **Cooled down**.
- For the hole with id **33333**:
  - If a custom property **Temperature** of **float** type exists, the value will be set to 39.8.
  - If a custom property **IsWet** of **boolean** type exists, the value will be set to **False**.
  - If a custom property **Notes** of **string** type exists, the value will be deleted.

4. Architectural and Component-Level Design

4.1 Logical architecture

The BlastLogic Integration Service comprises a configurable scheduler that polls drill navigation databases (sources) for new drilling events and loads them into BlastLogic Server sites (targets).

BLIS is hosted as a Windows Service and can be monitored and configured using a website hosted by the service.

Source systems are polled according to a configured schedule, whereas drilling events and drill measurements are extracted for a defined period and then compared with the data in the target BlastLogic site. Any new records are then uploaded to the site, ready for validation. BLIS will update drilling events and drill measurements as new data becomes available in the source system. Drilling entries will be updated according to the drilling source preferences.

As new events are uploaded to the site, BLIS attempts to auto-associate and validate the events against any designed drill holes that are not yet associated. Events that cannot be auto-associated and validated must be processed manually, typically by the drill and blast engineer on duty.

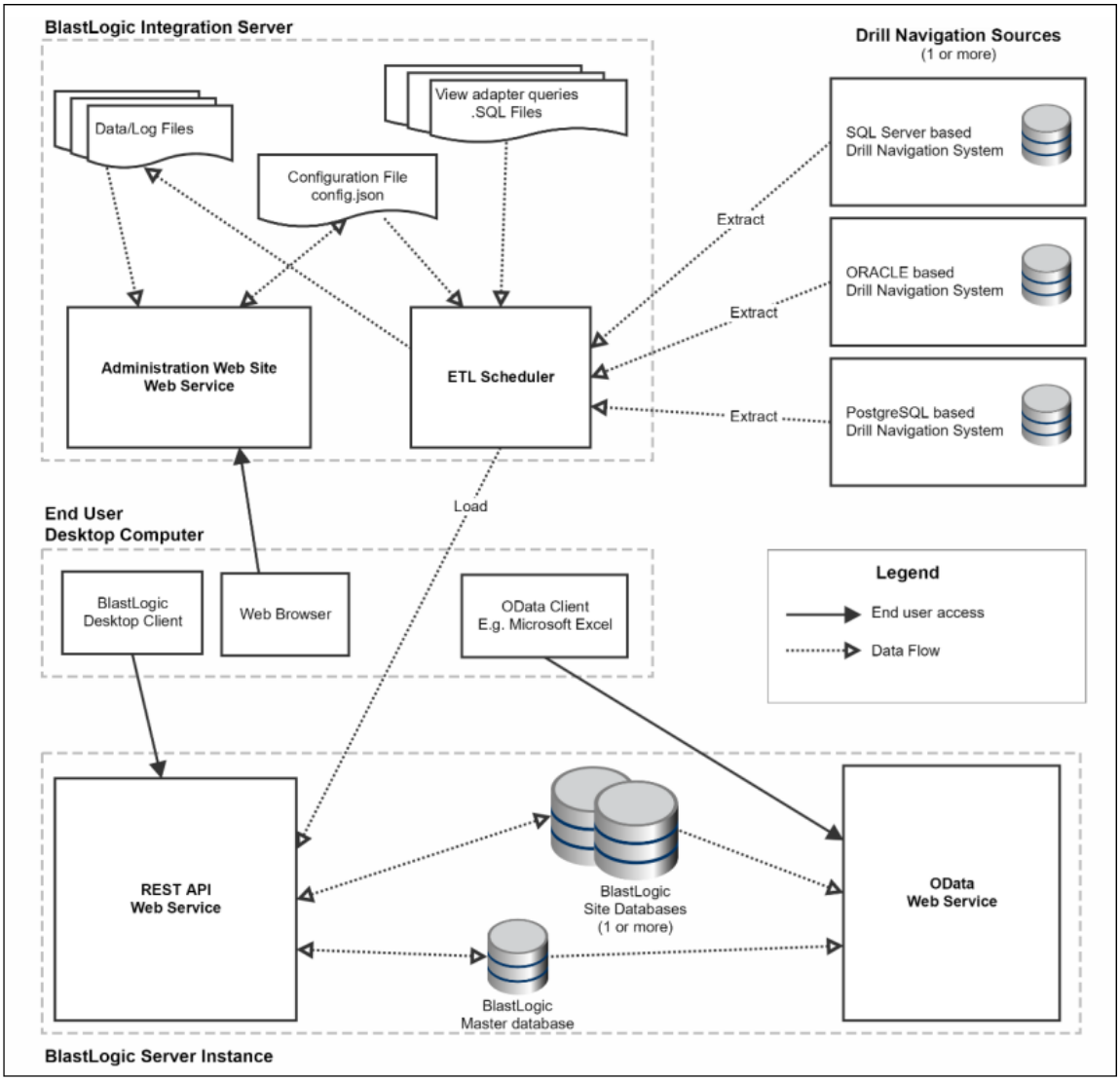

Figure 4-1 BLIS logical architecture

4.2 Physical architecture

The BLIS service is intended to be implemented on a Windows Server machine (typically a virtual machine (VM)) that runs 24/7 and integrates with existing infrastructure in a central data centre.

BLIS is a lightweight service that imposes minimal load on the host machine. It cannot fulfil its purpose without access to at least one target BlastLogic Server, so it is typically cohosted on the machine that hosts BlastLogic Server, as shown in the image below.

The drill navigation sources built upon a relational database management system (RDBMS) like SQL Server, Oracle, and PostgreSQL are typically provisioned and maintained separately by the vendor. These systems may be located on-site, in a central data centre, or replicated from site to a central data centre.

Though it is possible to deploy multiple instances of BLIS (for example, one per site), it is usually not necessary. A single instance in a central data centre is usually sufficient and requires fewer resources to manage.

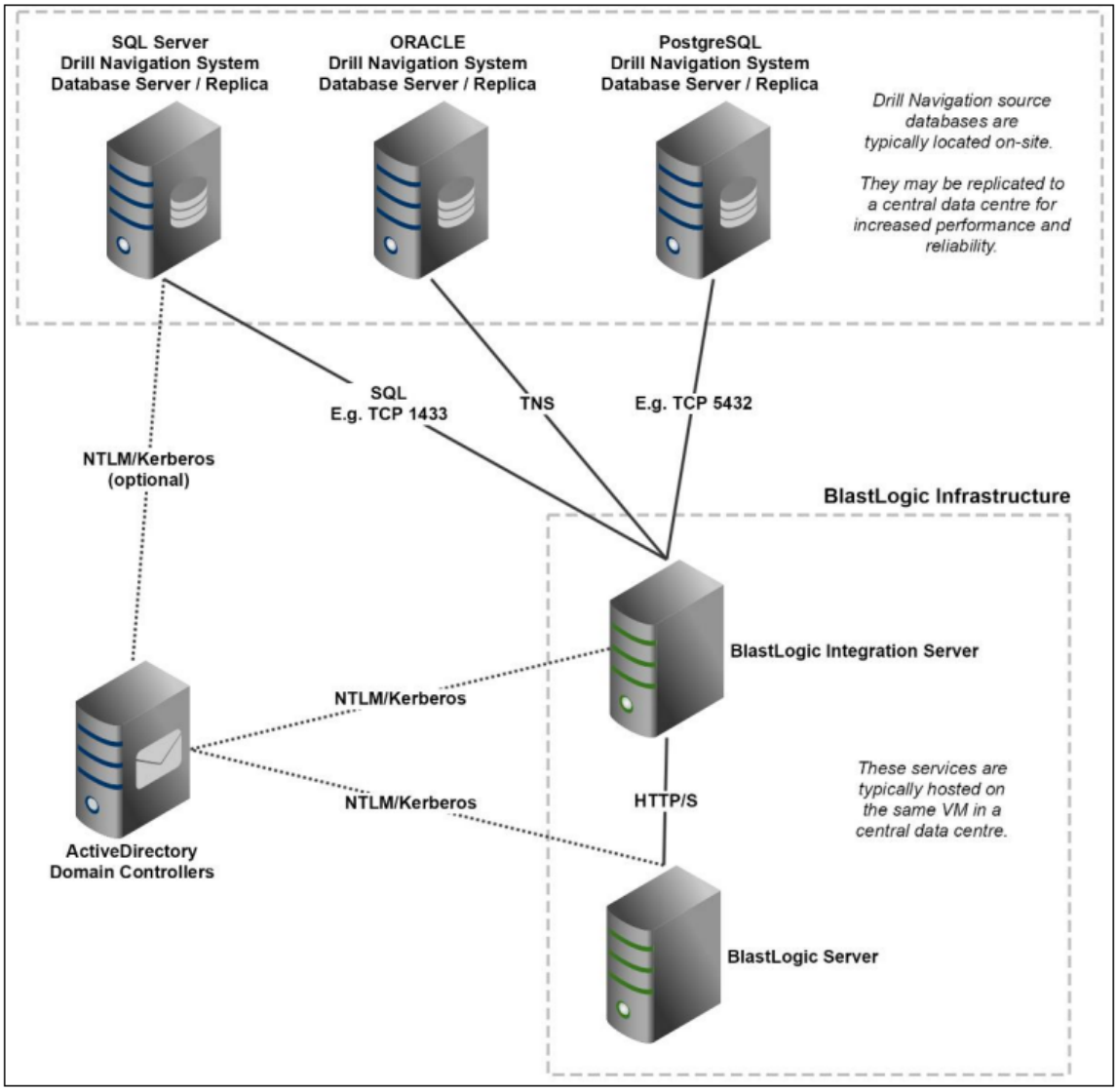

Figure 4-2 BLIS physical architecture

4.3 Processes

The BLIS scheduler applies the following processes to each enabled source-target mapping:

- Extract
- Transform
- Load
- Associate and validate

See also: 5.3.4 Step 4: Map sources to targets on page 31

4.3.1 Extraction from sources

Access to the site-based source system databases is established via a configurable drilling event provider that acts as a bridge for read-only access to site-based data sources and provides transformation of the representation of source drilling data.

Drilling event providers are available for Microsoft SQL Server, Oracle, and PostgreSQL databases. A Drilling event provider for Open Database Connectivity (ODBC) source is also available and can be used for sources that are not explicitly supported.

Each source is configured to use a provider that either queries a view directly or executes a query defined in a view adapter SQL file. `View adapter` queries afford flexibility of implementation, allowing addition of site-based data sources without creation of a view in the database supported or controlled by the drill navigation vendor. All queries are implemented as dynamic SQL and are executed by the BlastLogic Integration Service Windows Service host.

You must configure a source to execute a query to extract drilling events. Optionally, you can also configure a source to execute a query that extracts drill measurements. The queries must include a **StartTime** and **EndTime** parameter. Moreover, the queries must return any record where the **CompletedTime** field is between the **StartTime** and **EndTime** parameters.

BlastLogic Integration Service will establish connections to site-based sources using the configured credentials that you provide. Different providers support different authentication options, which are configured using ADO.NET connection strings. SQL Server sources can be configured for Integrated Windows Authentication or explicit credentials, whereas Oracle and PostgreSQL typically use explicit credentials. ODBC sources can be defined in the connection string or directly in the data source name (DSN).

Note: As all queries filter on the **CompletedTime** field, it is important that this field be a fixed database field and not calculated. Calculated fields can significantly decrease the performance of SQL queries.

4.3.2 Transformation and validation of drilling data

When records are extracted, the columns are mapped by matching names to the corresponding properties in the BlastLogic drilling event and drill measurement data models. Types in the source view must be convertible to the property types defined in the corresponding data model. Units must be as specified in 2.1 Drilling import definition on page 4.

Source rows that do not provide values for any required properties are discarded.

4.3.3 Loading into BlastLogic targets

The BlastLogic Server REST API provides an endpoint via which drilling events and drill measurements are loaded into the target BlastLogic site database.

When a source column does not have a corresponding fixed field or custom property in the target system, the column is ignored. If any custom property values cannot be loaded into the target due to mismatched type, all custom property values are discarded.

The service account under which the BLIS service is running must be registered as an account configured by a BlastLogic user and be configured with appropriate role assignments. A fixed **Integration** role is provided for this purpose.

When a drilling event row specifies **Drilling Rig** or **Drill Operator** values that do not exist in the target site, the drilling rig or drill operator is automatically added by BLIS.

When a drilling event is imported into BlastLogic and subsequently changes, BLIS will attempt to update that field. When a drill measurement is imported into BlastLogic and a property is subsequently changed, BLIS will also update that field. BLIS will always attempt to keep BlastLogic data consistent with the source system.

4.3.4 Association and validation against design

Drilling events loaded in to a BlastLogic site need to be associated with a design drill hole and validated where appropriate. Only when an event has been associated and validated, will the values be applied to the design hole and flow through to subsequent calculations.

After loading events, BLIS will attempt to auto-associate drilling events according to the rules specified using the **Drilling auto-association** settings that you have applied in the **Validation settings** tab of the **Site Setup** panel in the BlastLogic Desktop application (**Home** tab > **Setup** group > **Site** > **Validation settings**).

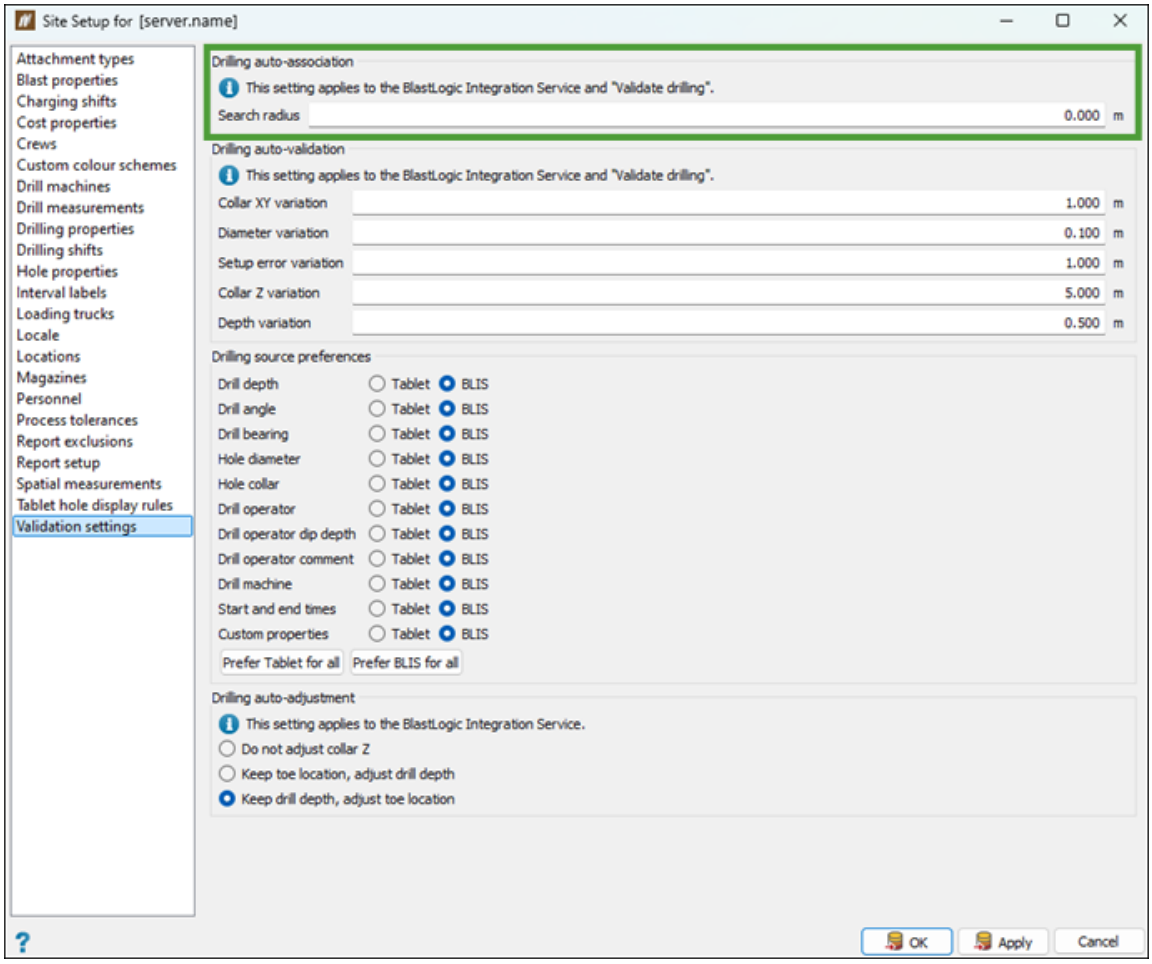

*Figure 4-3 **Drilling auto-association** section in the BlastLogic Desktop application*

BLIS will attempt to automatically validate any associated drilling events according to the settings that you have applied in the **Drilling auto-validation** section of the **Validation settings** tab in the **Site Setup** panel in the BlastLogic Desktop application (**Home** tab > **Setup** group > **Site** > **Validation settings**).

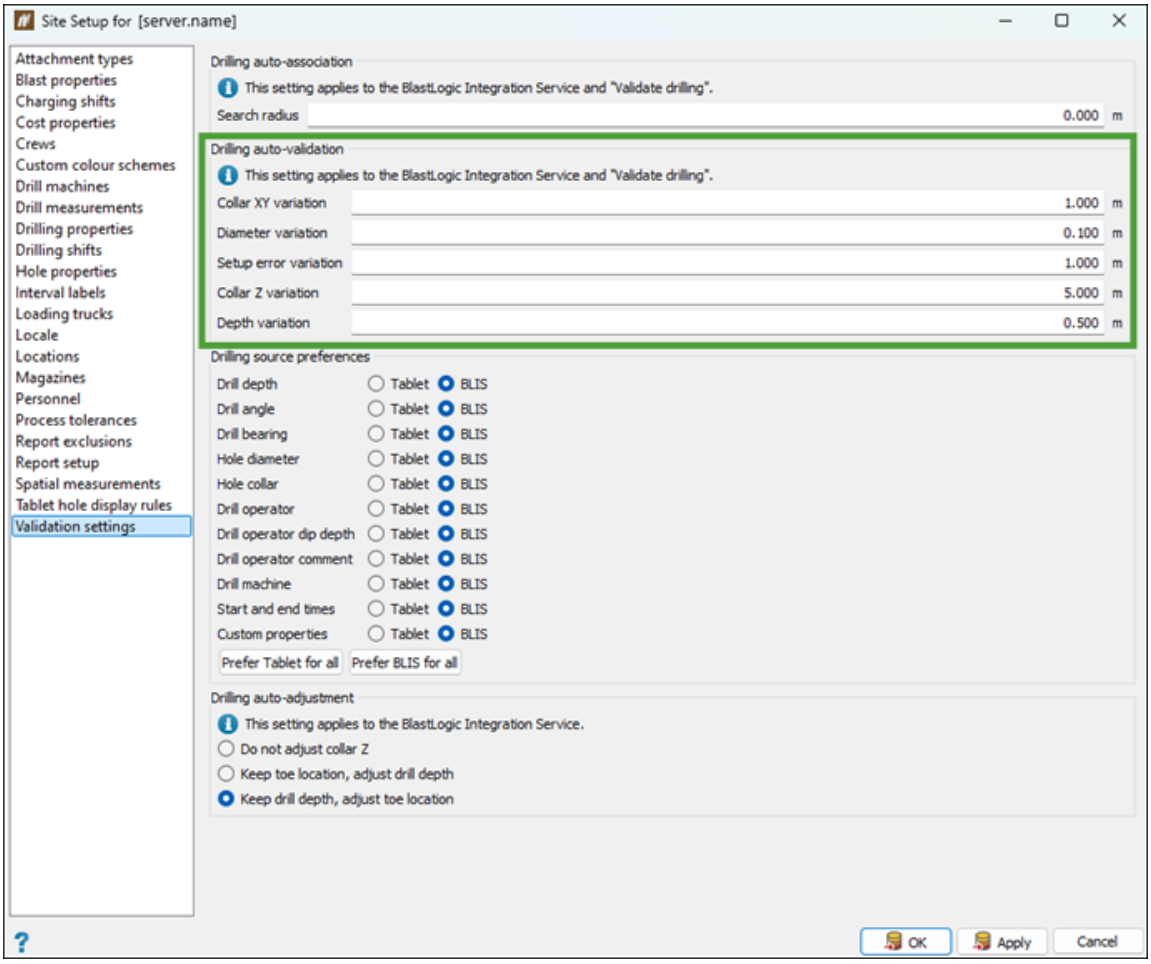

*Figure 4-4 **Drilling auto-validation** section in the BlastLogic Desktop application*

Source events that cannot be auto-associated and validated by BLIS require manual resolution in the **Validate Drilling** panel in the BlastLogic Desktop application (**Drilling** tab > **Validation** group > **Validate Drilling**).

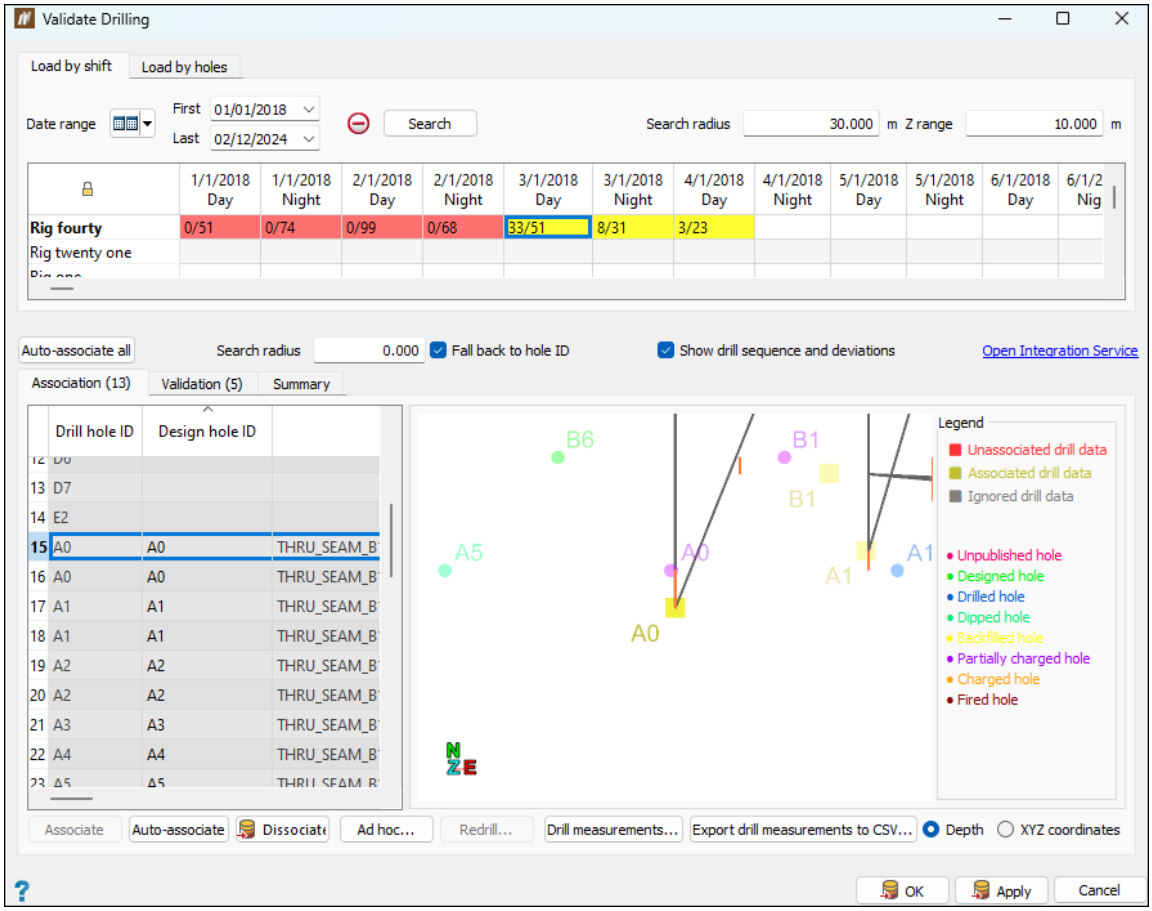

*Figure 4-5 **Validate Drilling** panel in the BlastLogic Desktop application*

4.3.5 Updating drill data

BLIS will attempt to ensure that all drilling events and drilling event drill measurements in BlastLogic are in sync with the data in the source system. If the data in the source system changes, BLIS will try to ensure that the corresponding records in BlastLogic are also changed.

Drilling entries will update according to the rules specified in the **Drilling source preferences** section of the **Validation settings** tab in the **Site Setup** panel in the BlastLogic Desktop application (**Home** tab > **Setup** group > **Site** > **Validation settings**).

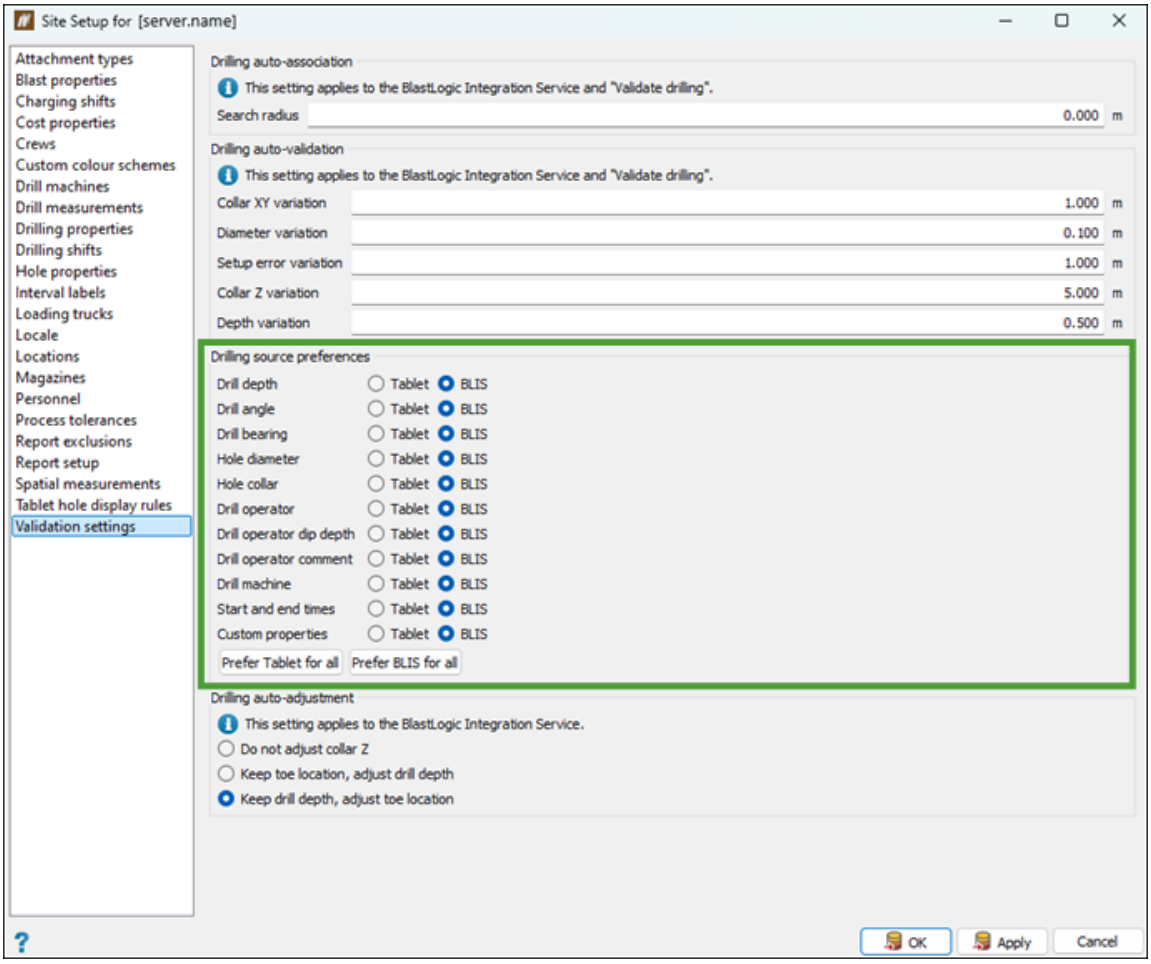

*Figure 4-6 **Drilling source preferences** section in the BlastLogic Desktop application*

BLIS will update null fields of drilling entry drill measurements. Non-null fields of drilling entry drill measurements will be ignored.

5. Installing and Configuring BLIS

Note: The following installation instructions are technical in nature and should be carried out by experienced IT staff, preferably with some knowledge of the relevant source system databases like SQL Server or Oracle.

5.1 Installation prerequisites

To install BlastLogic Integration Service (BLIS), you need to prepare the following:

- A Windows machine (virtual machine, VM) running 64-bit Windows.
- Local administrator rights to the machine.
- A working BlastLogic Server instance.
- Microsoft .NET Framework 4.8 or later installed.
- BlastLogic Integration Service MSI installer.

Moreover, BLIS requires the following main components to be acquired:

- A BLIS instance.
- A BlastLogic Server instance.
- One or more drill navigation sources.

5.2 Installation steps

Complete the following steps to install BlastLogic Integration Service.

5.2.1 Step 1: Establish an active directory service account to run the BLIS service.

Typically, the existing BlastLogic Server service account is used for BLIS service. However, you can create a dedicated account to run BLIS the same way you establish the BlastLogic Server service account. See *BlastLogic Server Installation Procedure* for details.

Once you have established your service account, you need to authorise it as a user for the target BlastLogic Server instances and assign the account with the **Integration** role for the required sites or for all sites.

5.2.2 Step 2: Install BLIS.

Follow these steps to install BlastLogic Integration Sevice:

1. Install BLIS using the supplied `.msi` file.
2. Enter the **User name** and **Password** for the service account that you established in step 1. Specify the fields listed in the **Administration Web Site** section in the **Service Account Credentials** panel and click **Next**.

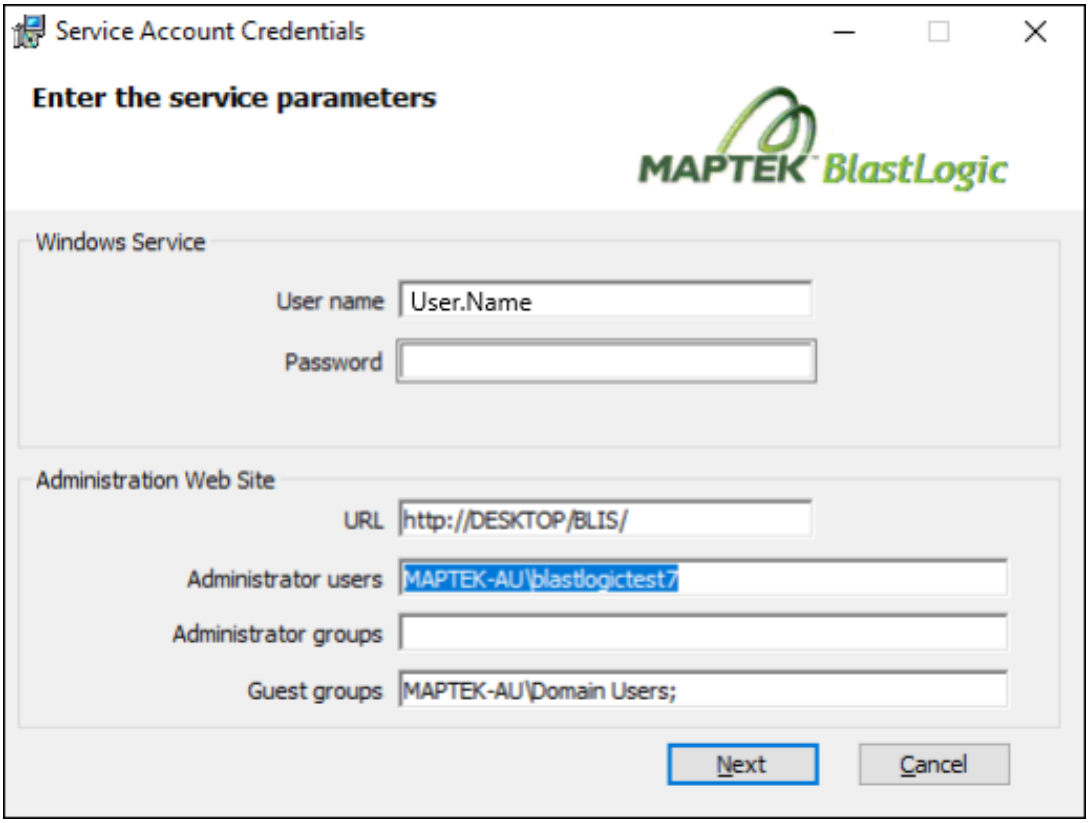

Figure 5-1 Service Account Credentials panel

3. Click **Agree** on the next panel that appears.

4. Click **Finish** on the next panel that appears. The BLIS website will open.

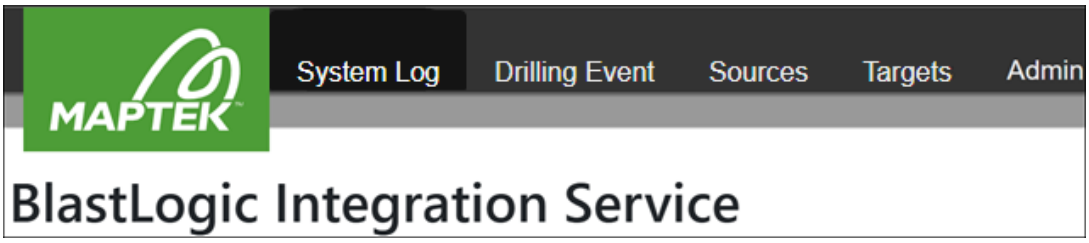

Figure 5-2 BLIS website start page

5.2.3 Step 3: Install Oracle Data Access Components (ODAC)

> **Note:** This step is optional. You should perform it only if Oracle data sources are to be used.

Follow these steps to install Oracle Data Access Components:

1. Download 64-bit Oracle Data Access Components (ODAC) from the Oracle official website.
2. Extract the downloaded `.zip` file to a temporary folder.
3. Open a command prompt as Administrator.
4. Change directory to the folder that you created in step 1.
5. Specify where the Oracle client should be installed.

   > **Note:** We recommend installing the Oracle client under the `C:\oracle\` path, unless this path has already been used.

6. Execute the `install.bat all c:\oracle odac` command.
7. Confirm any User Account Control (UAC) prompts displayed during installation.

   > **Note:** Any messages informing that permission was denied indicate that the installation has failed due to insufficient permissions. In that case, run the installation again as Administrator.

8. Add the Oracle and Oracle bin folders to the system path environment variable by completing the following steps:

   a. Click  (Start) on the Windows task bar and open **Settings**. Go to **System** > **About** and click **Advanced system settings.**

   b. Alternatively, open **Control Panel**, go to **System and Security** > **System** and click **Advanced system settings**.

   c. Click the **Environment Variables...** button in the **System Properties** panel that appears.

   d. Select **Path** in the **System variables** section and click **Edit...**.

e. Insert `C:\oracle; C:\oracle\bin` at the start of the value string.

f. Save the changes.

5.3 BLIS configuration

Complete the following steps to configure BlastLogic Integration Service.

5.3.1 Step 1: Configure the Open Database Connectivity (ODBC) data source

> **Note:** This step is optional. You should perform it only if ODBC data sources are to be used.

Follow these steps to configure the Open Database Connectivity data source:

1. Open the **ODBC Data Source Administrator** tool.
2. Click **Add**.
3. Select the appropriate ODBC driver.
4. Click **Finish**.
5. Configure the driver to connect to your data source.

5.3.2 Step 2: Configure and test drill navigation sources

You need to grant sufficient permissions so that BLIS can extract data from sources. The permissions will depend on the source type and the required authentication method.

Follow these steps to configure and test drill navigation sources:

1. Open the BLIS website and go to the **Sources** tab.
2. Click **Add Source**.
3. Fill in the information in the fields by either entering the data manually or selecting the required item from the drop-down menu (where available).

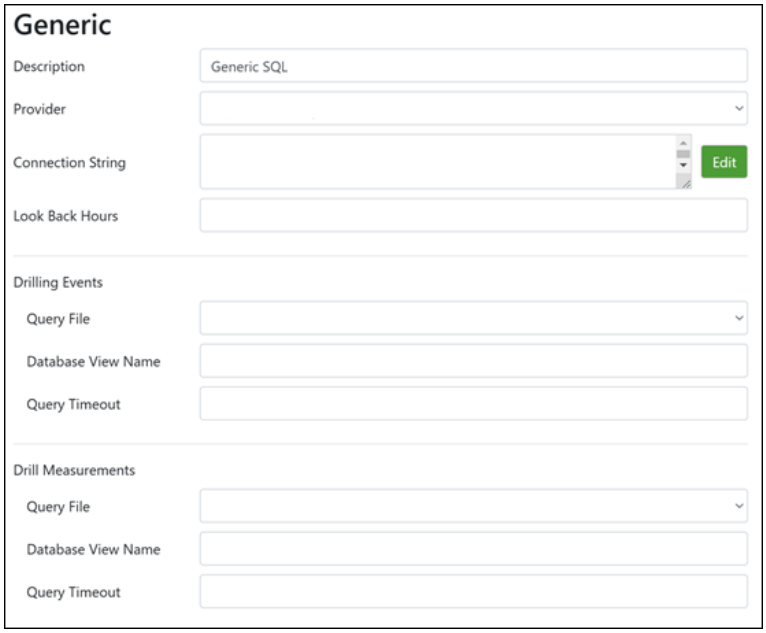

Figure 5-3 Add Source screen

> **Note:** BLIS will attempt to load drilling events created in the **Look Back Hours** time range that you specify. The maximum range that you can set is 14 days (350 hours).

4. Click **Test**. You will see a pop-up window informing you if BLIS was able to connect to your source system and extract data.

Figure 5-4 Pop-up informing that the connection to provider and data extraction have been successful

5. Click **OK** to exit the pop-up and then click **Save** to keep the source that you have added.

5.3.3 Step 3: Configure and test BlastLogic targets

Follow these steps to configure and test BlastLogic targets:

1. Open the BLIS website and go to the **Targets** tab.
2. Click **Add Target**.
3. Fill in the information in the fields by either entering the data manually or selecting the required item from the drop-down menu (where available).

4. Click **Test**.You will see a pop-up window informing you if the account has the necessary permissions to edit data.

Figure 5-5 Pop-up informing that the account has the necessary permissions to edit data

5. Click **OK** to exit the pop-up and then click **Save** to keep the target that you have added.

5.3.4 Step 4: Map sources to targets

A *mapping* specifies that data from a source should be loaded into a target. The *source* is the location from which the data should be extracted, whereas the *target* is the destination to save data in. You can add and edit mappings in the **Mappings** section of the **Sources** or **Targets** tab.

Follow these steps to map sources to targets:

1. Open the BLIS website and go to the **Sources** or **Targets** tab.
2. In the **Mappings** section, click the ⊕ button to add a mapping.
3. Configure as follows:
   - Select the required target from the drop-down.
   - Select the **Enabled** checkbox so that the data can be loaded.

     > **Note:** BLIS will only attempt to load data for a mapping that is enabled.

   - Set the **Cycle Sleep** interval by entering the value in minutes. BLIS will attempt to copy data from the source to its target in a cycle. For example, if you set the interval to 30 minutes, BLIS will try to copy the data every 30 minutes.

*Figure 5-6 **Mappings** section in the **Sources** tab*

4. Click **Save**.

6. Testing Requirements

Much of the functionality of the BlastLogic Integration Service is standard for an extract, transform, load (ETL) agent, so you can apply the following test criteria while testing BLIS requirements:

- **Accuracy:** Transformations alter only the representation of drilling data and do not impact its meaning or reliability.
- **Completeness:** Drilling data is captured and processed for all holes, where available in the source system. No drilling data is excluded.
- **Timeliness:** Drilling data is captured and processed soon after it is available in the source system.
- **Relevance:** Source system events that are unrelated to drilling data are not included.

Testing carried out in the Maptek environment and customer environment will adequately address the criteria of relevance and accuracy for the source systems of sites for which a data source is provided. Tests against source data assume that the configuration and usage of a source system is the same at each site at which the source system is implemented. Furthermore, testing that is not performed against live data can only be indicative of timeliness and completeness.

6.1 Testing source system views

During startup, the BlastLogic Integration Service will test connectivity of each configured site-based data source. Any connection failures are logged but will not prevent the service from starting. You can also initiate connectivity testing via the **Administration** tab on the BLIS website.

Testing and validation of source drilling events should be carried out against matching design drill holes, as follows:

- **Maptek integration and function testing:** A data view will be required from a recent extract from each applicable customer site.
- **Preimplementation testing:** To be performed using Maptek environment, as follows:
  - **Data.** Testing performed via data views extracted from the production instance of each of the site-based source system databases.
  - **Extraction method.** BlastLogic's scheduled polling of each applicable customer site data views.
- **Implementation testing:** To be performed using customer environment, as follows:
  - **Data.** Testing performed via data views extracted from the production instance of each of the site-based source system databases.
  - **Extraction method.** BlastLogic's scheduled polling of each applicable customer site data views.

To successfully test the data flow and validation within the Maptek environment, you need to prepare the following:

- A `.csv` file with a pattern exported from Vulcan or other general mine planning package.
- Extracts of matching drill navigation data from customer sites.

7. Operating BLIS Website

7.1 Accessing BLIS website

Once you configure the BlastLogic Integration Service, it will operate in the background without requiring manual intervention under business as usual conditions.

You can access BLIS website from the **Validate Drilling** panel in the BlastLogic Desktop application (**Drilling** tab > **Validation** group > **Validate Drilling**) by clicking the **Open Integration Service** hyperlink.

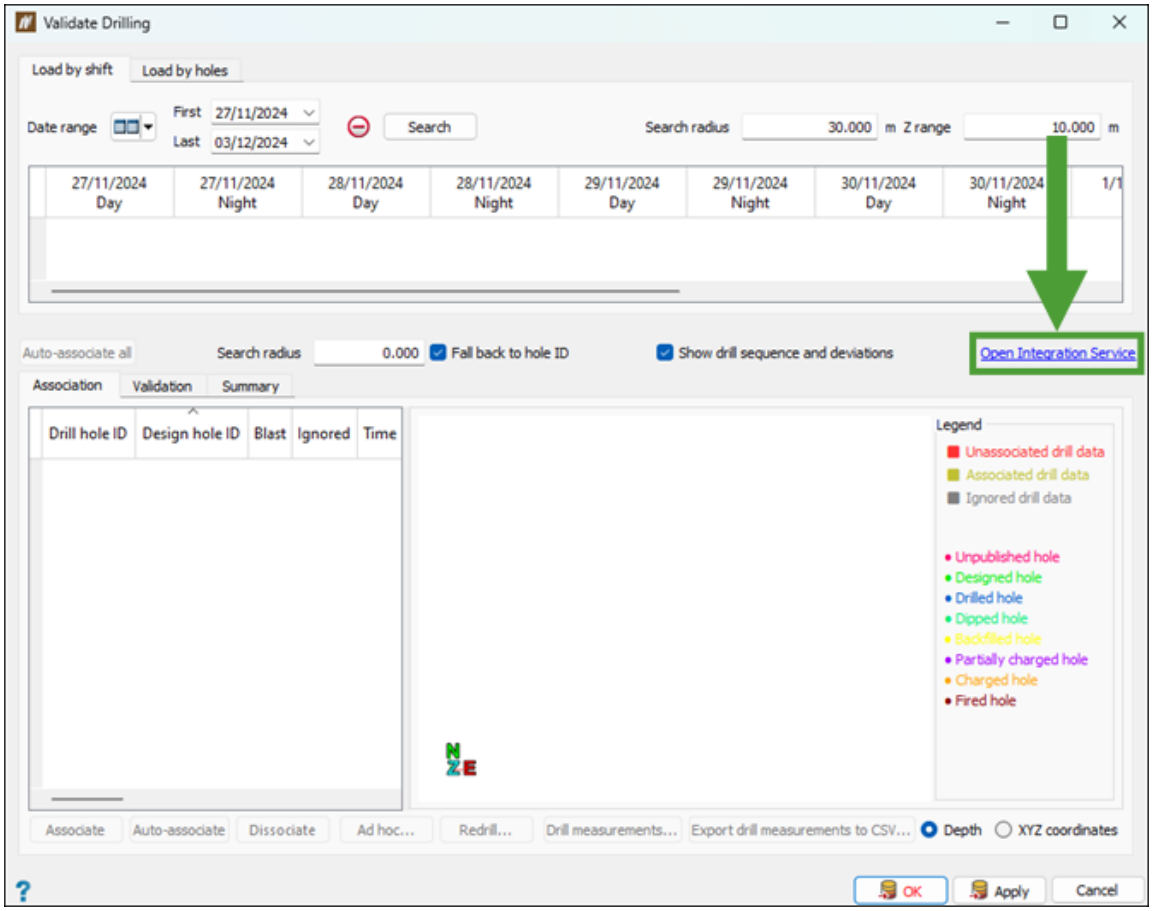

*Figure 7-1 Entering BLIS website from the **Validate Drilling** panel in BlastLogic Desktop application*

Alternatively, open the BLIS website by entering its address in your browser.

> **Note:** The address of the BLIS website will depend on your server configuration. Contact your network administrator for details.

7.2 Website structure and functionality

The BLIS website consists of the following tabs:

- **System Log**
- **Drilling Events**
- **Sources**
- **Targets**
- **Admin**

> **Note:** The **Admin** tab will appear only if you have **Administrator** permissions.

7.2.1 System Log

The **System Log** tab lists logs from all BLIS activities.

The logged activities are as follows:

- The extract, transform, and load (ETL) processes that BLIS has attempted to run and when.
- The number of drilling events that were loaded, updated, associated, and validated by ETL processes.
- Any errors or warnings that occurred during ETL processes.
- Any changes to configuration.

> **Tip**
> Click the **Extract now** button to force BLIS to immediately process data from every source.

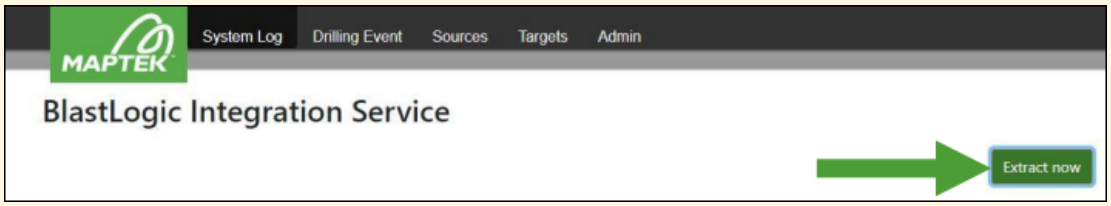

*Figure 7-2 The **Extract now** button in the **System Log** tab*

7.2.2 Drilling Event

The **Drilling Event** tab displays information about loaded drilling events. Select the required target from the **Target** drop-down list to view the loaded drilling events for that target.

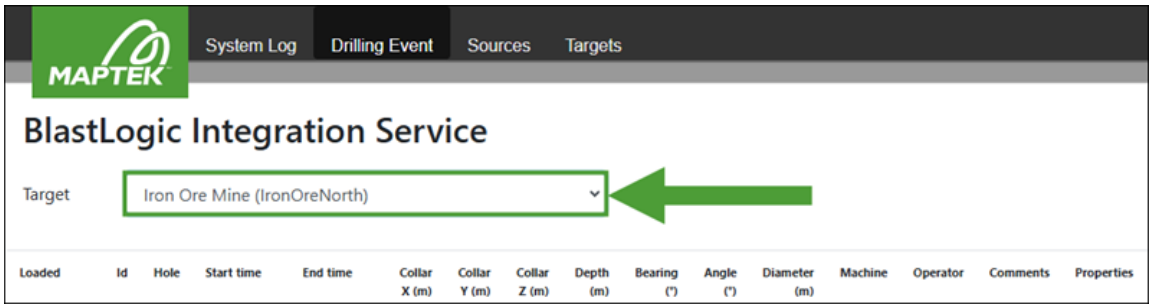

*Figure 7-3 Selecting the required target in the **Drilling Event** tab*

7.2.3 Sources

A BLIS source is a source of drill data. It can be an SQL Server, Oracle, or PostgreSQL database, a CSV file, or and ODBC data source. The **Sources** tab provides an interface for users to add and test sources and link them to targets. Sources can contain drilling event queries, drill measurement queries, or both.

The **Test** button attempts to connect to the source database using the supplied connection string and execute the selected query files. The test succeeds if the following conditions are met:

- Database exists at the specified location.
- BLIS can log in to the database.
- BLIS is able to successfully execute drilling event and drill measurement query files against the database.
- The returned data contains all of the mandatory fields and no duplicated fields.

Note: BLIS will report all encountered problems.

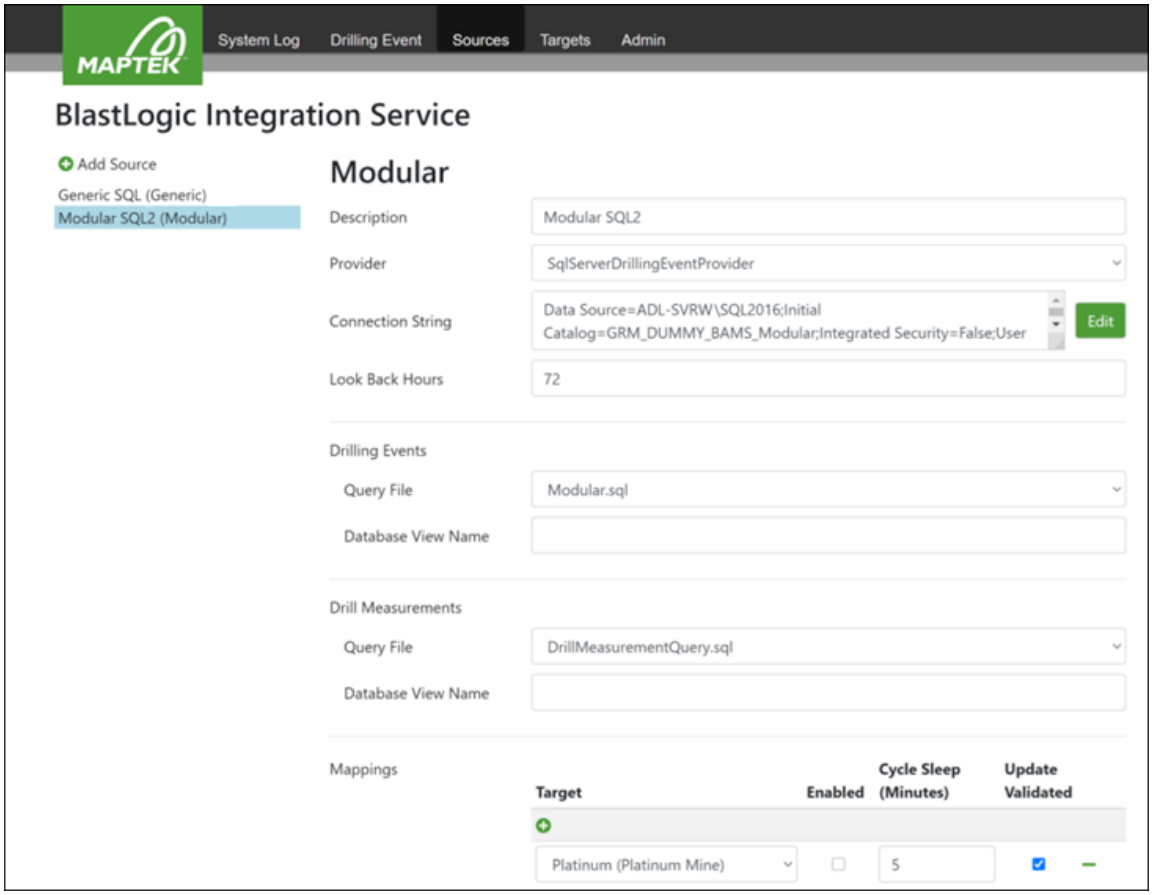

*Figure 7-4 The **Sources** tab*

You can add sources by clicking the **Add Source** button. When adding a new source, fill in the following fields:

- **Description.** Provide a short description for your source.
- **Provider.** Enter the platform of the source database.
- **Connection String.** The connection string you enter must contain the server, location of the database, and authentication details that BLIS will use to access it. You can use database authentication or Integrated Windows authentication, as follows:
  - For SQL Server connections, the format of the connection string with Integrated Windows authentication is `Data Source=[server name];Initial Catalog=[database name];Integrated Security=True`.
  - For SQL Server connections, the format of the connection string with database authentication is `Data Source=[server name];Initial Catalog=[database name];User Id=[username];Password=[password]`.

- **Look Back Hours.** The period BLIS will look back for drill data. If you set **Look Back Hours** to `72`, BLIS will attempt to retrieve any drill data that was created in the source system in the past 72 hours.
- **Drilling Events > Query File.** Enter the SQL script that BLIS will run against the source database to extract drilling events. The query file must be located in the `%ProgramData%\Maptek\BlastLogic\Integration\Drilling\[ProviderName]` folder on the server that hosts BLIS.
- **Drilling Events > Database View Name.** A drilling event query file can optionally contain the placeholder `[SourceView]`. If it does, BLIS will replace the placeholder with the value that you enter in the **Database View Name** field. This allows multiple sources to use the same query file.
- **Drill Measurements > Query File.** Enter the SQL script that BLIS will run against the source database to extract drill measurements. The query file must be located in the `%ProgramData%\Maptek\BlastLogic\Integration\Drilling\[ProviderName]\DrillMeasurementQuery` folder on the server that hosts BLIS.
- **Drill Measurements > Database View Name.** A drill measurement query file can optionally contain the placeholder `[SourceView]`. If it does, BLIS will replace the placeholder with the value that you enter in the **Database View Name** field. This allows multiple sources to use the same query file with different views.

See also: 8.1.2 Query file on page 44

7.2.4 Targets

A BLIS target is a BlastLogic site that will receive data.

The **Targets** tab provides an interface to add and test targets and link them to sources. The account used to connect to BlastLogic must be a valid BlastLogic user and have the **Integration** role in the selected site.

The **Test** button attempts to connect to the target server and site using the supplied credentials. The test verifies the following:

- If the server exists.
- If the server has a site with the supplied code.
- If the supplied credentials are valid.

- If the specified user is authorised to access the target server and has all necessary BlastLogic permissions.

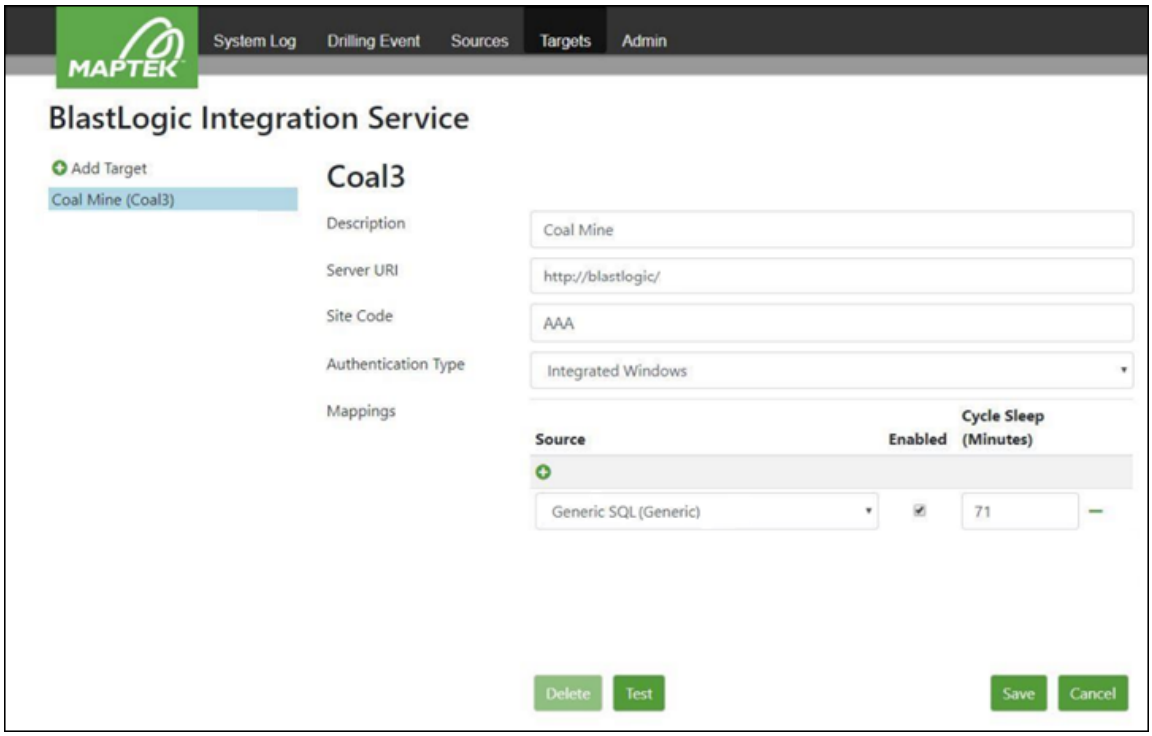

*Figure 7-5 The **Targets** tab*

You can add targets by clicking the **Add Target** button. When adding a new target, fill in the following fields:

- **Description.** Provide a short description for your target.
- **Server URI.** Enter the URI of the BlastLogic Server.
- **Site Code.** Enter the alphanumeric code that uniquely identifies the BlastLogic site.
- **Authentication Type.** Using the drop-down, select the type of authentication that BLIS will use to access the target from the following types:
  - ***Integrated Windows*** will attempt to authenticate the service account that runs BLIS.
  - ***Explict*** will require you to specify the credentials of the account used to access BlastLogic.
  - ***Azure*** if you're using servers hosted by Maptek.

If you have selected *Explicit* as the type of authentication, you must also specify the following:

- **User Name.** Enter the user name that will be used to log into BlastLogic.
- **Set Password.** Overwrite the saved password by selecting the checkbox and entering a new password. The saved password will be maintained when you keep the checkbox unselected.
- **Password.** Set the password that will be used to log into BlastLogic.

If you have selected *Azure* as the type of authentication, you must also specify the following:

- **Client ID.** Enter the client ID that will be used to log into BlastLogic.
- **Client Secret.** Set the password that will be used to log into BlastLogic.

7.2.5 Admin

Use the **Admin** tab to manage user access and permissions to the BLIS website.

The users of BLIS website are categorised as follows:

- **Administrators:** The users who have full access to every screen and feature of the BLIS website. Administrator permissions can be granted to individual users and to groups.
- **Guests:** The users who have read-only access to **System Log**, **Drilling Events**, **Sources**, and **Targets** tabs. Guest permissions can be granted to groups.

> **Note:** As the **Admin** tab is visible only to administrators, only administrators can assign administrator and guest permissions to users.

To grant administrator or guest access to a user or a group, click ⊕ corresponding to the given access category and enter the credentials, as shown in the image below.

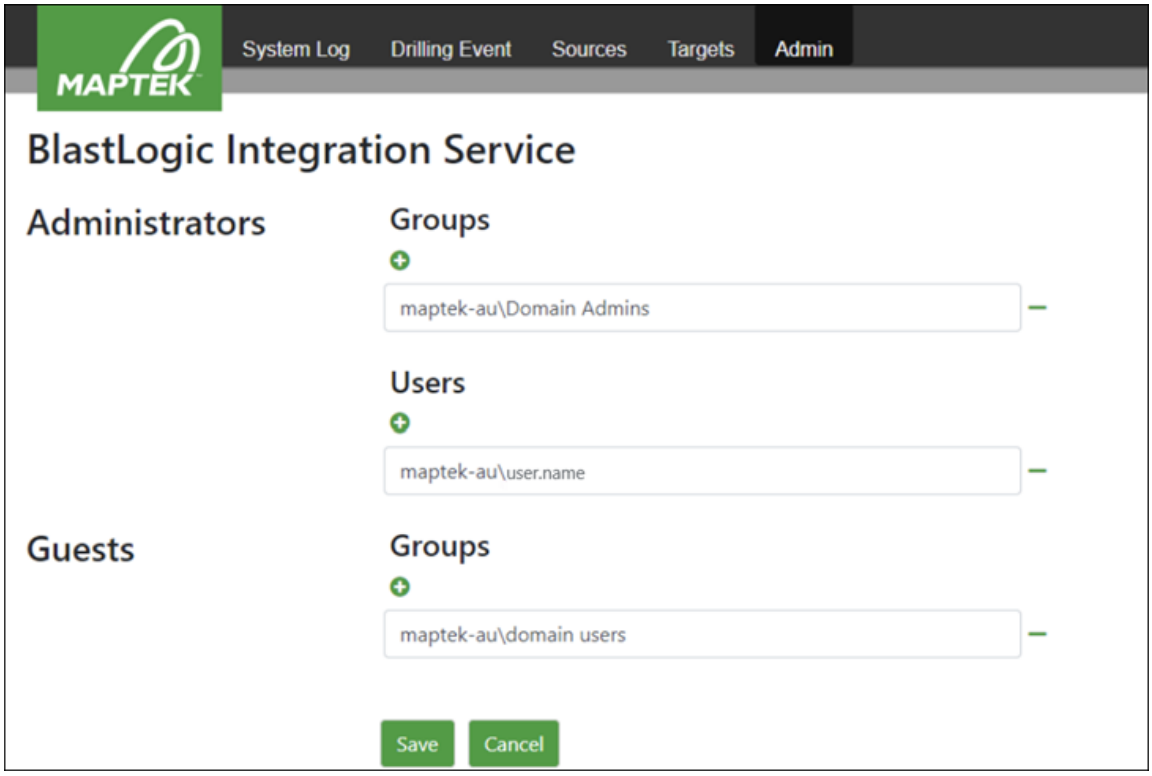

*Figure 7-6 The **Admin** tab*

Tip: Alternatively, you can modify the user registry via `[Server]\HKEY_LOCAL_MACHINE\SOFTWARE\Maptek\BlastLogic Integration Service` > `WebsiteAdministratorUsers`.

8. Setting Up BLIS

Note: To make changes to the BLIS configuration, you need to be listed as BLIS Administrator. See 7.2.5 Admin on page 40 for more information.

8.1 Source data

BLIS requires access to the source data, which may involve granting firewall permissions. You need to provide BLIS with the following information:

- The name of the database server.
- The name of the database.
- The name of the view (if applicable).
- Source database provider platform (BLIS supports SQL Server, PostgreSQL, and Oracle).

You also need the database access credentials to authenticate the read-only access on that source data. This can optionally be either Integrated Windows authentication for the account that executes the BlastLogic Integration Service (BLIS) or explicitly supplied credentials.

See also: 7.2.3 Sources on page 36

8.1.1 Drilling event data

Drilling event data is typically included within one row of information about a drill hole and must contain the following compulsory fields:

- **Id**

  Note: Id is a unique identifier that must not be repeated.

- **DrillMachine**
- **CompletedTime**

Other default BlastLogic fields that the drilling event data can include are as follows:

- **HoleName**
- **CollarX**
- **CollarY**
- **CollarZ**
- **Depth**
- **Diameter**
- **Angle**
- **Bearing**
- **Operator**
- **Comment**
- **StartTime**
- 2.1.1 Built-in fields for drilling events on page 4

You can also include additional information such as custom fields (for example, touch coal depth). Set up these fields in the BlastLogic Desktop application by going to **Home** tab > **Setup** group > **Site** > **Drilling properties**.

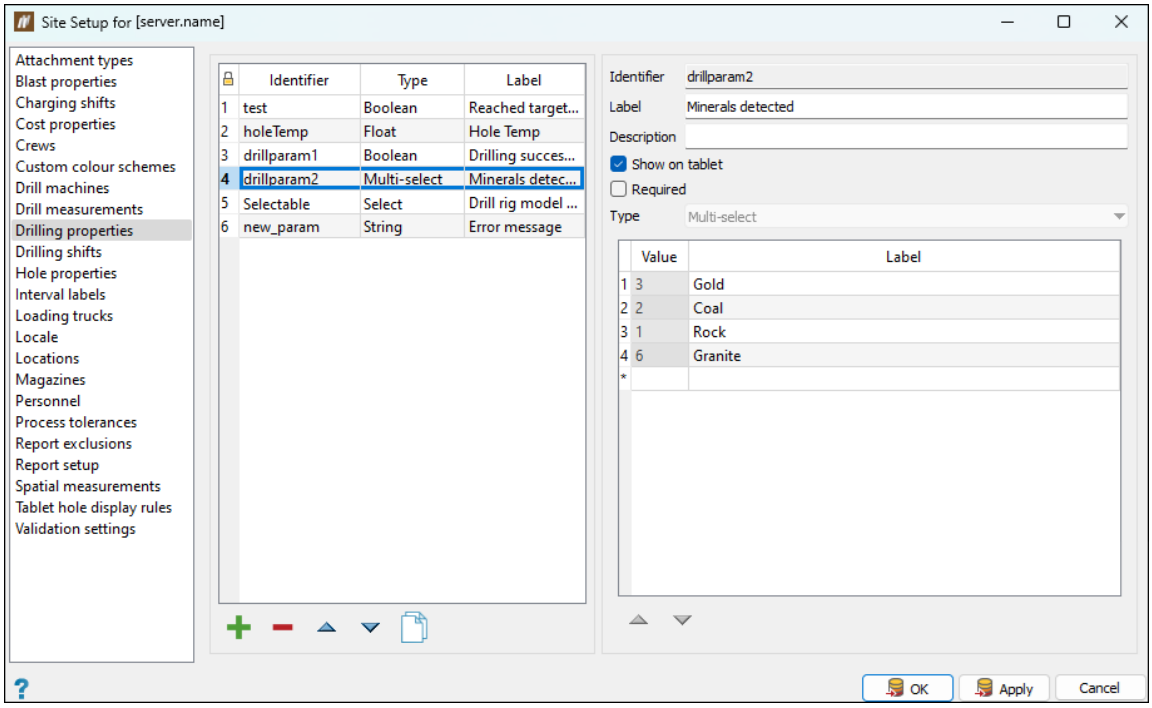

*Figure 8-1 The **Drilling properties** tab in the **Site Setup** panel in the BlastLogic Desktop application*

8.1.2 Query file

Use the query file (also called the *adaptor* file) to map fields from the source data to the required field names, as recognised in BlastLogic.

```
SELECT Id
     , HOLENAME
     , Comment
     , CollarE as COLLARX
     , CollarN as COLLARY
     , CollarRL as COLLARZ
     , Depth
     , Diameter
     , ANGLE
     , BEARING
     , DrillMachine
     , Operator
     , StartTime
     , CompletedTime
     , StringCustomProperty
     , FloatCustomProperty
     , BooleanCustomPropertyRequired
     , BooleanCustomPropertyOptional
     , SelectCustomProperty
     , MultiSelectProperty
     , DecimalCustomProperty
FROM [SourceView]
WHERE CompletedTime >= @StartTime AND CompletedTime < @EndTime
```

Figure 8-2 Query file example

The query file must be located on the BLIS server, under the `%ProgramData%\Maptek\BlastLogic\Integration\Drilling\[folder name]` path. Under this path, you can find the folders whose names appear as the options in the **Provider** drop-down in the **Sources** tab.

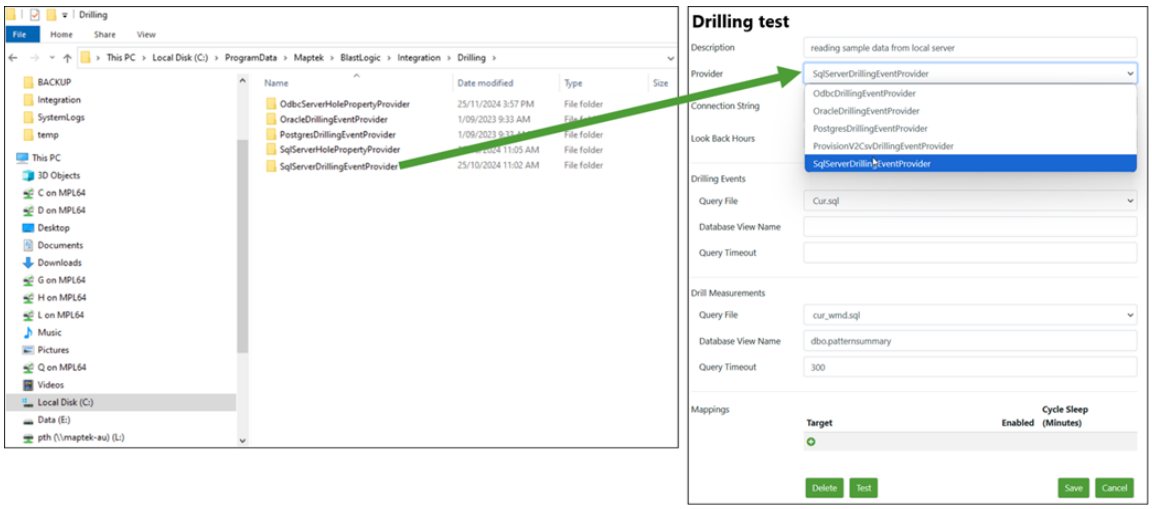

*Figure 8-3 Folder names appearing in the **Provider** drop-down (example)*

When you save your query file in the appropriate directory, the **Query File** drop-down in the **Drilling Events** section of the **Sources** tab will include the name of your saved query file as a selectable option, as shown in the example below:

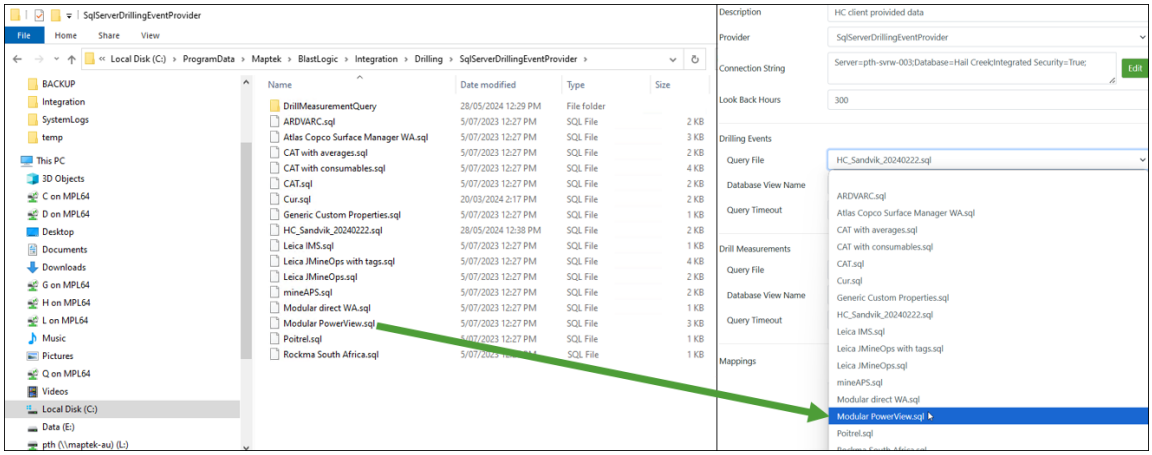

*Figure 8-4 Query files listed in the **Drilling Events** section of the **Sources** tab (example)*

You can directly reference the data tables or database views in your query file. Alternatively, you can use `[SourceView]`. This allows you to use the **Database View Name** field in the **Drilling Events** section to reference the appropriate database view without having to modify the underlying query file:

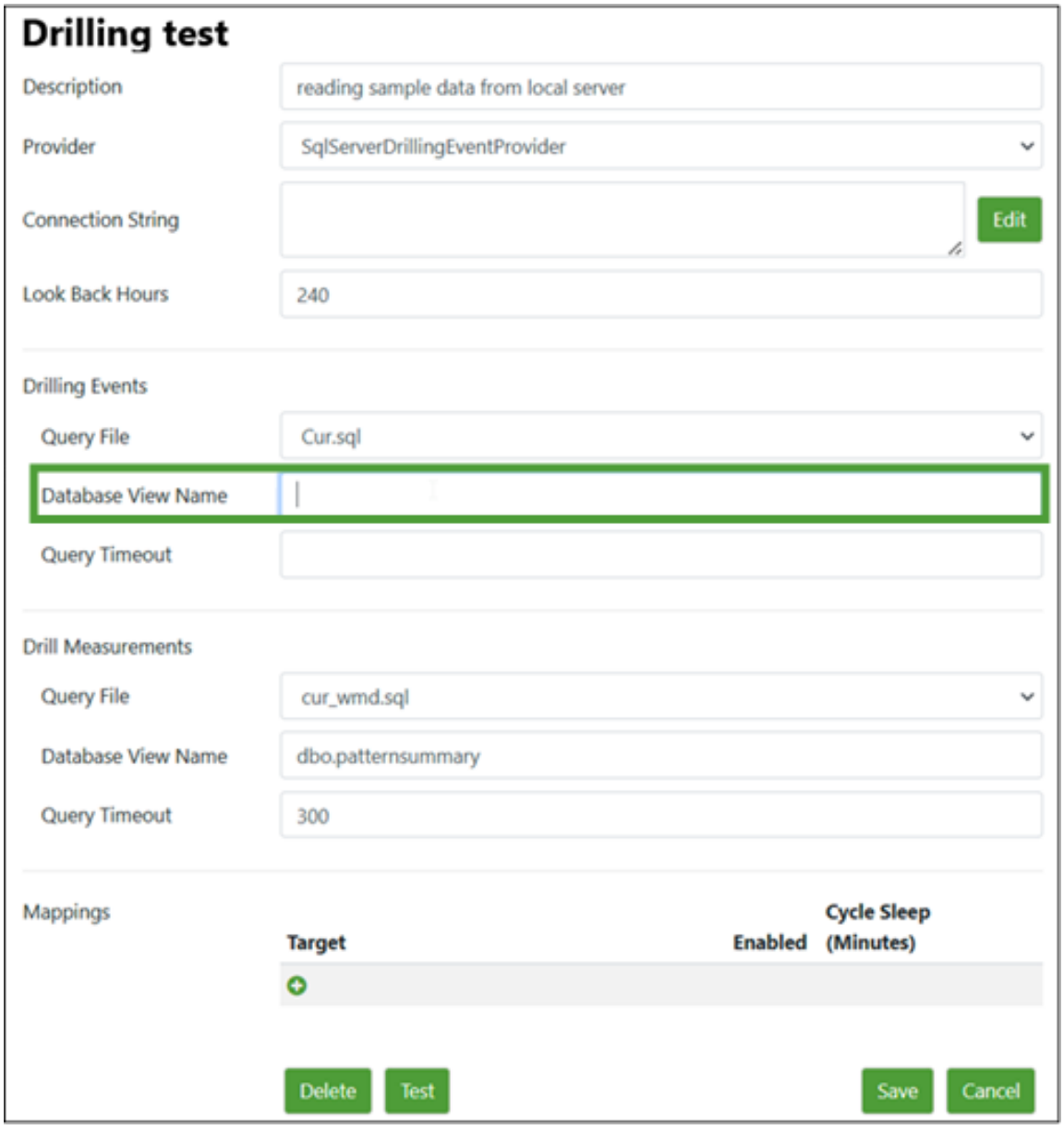

*Figure 8-5 The **Database View Name** field in the **Drilling Events** section (**Sources** tab)*

When you complete setting up your source data, click **Test** to ensure that BLIS can establish a connection to the defined data. Once a source is set up, you can map it to a target.

See also: 5.3.2 Step 2: Configure and test drill navigation sources on page 28, 5.3.4 Step 4: Map sources to targets on page 31

8.2 Measure while drilling

You can use the **Sources** tab on the BLIS website to include a separate adaptor file to read in the measure while drilling data. The file should be located in a subdirectory of that same SQL folder, as follows:

`%ProgramData%\Maptek\BlastLogic\Integration\Drilling\SqlServerDrillingEventProvider\DrillMeasurementQuery`.

You can select the files located under this path from the **Query File** drop-down in the **Drill Measurements** section of the **Sources** tab.

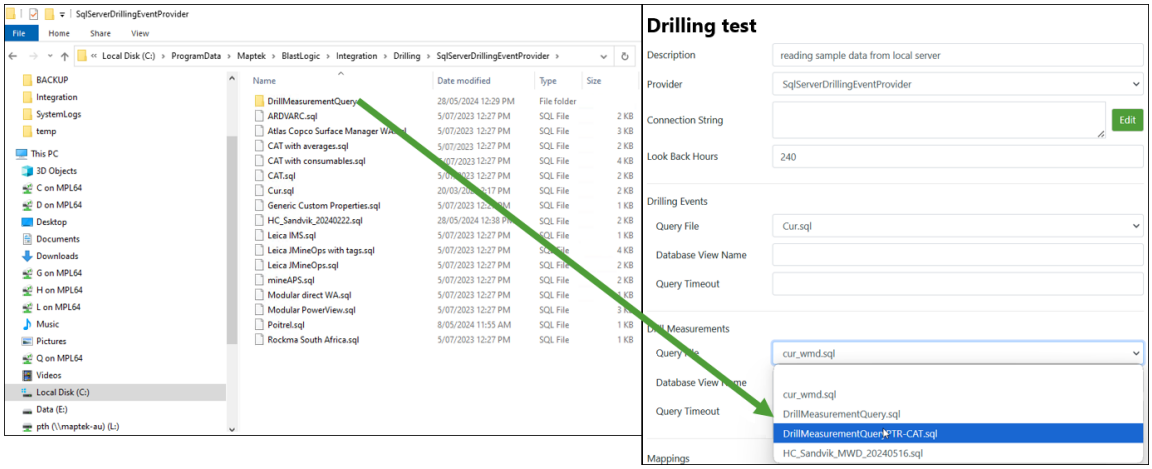

*Figure 8-6 The **Query File** drop-down in the **Drill Measurements** section of the **Sources** tab*

The drill measurements query file must contain the following compulsory fields:

- **Id**

  > **Note:** The **Id** should match the **Id** from the drilling events query file for that same hole.

- **Top**
- **Bottom**

All other fields are optional data types that you must add in the **Drill measurements** tab of the BlastLogic Desktop application (**Home** tab > **Setup** group > **Site** > **Drill measurements**.

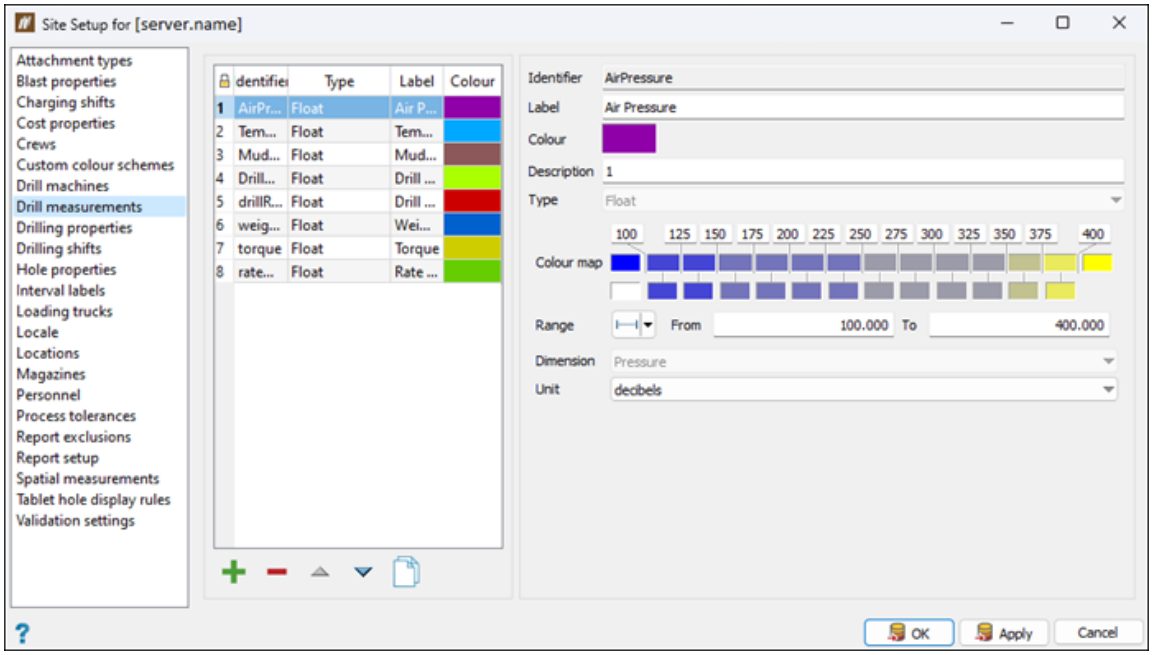

*Figure 8-7 The **Drill measurements** tab in the **Site Setup** panel in the BlastLogic Desktop application*

Example

The example below is based on a source view where most of the properties (except **Torque**) have slightly different field names to what has been set up in BlastLogic. The query (adaptor) file maps the properties together, as follows:

```
1  SELECT
2  [Hole_ID] as [Id],
3  [Start_Depth] as [Top],
4  [End_Depth] as [Bottom],
5  [Rpm] as [DrillRotationalSpeed],
6  [Weight_On_Bit] as [WeightOnBit],
7  [Torque],
8  [Rop] as[RateOfPenetration],
9  [Blastability] as [blastIndex],
10 [Rock_Type_ID] as [rockID]
11
12 FROM [SourceView] -- requires view to be provided in web interface
13 WHERE [Time_End] >= @StartTime AND [Time_End] < @EndTime
```

Figure 8-8 Mapping properties by a query file

The `[SourceView]` used in the line 12 of the query file allows you to use the web interface to reference the appropriate database view without having to modify the underlying adaptor file.

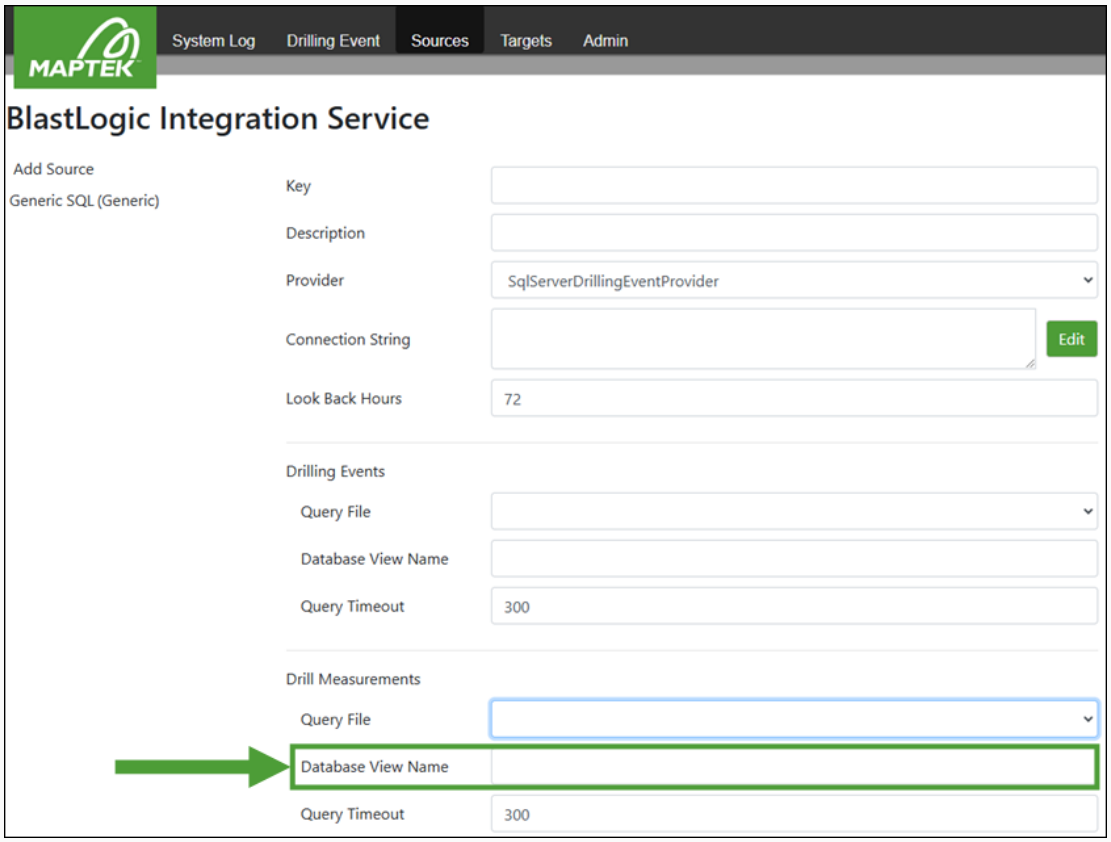

*Figure 8-9 **Database View Name** in the **Sources** tab of BLIS website*

You can also directly query the underlying data tables in the database.

When collecting the MWD data, BlastLogic ensures the data is consistent for both data sets. That is, if you identify a problem with the data in BlastLogic, then any modifications will be reflected accordingly in both data sets. Once the data is in BlastLogic and drill validation has occurred, the data can be exported from BlastLogic and opened in GeologyCore for interpretation. From GeologyCore, you can use automated and assisted strata picking tools and then either directly save these interval definitions back to the holes in BlastLogic or use them to create surfaces in GeologyCore and then import the surface into BlastLogic. Then you can assign the intervals, which is useful for when there are individual holes with missing or unusable drill data.