



Department
for Transport

TransXChange

Moving Britain Ahead

1. TransXChange

1-3 Publisher

The *TransXChange Publisher* is a standalone software tool that can be used to publish *TransXChange* compliant XML documents into a format that is easy to read and print. It also includes an option that will apply [additional integrity checks](#) to documents so that you can use it as a diagnostic tool to check they are consistent with various additional business rules.

The *TransXChange Publisher* is available as an executable that can be run on your own computer. The [latest version is available here](#).

The following are recent versions of the *TransXChange Publisher*

Version	Status	Date of issue	Download of ZIP	Prerequisite Java Runtime Environment
2.4_6	Current with support for 2.4 schema. Bing Maps Support	Sept 2015	Zip of TransXChange Publisher 2.4_6 (160Mb) (one minor bug fixed) See release notes in “readme” text file in zip. If you previously used version 2.1 You may need to revise revise your firewall settings to allow access to the Bing services.	JRE version 6.19 or later. TXC Schemas: 2.1, 2.4
2.4_5	Superceded Bing Maps Support	27/06/2012	Zip of TransXChange Publisher 2.4_5 (160 Mb) . Updated with minor fixes See Release notes . Note the publisher may take several minutes to start.	JRE version 6.19 or later. TXC Schemas: 2.1, 2.4

2.4_4	Superceded.. Bing Maps Support	18/04/2012	Superceded _ Updated with minor fixes See Release notes.	TXC Schemas: 2.1, 2.4
2.4_3	Superceded	10/02/2012	Superceded See Release notes.	TXC Schemas: 2.1, 2.4
Old			Archived	

Page last updated: 2016/10/05

Installing the Publisher

The *TransXChange Publisher* is available as an executable that can be run on your own computer. See publisher downloads.

Prerequisites for Running the TransXChange Publisher

1. Hardware

Publishing timetables is a computationally intensive process in terms of both memory usage and processor cycles and requires a computer with sufficient resources. Recommended minimum for a PC would be a 1.5 GHz processor and 512M of memory.

Note that the amount of memory allowed to the Publisher can be configured - see below for how to control publisher memory.

For Release v2.4_1 at least a MP size of at least 1024M is required - This is the default setting shipped with the Publisher

2. Operating System

The TransXChange Publisher is designed to run on Microsoft Windows platforms (Windows 2000, XP, etc). (It should run on any computing platform with support for the Java runtime, but only Windows is officially supported at this time.)

3. Java Environment JRE.

To run the publisher on your machine, you must first have installed the required version of the *Java Runtime Environment (JRE)* version. It is available free from <http://java.sun.com/download.html>.

Typically the Publisher will require the version of the run time current at the time of its creation, for example 2.1_1 requires JRE 1.4.2 or later, 2.4_0 requires JRE 6.1 or later. See downloads below for required version.

If you are unsure of your current Java version, do the following:

1. Open a command prompt
2. Type "java -version"
3. If you have Java correctly installed, you should see a message telling you the current version of Java.

If you do not have a sufficient version of the JRE installed you will not be able to run the publisher.

The default amount of memory configured for your Java VM may need to be increased. See below for how to control publisher memory.

4. Adobe Acrobat Reader

To view and print the pdf documents produced by the Publisher, you must have the [Acrobat reader](#) installed on your machine. The reader is available free from [Adobe](#).

5. Broadband Internet Connection

The enhanced version of the publisher (2.2a_1 and higher) includes some optional route map publishing features that require a broadband (512kbs or higher) internet connection. This is also required to read the on-line help text.

6. Firewall configuration

The route map publishing features access two we services. Your firewall must permit access to the domains from which these services run.

Installing the TransXChange Publisher

The TX *TransXChange Publisher* can be downloaded and installed as follows:

1. Download the publisher and saving the file to a directory on your machine. The file is a self-extracting zip
2. Make sure you have the required version of Java Runtime Environment (JRE) version installed.
3. Unzip the publisher distribution into a directory on your machine. You should see a list of files including those needed to run the publisher.
 - TX **TransXChangePublisher.exe** runs the desktop version of the publisher:
 - **publish.bat** runs the publisher from the command line (Deprecated).
 - The *documents* directory includes some sample documents you can use to try out the publisher.

The distribution package includes a local copy of the *TransXChange Schema* files: these are used to validate documents before publishing them. Note that the publisher ignores any schema location reference in a document being published and uses this local copy of the schema instead.

Configuring for a Proxy environment

The map publishing options of the publisher require an online internet connection to fetch stop and map data. If you are in a secure environment that requires use of a proxy, you may need to [Configure your Proxy settings](#) in order to use the map publishing.

Page last updated: 2013/04/19

Publisher 2.4_6

The *TransXChange Publisher* is a desktop software tool that can be used to publish *TransXChange* compliant XML documents into a format that is easy to read and print. The publisher can be used as a stand alone tool, off-line. It also includes a route mapping service which requires an on-line connections to fetch stop locations and maps.

Latest version of the Enhanced publisher

- [Download](#) the 2.4_6 Publisher (see “readme.txt” for release notes)
- TransXChange schema Versions [supported](#).

Further information

- How to [diagnose](#) publisher issues.
- How to [report](#) publisher issues.
- For further details on using the GUI, see on-line [help](#) .

For previous releases of the publisher see [Publisher](#).

Summary of Improvements

Version 2.4_6 is a new release of the *TransXChange Publisher* to support version 2.4 of the *TransXChange* schema and the use of BingMaps. You may need to update your firewall setting see ‘Troubleshooting’ section.

1. [List of Changes](#)

TransXChange Schema Version levels supported

The 2.4_6 version of the Publisher supports the following TransXChange Schema levels.

- 2.4 TransXChange
- 2.1 TransXChange

Downloading, Installing and Running the TransXChange Publisher

Please see the main [publisher page](#).

NOTE THAT the New release requires a new release of the Java Run time - [Java 6 v19 or higher](#). (Previous releases required only version 1.4.2)

Page last updated: 2016/10/05

Publisher GUI 2.4_5 - Help

The TransXChange Publisher allows users to render a TransXChange XML document into a human readable form suitable for printing. The Publisher Desktop GUI allows you to invoke the publisher easily from a Windows desktop environment.

You can use it to...

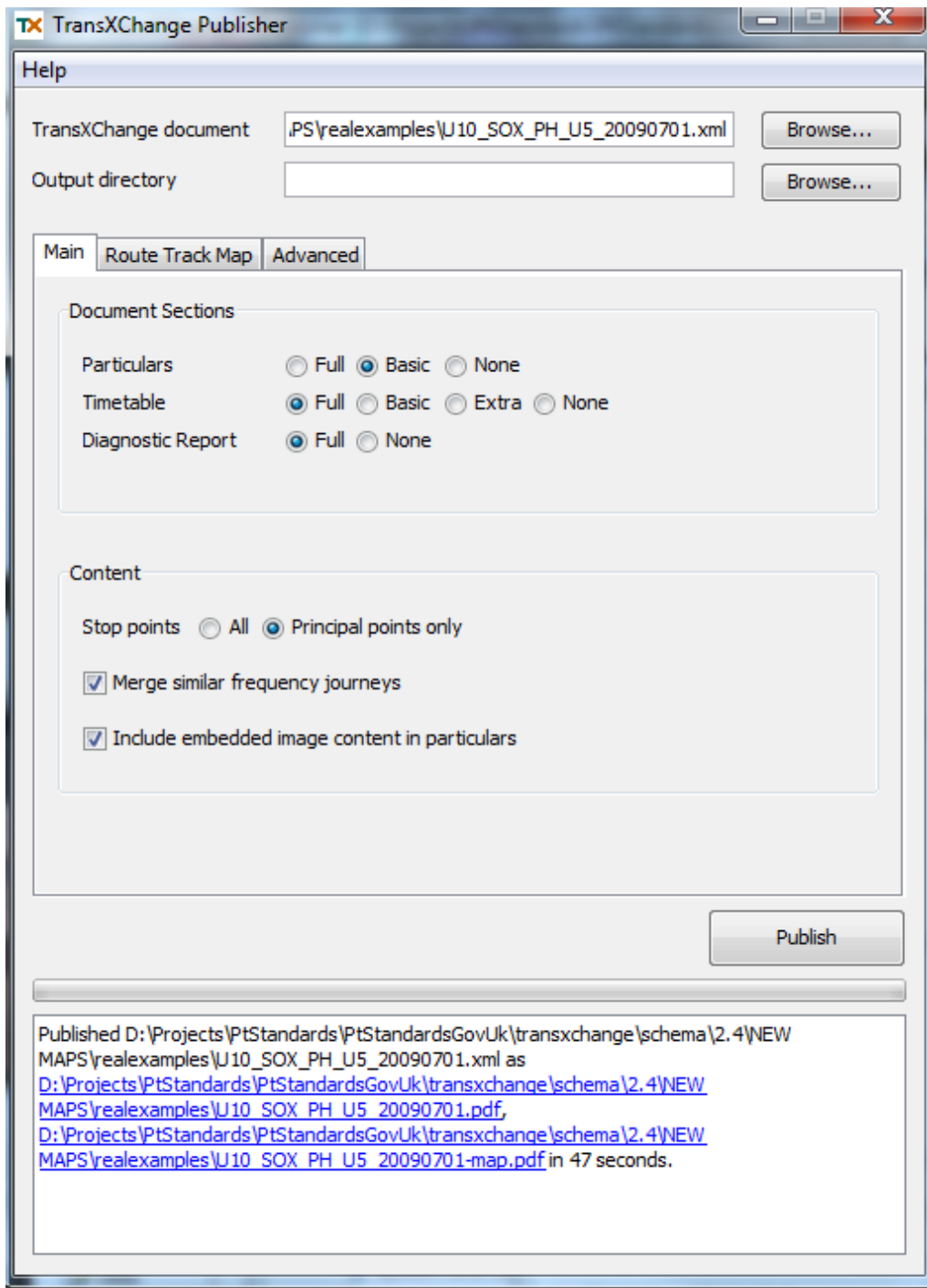
- Publish **registration particulars** from Registration TransXChange XML documents.
- Publish **timetable matrices** from TransXChange XML documents.
- Publish **route track maps** from TransXChange XML documents.
- Diagnose **validation** and **business rule errors** in TransXChange XML documents.

Read a summary of the steps involved in using the publisher (see 'GUI' section).

Overview

The Publisher Desktop GUI is a windows application with the following main areas:

- Menu bar. Application menus for accessing the help system.
- File choosers. Two file chooser boxes and browsers for choosing the input file and output directory.
- Input Options tabs:
 - Main tab. The main options for publishing.
 - Route Track Map tab. Options for publishing a route track map.
 - Advanced tab. Options for advanced use of the Publisher.
- Publish button. Press this to publish the document.
- Output console. Messages appear here after publication.



Menu bar

The **Menu bar** has a **Help** menu with two menu items:

- **About** This shows the version number of the publisher. (You should quote this if you ever need support.)
- **Online Help...** This opens these help pages in a browser window for the version of the publisher that you are running.

File choosers

There are two boxes below the menu bar.

- **TransXChange document.** The name of input file to be published. An error will occur if this box is left blank, or if the file doesn't exist.
 - **Output directory.** Where the output file (or files) will be published. Leave this blank to have output file(s) published in the same directory as the input file.
-

Main tab

The **Main tab** (illustrated above) provides options to control which document sections and content are included in the published output.

The Main Tab is made up of the following screen elements:

Document Sections

- **Particulars.** The particulars section includes a summary of the contents of the TransXChange file, (for example how many stops and journeys)) followed by a textual listing of the entities described in the file (such as operators, services, routes, and stops).
 - **Full** publishes all details from the TransXChange file. This is the default.
 - **Basic** publishes all required details from the TransXChange file for an EBSR registration. Omits certain additional informative values, such as alternative address, other operator code.
 - **None** omits the particulars section entirely.
- **Timetable.** The timetable section contains matrix timetables for the services in the TransXChange file. Separate timetables are generated for different services, directions (e.g. outbound and inbound), and day types (e.g. a Monday to Friday timetable, and a Saturday timetable).
 - **Full** publishes timetable matrices with footnotes. This is the default.
 - **Basic** publishes timetable matrices, but suppresses footnotes.
 - **Extra** is as for **Full**, but publishes an additional separate **Full** timetable in a file named `<inputfile>-timetable.pdf`.
 - **None** omits the timetable section entirely.
- **Diagnostic Report.** The diagnostics section contains a report detailing violations of consistency checks for the TransXChange document (over and above those expressed in the TransXChange XML Schemas alone). These are business-level rules that help enforce high quality data for TransXChange documents. See TransXChange Publisher Validation & Diagnostic Rules for more on which rules are used.
 - **Full** publishes a complete report. This is the default.
 - **None** omits the diagnostics section entirely.

Content

- **Stop points.** This option controls which stops appear in the particulars and timetable sections of the output.
 - **All** includes all stop points in the particulars and timetable sections.
 - **Principal points only** excludes non-principal timing points (and "other" points) from the particulars and timetable sections.
- **Merge similar frequency journeys.** If checked, then groups of consecutive vehicle journeys that are frequency-based (i.e. have **Frequency** elements specified) and have the same **EndTime** value will be published as a single three-column

frequency group in the timetable matrix. If unchecked, such vehicle journeys will be shown in the usual manner, as one journey per column.

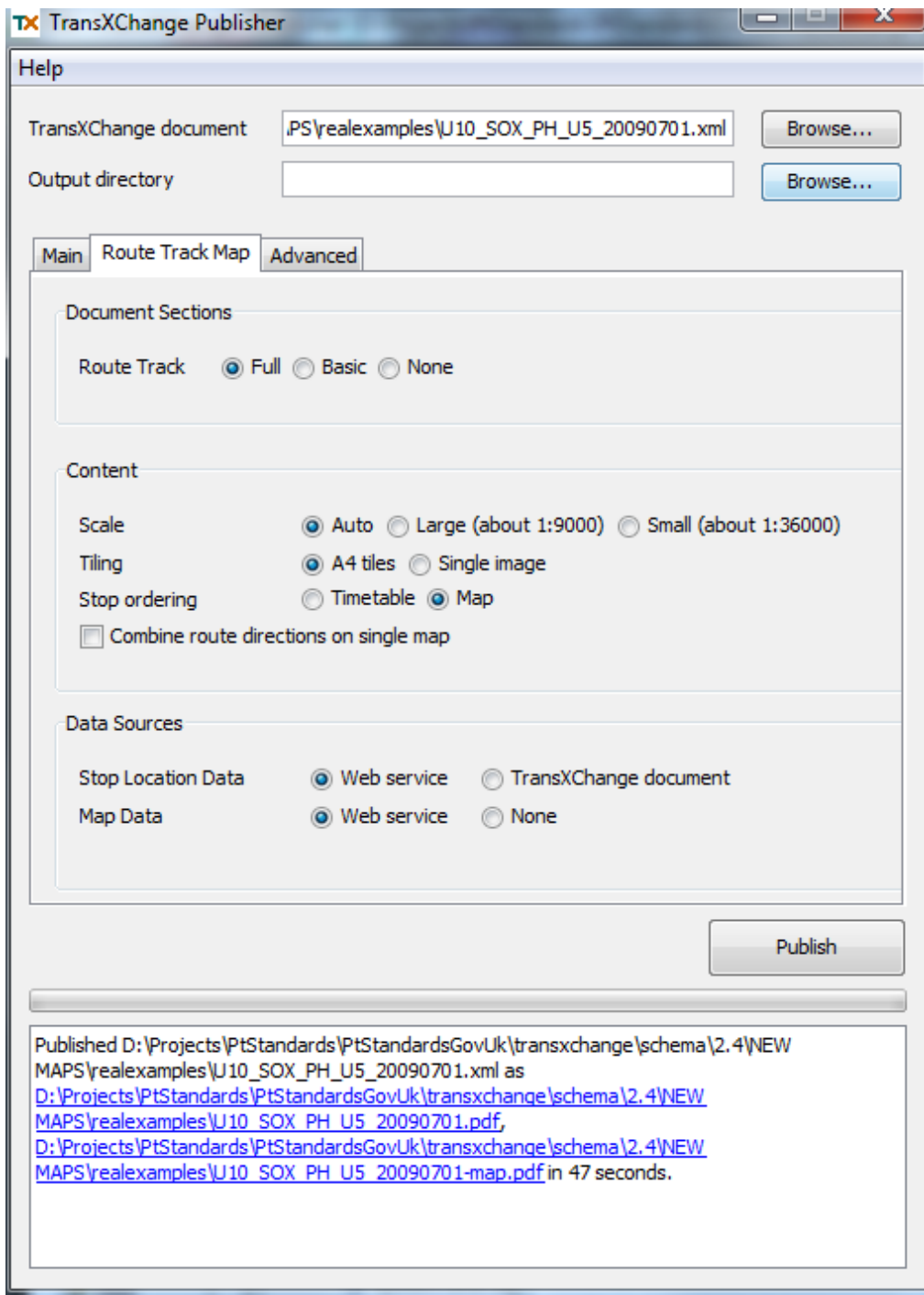
This option allows you to include separate detailed operational running times and operation data (e.g. run numbers) for the many individual journeys making up a frequent service in a document, but still publish and register the service concisely as a frequent service (i.e. as just three columns: one for the start times; one for the frequency -e.g. 'and then at least every 10 minutes'; and one for the end times).

- **Include embedded image content in particulars.** If checked, then any image resources specified in the TransXChange document (e.g. schematic maps) will be included rendered in the particulars section. If unchecked these secondary resources will be omitted from the published document.

Route Track Map tab

The **Route Track Map tab** (illustrated immediately below) provides options to control the appearance of a route track map (if any) in the output. The map is to support registration and is not for general commercial use.

To publish route map you need a broadband internet connection and the Publisher web services need to be available (see 'Troubleshooting' section).



The **Route Track Map Tab** is made up of the following screen elements:

Document Sections

- **Route Track.** The route track section is a separate document published in a file named *<inputfile>-map.pdf*. It consists of route plots for the services in the TransXChange along with an accompanying table of stops.
 - **Full** publishes a full route track.
 - **Basic** publishes a basic route track.
 - **None** omits the route track section entirely.

Content

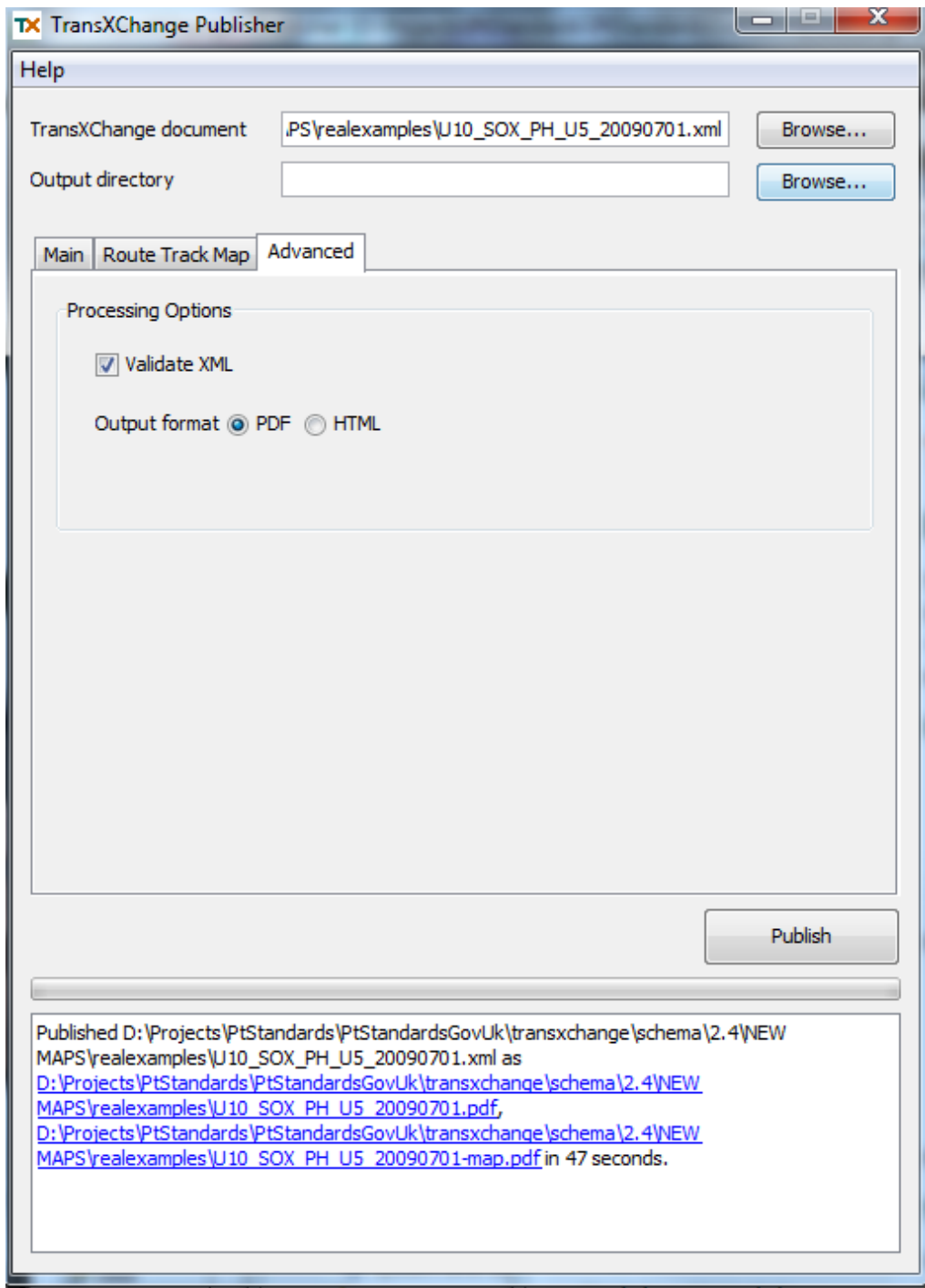
- **Scale.** This option controls the scale of the map tiles.
 - **Auto** : chooses a scale of Large or Small by looking at the extent of the route and using some simple rules to determine an appropriate level of detail.
 - **Large** (About 1:9000) Scale map to high resolution (Used for small routes)
 - **Small** (About of 1:39,000). Scale map to lower resolution (Uses fewer pages)
- **Tiling** This option controls how the map is split across pages.
 - **A4 tiles** splits the map into A4 size pages suitable for printing.
 - **Single image** scales the map to fit on a single page. This is appropriate for viewing on a screen using pan and zoom controls.
- **Combine route directions on single map.** If checked, then all directions for a route will be plotted on the same map. If unchecked, then a separate map is plotted for each direction.
- **Stop List Order.** Controls the order in which the stops are shown in the list of stops on a route track. In both cases stops are numbered on the map in North-South order.
 - **Timetable:** stops are listed in same order as they appear in the matrix.
 - **Map:** stops are listed in North-South spatial order.

Data Sources

- **Stop Location Data.** This option controls the source from which to obtain stop point location data for plotting stops described in the the TransXChange document using Annotated Stop References (i.e. references to stops in the NaPTAN database).
 - **Web service** uses the official NaPTAN Web Service as the source for the location for stop points (The location for locally declared stops will still be taken from the local definition). If you use this option then you must have internet connectivity in order to access the data.
 - **TransXChange document** uses the TransXChange document being published as the source for the location for annotated stop points. The Web service will not be used. If you use this option then the document must contain the required stop data locally. Only 2.2a or later schema stops can contain this data.
- **Map Data.** This option controls where map tiles are obtained from.
 - **Web service** uses the official Map Web Service as the map tile data source. If you use this option then you must have internet connectivity in order to access the data.
 - **None** turns off map tile retrieval. The route maps will be plotted with a blank background.

Advanced tab

The **Advanced** options tab (illustrated immediately below) provides advanced options to control the output of the publisher.



The **Advanced Tab** is made up of the following screen elements:

Processing Options

- **Validate XML.** If checked (the default), then the TransXChange document is validated against the XML Schema. The validating step for a large document takes some time. In order to save processing time you can uncheck this option if you have previously validated your document. Note that invalid documents may fail to publish in hard to diagnose ways, so it is not recommended that you disable validation.
- **Output format.** This option controls the format of the output documents.
 - **PDF** publishes as Adobe's Portable Document Format (the default). This format is fully supported and is suitable for printing.

- **HTML** publishes as HTML web pages. This format is for testing, and currently only supports publishing of timetable matrices. It is not suitable for printing.

Publish button

Press the **Publish** button when you have selected your options and are ready to publish your TransXChange document. The progress bar below the button will be animated while the publishing is underway. When the publishing has finished a message will appear in the Output console.

Output console

When a document has been successfully published a message will appear in the console including a **link to the output document**. Click on the link to see the published PDF. (It may take a few seconds to open Acrobat Reader if it is not already running.)

If there was a problem publishing a document then the console will display an error message. Have a look at the Publisher troubleshooting reference for further help.

Initial Defaults

The following are the initial defaults for the Publisher. these may be changed using the GUI.

The EBSR version of the publisher uses the default values.

Tab	Option	Defaults
Main	Particulars	<i>Basic</i>
	Timetable	<i>Full</i>
	Diagnostic Report	<i>Full</i>
	Stop Points	<i>PTP</i>
	Merge Similar Frequency Journeys Journeys	<i>Yes</i>
	Include embedded image	<i>Yes</i>
	Route Track Map	Route Track
Scale		<i>Auto</i>
Tiling		<i>A4</i>
Combine Route Directions		<i>No</i>
Stop List order (+TXC v2.4)		<i>Map</i>
Map Stop Location Data Source for Annotated Stop Point Refs		<i>Web</i>
Map Data Source		<i>Web</i>
Advanced	Validate XML	<i>Yes</i>
	Stop Data Output	<i>PDF</i>

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Desktop GUI

The TransXChange Publisher GUI interface allows you to run the publisher easily from a desktop environment, for example Windows XP or Windows Vista.

How to run the TransXChange Publisher Desktop GUI

1. Launch the TransXChange publisher application by double clicking on the TX *TransXChangePublisher.exe*.
2. Specify the document to be published either by entering the name of a document, or by selecting a TransXChange document to publish by clicking on *Browse....*
 - There is an example document (*linear.xml*) to publish in the *documents* directory in the base directory in which you installed the publisher.
3. Specify any other options as to content or output.
4. Click the *Publish* button.
5. When the document has been successfully published, a message will appear in the console at the bottom of the window. Click on the link to see the published PDF. Alternatively, if an error occurred during publishing it will be displayed in the console.

To resolve the cause of any errors see Troubleshooting.

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Troubleshooting

This page gives some guidance on resolving problems with running the TransXChange Publisher.

Problems launching the publisher

If the publisher will not start (from the GUI or command line), then check that you don't have another window with the publisher running in it. Only one instance of the publisher may run at any one time.

You must also ensure that you have the required version of the Java Jun time installed (e.g. Version 6.2 for publisher 2.4_2)

Possible causes of publishing problems

Documents may fail to publish for several different reasons:

- The XML of the TransXChange document is invalid, causing a failure of the initial document validation step.
- The XML of the TransXChange document is of a version level not supported by the publisher.
- There are problems accessing on-line web services. (This Applies to Enhanced Publisher .2a_1 and later only).
 - Your environment requires the use of proxy settings to access external web services. These must be configured - see later below.
 - A web service is not available for a requested function. (For example the NaPTAN stop services are required to publish route maps).
 - There is an error in the web service configuration settings of the publisher.
 - Not all the required data can be fetched leading to incomplete output.
- The publisher Java environment is not configured with enough memory. See out of memory errors.
- There is a bug in the publisher. See reporting issues below.

Errors are written to a log file, and displayed in the output window. The log file can be found in the *logs* directory.

Common Publisher Error Messages & Remedies

Error	Cause	Remedy
Invalid request. Cannot find input document: ...	No such TransXChange input document.	Correct the name or location of the TransXChange input document and try again.
Invalid request. Cannot find output directory: ...	The output directory specified does not exist.	Create the out directory (e.g. using Windows Explorer) and try again.

The process cannot access the file because it is being used by another process.	An output document already exists with the same name and is in use.	Close PDF document (from Adobe Acrobat) and try again.
Version not supported	The version of the schema is not supported by this version of the publisher	Use a version of the publisher that does support version level, or update the document to the next level.
Only the timetable section can be published in HTML format.	Invalid combination of publisher options.	Change selection values - specify None for all sections except the timetable, and try again.
Error while parsing document.	Invalid XML input document - does not conform to TransXChange XML schema.	Correct errors reported and resubmit. You might find it convenient to use an XML validation tool to find and correct errors more efficiently. See the Technical FAQ.
Options not available.	NaPTAN web service not available.	See below.

Firewall Settings & How to tell if the web services are available?

The Route Map options of the enhanced publisher require the use of a broadband internet connection and the availability of two separate on-line web services to fetch stop and map data. If you have a firewall that restricts access to certain sites then you need to ensure that it is configured to permit requests to the necessary domains.

- **NaPTAN Stop service** Since the transfer of NaPTAN data management from Landmark to DfT in May 2016, the NaPTAN stops web service is unavailable. A replacement web service was not developed due to lack of use of the old one. This will be reviewed during the discovery phase of the upgrade to the Publisher.
- **Map image service:** If you have specified map data should be retrieved from the map web service and the map service is completely unavailable, you cannot print a route map with a map image background. In this case the publisher will again fail early with the error message "*Got response code x from: y*"
 - Check that you have internet access. If necessary explicitly configure your firewall to allow any request beginning with <http://dev.virtualearth.net>
 - Check the availability of the map web service using a standard web browser.
 - Publisher v2_4_1 and later **Bing**:
 - Clicking on the following link should return a result an xml document.
 - **Bing service test on virtual earth :** <https://msdn.microsoft.com/en-us/library/ff701713.aspx>
 - **Bing Tile Test :** [click here to see a map](#)
 - It may be that the map service is exceptionally busy and is timing out in which case try again later.

Note: Even if the map service is not available, it is still possible to produce a schematic route map without a map background. Specify 'None' for the *Map data* option on the *Route map* tab. This will stop the publisher from attempting to use the map web service.

How to change the web service settings

1. Web service Configuration files

Some properties of the web services are configurable in the TransXchange Publisher application. There are separate configuration files for each web service. The web services are located in the `config` subdirectory of the publisher folders and are:

- **Stop data:** `../config/naptan.properties`
- **Map tiles:**
 - Publisher `v2_4.0` and earlier : DEPRECATED `../config/multimap.properties`
 - Publisher `v2_4_1` and later : `../config/bing.properties`

These files allow you to change the URL of the web service and also the number of retries attempted and the timeout period of the connection. The settings should not be changed unadvisedly.

2. Proxy Settings (nt credentials)

If you need to access external services via a secure proxy, then it is possible to configure the proxy access.

To get the publisher to use a named proxy host, add the following lines to the `TransXChangePublisher.l4j.ini` file in the root of the publisher directory, specifying the appropriate proxy settings:

```
-Dhttp.proxyHost=proxyHostName  
-Dhttp.proxyPort=portNumber
```

Setting Explicit proxy settings with `ntCredentials`

The user must be authorised to the proxy. This may be done explicitly using the `ntCredentials` file (see below) . However you do not need to need to configure the `ntCredentials` file if the application is run under a Windows session where the logged on user has access to the internet via the specified proxy. As the application is run under a Windows session then the application process assumes the identity of that user.

If you need to configure individual process access settings, then it is possible to do so using the following file:

- `ntCredentials.properties`

Within this file are four values:

1. `userName` - The user name. This should not include the domain to authenticate with. For example: "user" is correct whereas "DOMAIN\user" is not.
2. `password` - The password.

3. host - The host the authentication request is originating from. The computer name for the client machine.
4. domain - The domain within which to authenticate.

Location of configuration files

The TransXChange publisher has six configuration files, all located in the `../config` subdirectory of the publisher folders.

1. `application.properties` ; application settings
2. `ntCredentials.properties` ; proxy settings
3. `log4j.properties` ; log4j files properties : Memory and heap settings
4. `multimap.properties` ; web service settings (Deprecated): URL and timeout values for Publisher v2.4_0 and earlier
5. `bing.properties` ; web service settings : URL and timeout values for Publisher v2.4_1 and later
6. `naptan.properties` ; naptan web service

The configuration files can be moved to a different place if this is more convenient. Their location should be specified with the system property in the `TransXChangePublisher.l4j.ini` file located in the root of the publisher directory:

- `com.kizoom.transxchange.publisher.config.location`

What happens if there isn't enough memory?

The publisher is a portable application that runs on the Java Virtual Machine (VM). A Java VM can be configured to run in a certain amount of memory. If this is exceeded an "out of memory" error will occur. By default the Java VM memory limit is set to a sensible default appropriate for most timetables. However, for large TransXChange documents you may need to increase this allocation. You can do this simply by editing the configuration settings.

What happens if some of the on-line data is missing?

The publisher will typically use the web services to fetch a number of different items of data (i.e. stops and map tiles). This means there may be modes of partial failure if the publisher is able to fetch some but not all of the required data:

- **Stop Data:** If the NaPTAN web service cannot resolve all the stop data because the stops are not yet in the central NaPTAN database, the publisher will continue to produce output: it will draw on the map any stops for which it has location information, and mark in the route map stop index table any stops that it cannot plot. In this case the NaPTAN web service will also return a warning message which appears as a warning in the result pane of the publisher GUI.
 - To resolve missing stop coordinates you must either arrange to get the NaPTAN definition submitted - see www.dft.gov.uk/naptan/, or include a full

definition of the stop in the TransXChange document to be published using the **StopPoint** or **AnnotatedStopRef** tags.

- **Map data** If the publisher is able to retrieve the metadata about map tiles, but not all the map image themselves, the publisher will draw the map, filling in the background for just the areas for which it has received images. This may result in some blank sections of map in the resulting document. The publisher will produce the warning *"Did not successfully retrieve x out of y map tile images."*
 - This may occur either if the map service is busy or there is insufficient bandwidth to download the tiles fast enough, so that the publisher times out. A longer time out period may be set using the configuration settings (see 'Troubleshooting' section).

What happens if the map service is running slowly?

The publisher uses the map web services to fetch map tiles if route map options are selected. If the map service is running very slowly this can cause timeouts and exceptions.

- The values for timeouts on requests and the number of retries to attempt can be increased in the the `bing.properties` file.

How to report publisher issues

If you think the problem is due to a bug in the publisher you can report it to naptan.nptg@dft.gsi.gov.uk. When reporting bugs please always include the following.

1. The TransXChange XML document causing the publishing error.
2. Any options you are using to publish the document, such as route map, etc
3. The publisher version number. (See the **About** option on the Publisher Desktop GUI.
4. All log files from the publisher's `logs` directory.
5. Any contents of the GUI output console, or any output from the command line.
6. Any related information that may help.

Please check against the Technical FAQ and the known issues for the version of the publisher you are using before submitting a report. There may already be a workaround.

Diagnostics & Validation

The TransXChange Publisher includes a diagnostic function to apply additional consistency checks to *TransXChange* documents over and above those that can be expressed in the *TransXChange* XML Schemas alone.

The full list of integrity rules is published in the [TransXChange Schema Guide](#). This page provides a summary of the integrity rules that are implemented as diagnostic checks for the current publisher. When a document is published, any exceptions are shown in the validation report at the end of the published pdf document.

- Syntactic Validation.
- Semantic Diagnostics.
- Diagnostic Rules implemented by the Publisher.

Syntactic Validation Rules - XML: Schema validation

XML's inbuilt mechanisms are used in the *TransXChange* schemas to enforce a number of basic integrity checks of data within a *TransXChange* document. A document must satisfy these constraints, or it is not 'well-formed' and will not be processed further by the *TransXChange Publisher* or other XML tools.

XML enforced checks include:

- The **Naming, Order, Cardinality** and **optionality** of elements and attributes is enforced.
- **Data types** are specified for dates, times, durations and other common data types. For example times must be of the form *hh:mm:ss*
- Restricted values are enforced by **enumerations** - see individual tables of allowed values under the schema guide entry for different constrained elements.
- Some additional rules for encoding formatted elements are enforced by **regular expressions**. These can be used to specify which characters or digits may occur in which position of a value within a custom data type. For example, Registration numbers must have a particular format.
- **Minimum** and **maximum** lengths can be specified.
- **Uniqueness** and **keyref** constraints are enforced. These can be used to ensure that referential integrity is maintained within the document - i.e. that any element referenced by a cross reference is declared elsewhere in the document.

To check whether your document passes XML validation you can use an XML validation tool.

Performing schema validation takes some time on a large document. In the enhanced publisher you can suppress revalidation of a document that is already known to be correct using the GUI advanced options.

Semantic Integrity Rules - TransXChange Diagnostics

In addition to the syntactic integrity rules, *TransXChange* specifies a number of semantic rules that need to be applied by applications parsing a *TransXChange XML* document. These are subdivided into two categories:

- **Intrinsic Constraints** Consistency checks that can be applied without reference to external data. For many of these, a sensible recovery action can be taken.
- **Extrinsic Constraints** Checks of data values that require reference to an external source. Whether these need to be applied depends on the availability of the relevant data sets, and the purpose of the application.
 - The 2.1_1 version of the publisher make no external checks.
 - The 2.2a_1 and later versions of the publisher check for external NaPTAN references when using the route mapping option. Stops without data are listed in the route map key.

Rules are assigned a Severity		
Severity	Meaning	Action
1	Fundamental Inconsistency - Schedule cannot be accurately interpreted.	Report as serious error. Reject for registration.
2	Inconsistency - Default Remedial action possible, but statutory Registration requires clarification.	Report, apply remedy automatically. Reject for registration.
3	Inconsistency - Default Remedial action possible.	Report, apply remedy automatically.
4	Data reference does not exist in external source.	Report as missing.
5	Ancillary data reference does not exist.	Report as missing.
6	Minor data inconsistency.	Report, leave uncorrected.

Integrity rules - Implemented by the TransXChange Publisher

The TransXChange Publisher implements a subset of the integrity rules listed in the [TransXChange Schema Guide](#), including all severity 1 and severity 2 errors. Any exceptions are listed in a diagnostics section at the end of the published pdf document, with a severity.

- From the GUI, the checks shown are carried out by the Publisher if the option to include the diagnostics is selected .
- From the command line interface, diagnostics are produced unless the **novalidation** option is specified to suppress integrity rule checking.

Group	#	Rule Name	Description	Ca t	Sev	Remedy
Metadata	Dc1	Valid FileName	File name is made up of recommended elements.	Int	6	Allow, but give warning.
Registration	RG1	Justifications	Short term registrations must have at least one justification element (Severity 2 – i.e. required for submission).	Int	3	>Warning. (+TXC 2.4)

	RG2	New stops	<i>Only Cancellation may omit new stops required</i>	Int	4	Warning. (+TXC 2.4)
Serviced Organization						
	Eo2	Serviced Organization no cyclic References.	Parent or ancestor should not be self.	Int	3	Ignore parent.
Period						
	Tp1	Unique Operation Profile weeks	<i>PeriodicDayType/ Weeks</i> should be distinct.	Int	3	Ignore overlap.
	Tp2	Valid Date Ranges.	EndDate should be after StartDate on ValidityPeriod and other ranges.	Int	3	Use start date for both, and report.
Service						
	Sv2	Appropriate Service type.	The following combinations of ServiceClassification are not allowed. <ul style="list-style-type: none"> • NormalStopping and any other type except RuralService • ExcursionOrTour and any other type. 	Int	2	DEPRECAT ED (TXC 2+4)
Operator						
	Op2	Distinct Operator References	<i>RegisteredOperator</i> of a Service should not be the same as <i>AssociatedOperator</i>	Int	3	Ignore associated operator.
	Op3	Distinct Associated Operator roles.	Each <i>AssociatedOperator</i> should only be referenced once by a given service for a given role.	Int	6	Ignore duplicate references.
Route						
	Rs1	Linear routes.	In a sequence of RouteSection instances making up a given Route , the To/ StopPoint of the last link of a given RouteSection should be the same as the From / StopPoint of the first link of the succeeding RouteSection in the Route .	Int	1, p	Reject.
	Rs2	Route section link direction.	All route links in a route section should have the same Direction .	Int	6, p	Use first direction found.

	R11	Route Link sequence stop references.	In a collection of successive route links, 'To' stop point reference of previous link should be same as 'From' stop reference of next successive link.	Int	3, p	Ignore second usage.
	R12	Route Link distinct endpoints.	'From' and 'To' stop points of a RouteLink should be distinct, i.e. not the same.	Int	6	Allow, but issue warning.
	R14	Stop Type Usage	Within a given route Fixed stops (i.e. stops of type <i>MKD</i>) should not fall within the area of Hail and Ride stops (i.e. stops of type <i>HAR</i>)	Int	2	Report as disallowed (TXC+2.4
Journey Pattern	Jp1	Timing endpoints.	Start and end stops of a journey pattern should have a StopType TimingStatus of principle point.	Int	4, p	Treat as PTP regardless.
	Jp2	Distinct journey pattern Interchange References	Inbound and outbound journey patterns at an interchange should normally be distinct.	Int	6	Allow, but issue warning.
	Jps 1	Section Projection.	If there are route sections, then for each JourneyPatternSection , there should be a corresponding RouteSection with the same number of links.	Int	1 Not implemented	Reject.
	Jps 2	Linear journey patterns.	In a sequence of JourneyPatternSection instances making up a given JourneyPattern , the To / StopPoint of the last link of a given JourneyPatternSection should be the same as the From / StopPoint of the first link of the succeeding JourneyPatternSection in the JourneyPattern .	Int	1, p	Reject.
	Jptl 1	Journey Pattern timing link sequence	In a collection of successive timing links, 'To' stop reference of previous link should be same as 'From'	Int	6, p	Ignore second usage.

		stop references.	stop reference of next successive link.			
	Jptl3	Route Link Projection.	If a JourneyPatternTimingLink references a RouteLink , the start and end stops of both links should correspond. If the Direction of the JourneyPatternTimingLink is the same as that of the RouteLink , the respective start points should be the same and the respective ends point should be the same. If the Direction is opposite, the JourneyPatternTimingLink start point should match the RouteLink end point, and vice versa.	Int	1, p	Reject
Vehicle Journey	Vj1	Cyclic vehicle journey references.	Referenced VehicleJourney for link usage should not be self, either directly or <i>indirectly</i> .	Int	3, p	Ignore reference.
	Vj2	Vehicle journey link references.	If a VehicleJourney references a VehicleJourney for its link usage, there should be no VehicleJourneyTimingLink instances present for the referencing journey.	Int	3, p	Ignore links in referencing journey.
	Vj3	Mixed Frequency Group	In a group of journeys with the same end making up the same frequent service period, not all vehicle journeys in the group have the same minimum, maximum and scheduled frequencies or minutes past the hour.	Int	3, p	Use values from first (+TXC2.2)
	Vjtl1	Vehicle journey timing link projection.	For each VehicleJourneyTimingLink there should be a corresponding JourneyPatternTimingLink .	Int	1	Reject.
	Vjtl3	Short working reference.	Any ShortWorking / JourneyPatternTimingLinkRef instances should	Int	3, p	Ignore short working.

			<i>reference a timing link of the vehicle journey that contains it.</i>			
	Vjpl 2	Positioning link stop point.	One end of a PositioningLink sequence should reference a stop in the journey pattern.	Int	3, p	Ignore positioning link sequence.

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Foreword

Overtyping text below. Or, to import text from another Word document, copy the content to the clipboard and use the Safe paste button on the DFT ribbon.

Body text

Executive summary

Introduction

Please use the single number style (1. Main text) for paras (1, 2 etc.).

- 1 Overtyping text here

2. Overtyping chapter title

Heading 2

2.1 Number 1

3. Next Chapter

Heading 2

3.1 Number 1