

# THALES



**PROJECT WA119  
NATIONAL TRAFFIC INFORMATION SERVICE  
TRANSFORMATION PROJECT**

**EXTERNAL INTERFACE DESIGN DOCUMENT**

**Publish Services: DATEXII Webservice  
E21-DATEXII Subscribers**


WA119-08-007-002-03-02-21 v6.00

09 February 2015

Originator's signature & date

 9/2/2015  
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## ISSUE RECORD

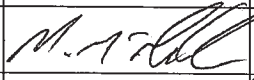
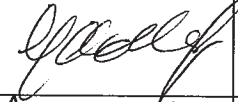

Issue	Date	Purpose
V0.01	17/07/13	First draft issue. Excludes some items, including the publication of Events. 'TBC's are included to mark incomplete items.  Mark McMullen
V1.00	12/09/13	Incorporated all comments on v0.01 from Matt Hayhurst (Thales), Pete Radford (NIS), Usman Shabbir (Thales) and issued at v1.00.  Note: this version of the document includes all functionality delivered with Release 2.4 of the NTIS sytem. Release 2.5 introduces the publication of Event data; to be included in the next version of the document.  Mark McMullen
V1.01	13/09/13	Updated to include: generic Event publishing information, and the specific design of Major Organised Events, Roadworks and Weather Events.  The design detail of Unforecast Events is still outstanding.  Mark McMullen
V1.02	02/10/2013	Added Unforecast Events.  Updated Appendix A – DATEXII Schema Extensions to include extensions required for Events publishing.  Mark McMullen

V1.03	18/10/13	<p>Added placeholder for Abnormal Load Events (future update).</p> <p>Updated Event publications (Message Content, General Notes, Data Item Descriptions and Data Type Mapping sections for each Event Type) to reflect changes to the Event data model.</p> <p>Refined the description of the geographical area of interest filter Subscription Option.</p> <p>Added the 'suspect equipment' flag to ANPR, MIDAS and TMU publications (Message Content, Data Item Descriptions and Data Validation sections for each publication type).</p> <p>Refined the definition of Event Location when the Event is off-network; for Weather and Major (parent) Events only (General Notes section for each Event type).</p> <p>Mark McMullen</p>
V1.04	03/12/13	<p>Added references to the DATD interface and the collection of TAME data; for completeness and consistency with other Publish Services EIDDs.</p> <p>Minor updates to the Event publications to reflect changes to the Event data model. These are in addition to those changes in v1.03 (see above).</p> <p>Refined the definition of Event Location when the Event is off-network; for Unforecast and Roadworks Events (General Notes section for each Event type).</p> <p>Added Abnormal Load Events.</p> <p>Added references, in the overview sections, to system links that import Event data.</p> <p>Barring any updates resulting from comments on this draft issue, the document is now complete, includes all functionality for Release 2.5 (final NTIS release) and is ready for formal issue @ v2.0.</p> <p>Mark McMullen</p>
V2.0	06/12/13	<p>Minor updates resulting from review comments received for v1.04 of the document.</p> <p>Mark McMullen</p>
V3.00	07/01/14	<p>Updated to resolve incorrect page numbering in the document. No changes made to document content.</p> <p>Mark McMullen</p>

V3.01	04/02/14	<p>Matrix Signal publications: added the raw 'aspect code' into the publication (Section 5.2.8) and extended the DATEXII schema (Annex A) to include new values, to more closely match the codes/descriptions in [ref 35] (newly-referenced document).</p> <p>Removed text describing 'Flooding' as an Unplanned Event sub-type (5.2.2.5): flooding had already been changed to the sub-type 'Obstruction' in the previous version of this document.</p> <p>Mark McMullen</p>
V4.00	13/02/14	<p>All comments on v3.01 addressed:</p> <ul style="list-style-type: none"> <li>- Minor typos, corrections.</li> <li>- E49-MIDASCatchUp interface added to the Interface Overview and References Sections; for information/completeness only, as it does not affect the rest of the document.</li> </ul> <p>None of the changes require further comment/review; document issued at v4.00.</p> <p>Mark McMullen</p>
V4.01	14/05/14	<p>Minor changes to the publication of Events, following changes to the way Events are managed (Section 5.2.2 + subsections):</p> <ul style="list-style-type: none"> <li>- Return to Profile and Return to Free Flow times are only included in Unplanned Event publications.</li> <li>- If an Event is Off Network or is an Unplanned Congestion Event, then no lane/road information is included in the Event publication.</li> </ul> <p>Event publications: clarified how individual lane statuses are interpreted by the system to provide a summarised carriageway status (Section 5.2.2.1.2).</p> <p>Mark McMullen</p>
V5.00	28/07/14	<p>No comments on v4.01 – updated to full issue v5.00.</p> <p>Mark McMullen</p>
V5.01	12/09/14	<p>Updated the descriptive text for the speed limit data item published in Roadworks Events (Section 5.2.2.4.3); to clarify the meaning of the item.</p> <p>Mark McMullen</p>
V5.02	06/02/15	<p>Managed Motorway Events are no longer published via this interface (refer to JIRA NTISTEST-4920). Document updated to remove all references to this Event Sub-Type from the list of Unplanned Event Sub-Types: Section 5.2.2.5.</p> <p>Mark McMullen</p>

V6.00	09/02/15	No comments on v5.02 – updated to full issue v6.00. Mark McMullen
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### APPROVAL RECORD

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# **EXTERNAL INTERFACE DESIGN DOCUMENT**

## **PUBLISH SERVICES: DATEXII WEBSERVICE**

### **E21-DATEXIISUBSCRIBERS**

## **1. Scope**

### **1.1 Identification**

This External Interface Design Document (EIDD) specifies the DATEXII Webservice interface between the National Traffic Information Service (NTIS) system and Subscriber systems. The document defines the characteristics of the interface in sufficient detail to provide a common understanding across the interface boundary.

The interface is uniquely identified within the NTIS system as E21-DATEXIISubscribers and referred to throughout this document, for brevity, as 'the interface'.

### **1.2 System Overview**

The NTIS system is described in the NTIS SSDD [ref 3].

The NTIS system includes a Publish Services subsystem. The primary operation of the Publish Services subsystem is to publish real-time data to Subscribers and to provide a reference data set, in the form of the NTIS Model, for subscribers to relate the real-time data to the NTIS road network. Additionally, a daily payload of all network events and traffic data is published.

The E21-DATEXIISubscribers interface is a component of the Publish Services subsystem; responsible for delivering real-time published data to Subscribers using the DATEXII specifications [ref 16] for data delivery and content.

### **1.3 Document Overview**

This document is based on the Interface Control Document Template [ref 14] and Interface Control Document Writing Guide [ref 15], components of the Thales Chorus 2.0 process management system. The document is tailored to accommodate NTIS-specific documentation guidelines.

The document is structured as follows:

- Section 1: Scope and introduction
- Section 2: References – documents and resources referenced from this document
- Section 3: Interface Overview – basic function and context of the interface
- Section 4: Interface Details – protocols, messages, operation and message sequences
- Section 5: Message Definitions – message content listings and descriptions

Section 6: Qualification of the interface

Section 7: List of Annexes

Annex A: DATEXII v2.0 Schema – NTIS extensions

Annex B: DATEXII v2.0 WSDL – listing and description

Annex C: Subscription Information – Subscriber options, system requirements, web service implementation and on-line resources

Annex D: Abbreviations and Glossary

## **1.4 Relationship to Other Documents**

This EIDD documents the interface design based on the system requirements specified in the corresponding interface requirements specification [ref 5]. The EIDD is one of a suite of EIDDs describing the design of the external interfaces of the NTIS system.



## 2. References

The following table lists the documents and resources referenced from this document.

Ref	Title	Document ID/Reference	Originator
1	Traffic Information 2011 Taxonomy	V4.0 20/09/2010	HA
2	NTIS Test Strategy	WA119-08-008-001	Thales
3	System/Subsystem Design Description for NTIS	WA119-08-007-002-02-02-04	Thales
4	NTIS Infrastructure – Architecture Definition	WA119-08-007-008-01	Thales
5	NTIS E21 DATEXII Subscribers External Interface Requirements Specification	WA119-08-006-03-02-21	Thales
6	NTIS External Interface Design Document Publish Services: NTIS Model Download E18-PublishNTISModel	WA119-08-007-002-03-02-18	Thales
7	NTIS External Interface Design Document Publish Services: Email E46-EmailSubscribers	WA119-08-007-002-03-02-46	Thales
8	TMU Handler Interface Specification	RFC01421	Serco
9	NTIS HATMS Gateway Service Functional Specification	Project ref: 1240/001 Document ref: FS007	IPL
10	INRIX-NTIS System Functional Specification	Project ref: WXCN095/TRS 001 Document ref: INFS001	INRIX
11	NTIS Traffic Data Service Functional Specification	Project ref: 1240/001 Document ref: FS006	IPL
12	RFC01419 – JTMS Handler Interface Specification	IFS00001	Serco
13	NTIS TIH Publisher	NIS-P-TIH-003	NIS
14	Chorus 2.0 Interface Control Document (ICD) Template	83510877-DDQ-GBR-EN-001	Thales

15	Chorus 2.0 Interface Control Document (ICD) Writing Guide	83511164-DDQ-GBR-EN-001	Thales
16	DATEXII website	<a href="http://www.datex2.eu">http://www.datex2.eu</a>	DG MOVE
17	DATEXII v2.0 Schema	No identifier, located at: <a href="http://www.datex2.eu/content/datex-ii-xml-schema-20">http://www.datex2.eu/content/datex-ii-xml-schema-20</a>	DG MOVE
18	DATEXII v2.0 Push WSDL	No identifier, located at: <a href="http://www.datex2.eu/content/datex-ii-exchange-psm-20">http://www.datex2.eu/content/datex-ii-exchange-psm-20</a>	DG MOVE
19	DATEXII v2.0 User Guide	No identifier, located at: <a href="http://www.datex2.eu/content/datex-ii-v20-user-guide-0">http://www.datex2.eu/content/datex-ii-v20-user-guide-0</a>	DG MOVE
20	DATEXII v2.0 Software Developer's Guide	No identifier, located at: <a href="http://www.datex2.eu/content/datex-ii-v20-software-developers-guide-0">http://www.datex2.eu/content/datex-ii-v20-software-developers-guide-0</a>	DG MOVE
21	DATEXII Extension Guide	No identifier, located at: <a href="http://www.datex2.eu/content/datex-ii-extension-guide">http://www.datex2.eu/content/datex-ii-extension-guide</a>	DG MOVE
22	IEEE 802.3 Standard for Ethernet	<a href="http://standards.ieee.org/about/get/802/802.3.html">http://standards.ieee.org/about/get/802/802.3.html</a>	IEEE
23	Transmission Control Protocol: DARPA Internet Program Protocol Specification	<a href="http://www.ietf.org/rfc/rfc793.txt">http://www.ietf.org/rfc/rfc793.txt</a>	Network Working Group
24	Internet Protocol: DARPA Internet Program Protocol Specification (IPv4)	<a href="http://www.ietf.org/rfc/rfc791.txt">http://www.ietf.org/rfc/rfc791.txt</a>	Network Working Group
25	Hypertext Transfer Protocol -- HTTP/1.1	<a href="http://www.w3.org/Protocols/rfc2616/rfc2616.html">http://www.w3.org/Protocols/rfc2616/rfc2616.html</a>	Network Working Group
26	Simple Object Access Protocol (SOAP) 1.1	<a href="http://www.w3.org/TR/2000/NOTE-SOAP-20000508/">http://www.w3.org/TR/2000/NOTE-SOAP-20000508/</a>	W3C
27	Web Services Description Language (WSDL) 1.1	<a href="http://www.w3.org/TR/2001/NOTE-wsdl-20010315">http://www.w3.org/TR/2001/NOTE-wsdl-20010315</a>	W3C
28	Extensible Markup Language (XML) 1.0 (Fifth Edition)	<a href="http://www.w3.org/TR/2008/REC-xml-20081126/">http://www.w3.org/TR/2008/REC-xml-20081126/</a>	W3C
29	The MIT License (MIT)	<a href="http://opensource.org/licenses/MIT">http://opensource.org/licenses/MIT</a>	MIT

30	World Geodetic System 1984 (WGS84).	<a href="http://www.dqts.net/wgs84.htm">http://www.dqts.net/wgs84.htm</a>	DQTS
31	European Terrestrial Reference System 1989 (ETRS89)	<a href="http://www.euref.eu">http://www.euref.eu</a>	EUREF
32	NTIS External Interface Design Document Publish Services: Daily Aggregated Traffic Data E33-PublishDATD	WA119-08-007-002-03-02-33	Thales
33	NTIS External Interface Design Document Event Collection E35-EventsInput	WA119-08-007-002-03-02-35	Thales
34	Traffic Control Centre TAME Project Data Extraction	TCC-TAME-0006	Serco
35	NMCS2 Data System Message and Site Data Header Code Register	MCH 1689 Issue J May 2011	HA
36	NTIS External Interface Design Document MIDAS Catch-Up E49-MIDASCatchUp	WA119-08-007-002-03-02-49	Thales

### 3. Interface Overview

#### 3.1 System Interfaces

Figure 3-1 illustrates the context of the interface (E21-DATEXIISubscribers) within the overall operation of the NTIS system.

The boundary of the interface is defined as the network interface on which the NTIS system sends and receives data to and from Subscriber systems.

The context diagram also includes the NTIS system external interfaces that are related to, or impact on, the function of this interface. The E<number>-<descriptor> ID is a unique external interface identifier within the NTIS system.

Note that the diagram omits any interface or external system that does not directly affect the Publish Services provided by the NTIS system.

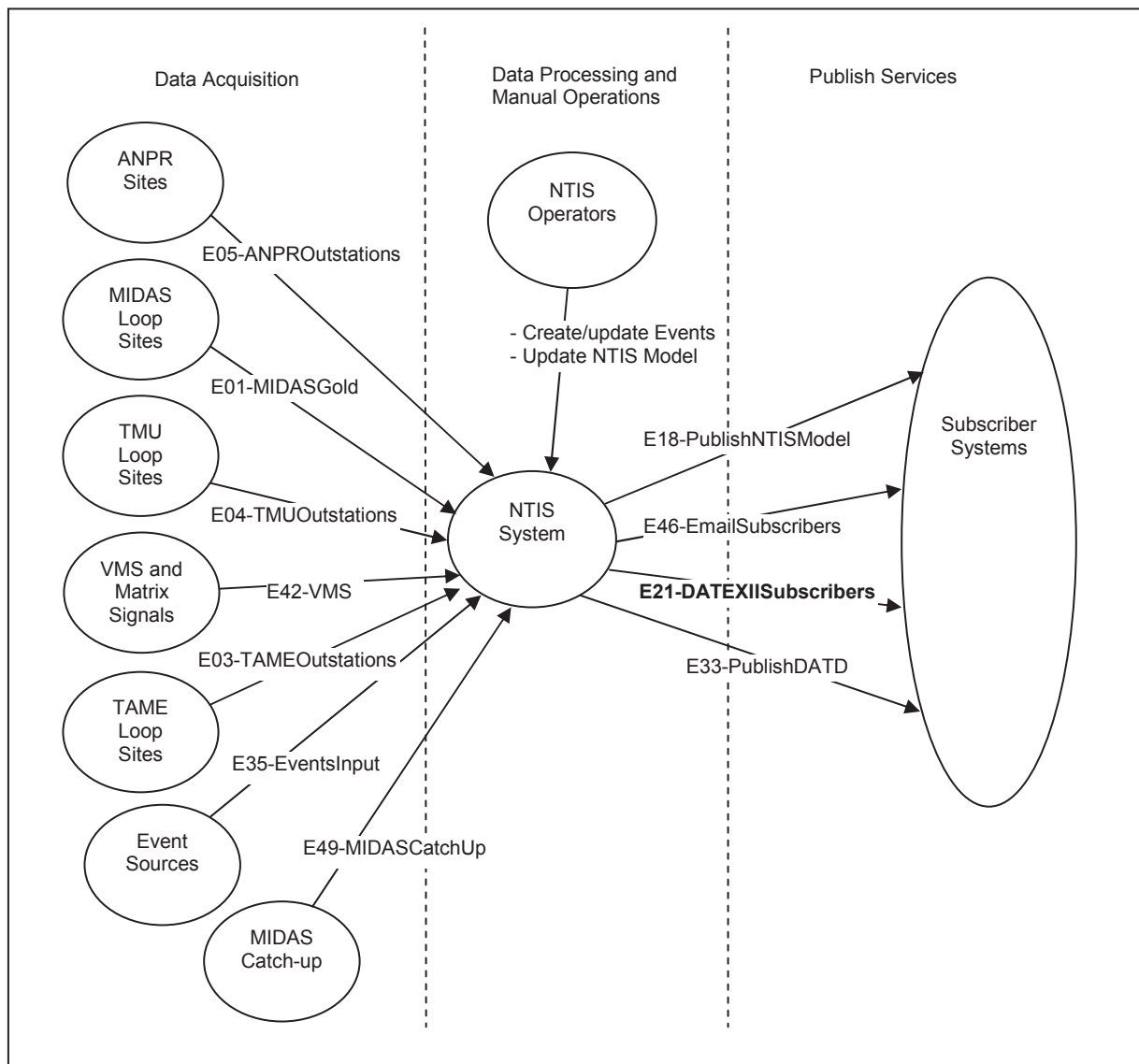


Figure 3-1 : Publish Services Context Diagram

#### Data Acquisition External Interfaces:

- E01-MIDASGold: the interface used to collect real-time traffic data from MIDAS Gold outstations. The interface is documented in [ref 11].
- E03-TAMEOutstations: the interface is used to collect daily traffic data from TAME outstations. The interface is documented in [ref 34]. Note: this data is not real time and hence is not published on the E21-DATEXIISubscribers interface, but is included in other Published Services and so is included for completeness.
- E04-TMUOutstations: the interface used to collect real-time traffic data from TMU outstations. The interface is documented in [ref 8].
- E05-ANPROutstations: the interface is used to collect real-time travel times from ANPR outstations. The interface is documented in [ref 12].
- E42-VMS: the interface is used to collect real-time VMS and Matrix Signal display status information. The interface is documented in [ref 9].
- E35-EventsInput : the interface is used to collect Events data and information from external sources. The interface is documented in [ref 33].
- E49-MIDASCatchUp : the interface is used to collect catch-up data from the MIDAS historical data repository [ref 36].

#### Publish Services External Interfaces:

- E18-PublishNTISModel: this interface is utilised to publish the NTIS Model to Subscribers. The NTIS Model contains reference data that is required to interpret the real-time data published on the E21-DATEXIISubscribers interface and is documented in [ref 6].
- E46-EmailSubscribers: this interface is utilised to publish data via email and is documented in [ref 7].
- E33-PublishDATD: this interface is used to publish the Daily Aggregated Traffic Data (DATD) to Subscribers. The DATD interface and publication are detailed in [ref 32].

The data acquisition source systems and interfaces, and the facilities provided to operators, are outside the scope of this document and are only detailed in this document where this affects the functionality of the interface.

### **3.2 Description of the Interface between the NTIS System and Subscriber Systems**

The interface is utilised to publish data to multiple Subscriber systems via the internet.

The interface employs a SOAP-based XML web service to deliver the published data. The NTIS system implements the client-side web service to deliver the published data, the Subscriber system the server-side endpoint to receive the data.

The interface delivers a number of different types of data (Published Data Types) to the Subscriber systems. The different Published Data Types are delivered as separate services. The Published Data Types delivered by the interface are listed in the table below.

Published Data Type	Description
ANPR Travel Times	Raw travel times, measured using number plate recognition between pairs of ANPR camera sites.
Events	Events affecting the traffic status of the road network; manually created and modified by operators of the NTIS system.
MIDAS Loop Data	Traffic data, measured from roadside loop sensors monitored by MIDAS Gold outstations.
NTIS Model Update Notifications	Message informing Subscribers that a new NTIS Model is available for collection.
Processed Traffic Data – Fused FVD and Sensor Data	Traffic data, derived from fusing and processing raw FVD and sensor (MIDAS/TMU loop, ANPR) traffic data.
Processed Traffic Data – Fused Sensor-only Data	Traffic data, derived from fusing and processing raw sensor (MIDAS/TMU loop, ANPR) traffic data.
TMU Loop Data	Traffic data, measured from roadside loop sensors monitored by TMU outstations.
VMS and Matrix Signal Data	VMS and Matrix signal display and status information.  Note that VMS and Matrix Signal data are included in the same service.

**Table 3-1 : Data Types Published on the Interface**

There are two publication mechanisms:

1. **Data Update:** data updates are sent to Subscribers on occurrence. That is, the data is published immediately when updated or new data is received by the NTIS system (traffic data, VMS/Matrix data) or when the states or values are updated internally within the NTIS system (Events, NTIS Model Update Notifications).
2. **Full Refresh:** under certain circumstances, a full refresh of all states and values of a particular Published Data Type is required to ensure that the Subscriber has a complete set of current information. The Full Refresh publication uses the same web service and data content and format as the Data Update publication.

Subscription Options, held and managed by the NTIS system, are utilised to specify which Published Data Types are published to the Subscriber. The Subscription Options also enable further filtering on the type and content of the data received by the Subscriber for each Published Data Type. Refer to Section 7.3 for details.

### **3.3 Description of the NTIS System**

The NTIS system function and operations are described in the NTIS SSDD [ref 3].

### **3.4 Description of the Subscriber System**

A Subscriber system is any system employed by a registered NTIS Publish Services Subscriber to receive published data. The Subscriber system must be capable of hosting the server-side endpoint of the web service and be accessible via the internet (refer to Section 7.3 for details).

The NTIS system maintains a number of Subscription Options for each Subscriber (refer to Section 7.3). The Subscription Options enable a Subscriber to specify a URL where the web service endpoint is implemented. The URL is specified per Published Data Type: hence, a Subscriber can utilise more than one Subscriber system to receive published data.

## 4. Interface Details

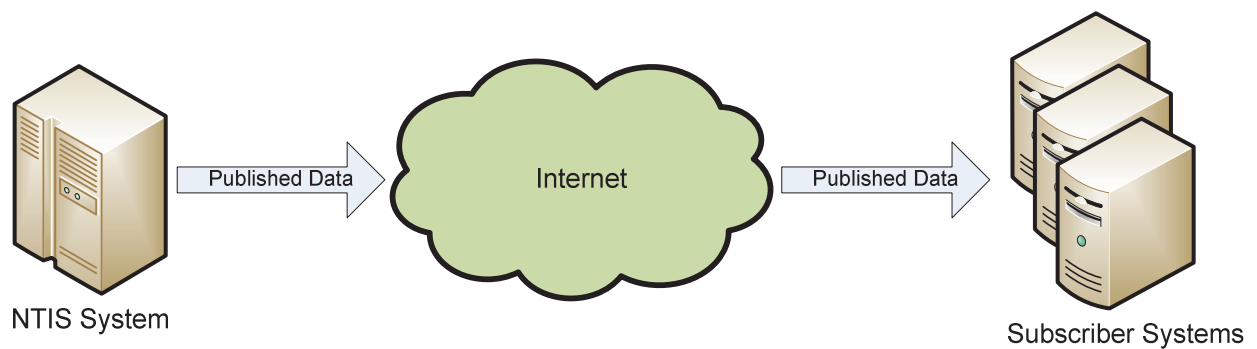
### 4.1 Physical

The NTIS system exchanges data with Subscriber systems via the internet.

The physical interface comprises standard networking components and transport mechanisms and protocols. The system network components provide a virtualised connection to the internet in a single interface.

This infrastructure provides a transparent communication path for the interface that requires no direct management from the interface itself. Hence, the physical make-up of the interface is not detailed further in this document. The networking components and system infrastructure are described in detail in [ref 4].

A simplified schematic representation of the physical interface is illustrated below.



**Figure 4-1 : Physical Interface Schematic**



## 4.2 Interface Protocols

The interface employs the protocols and specifications listed below.

Network Layer	Protocol	Utilisation
Link	Ethernet [ref 22]	Utilised for all network communications by the NTIS system; refer to the system infrastructure document [ref 4].
Transport	TCP [ref 23]	
Internet	IPv4 [ref 24]	
Application	HTTP v1.1 [ref 25]	HTTP is utilised for all communications on the interface.
	XML v1.0 [ref 28]	XML is used for all message content within the HTTP framework. Both SOAP and DATEXII utilise XML for data content formatting.
	SOAP v1.1 [ref 26]	The SOAP protocol is used to provide the basic messaging framework for the web service implemented by the interface.
	WSDL v1.1 [ref 27]	A WSDL is used to describe the web service and operations provided by the interface. The interface utilises the Push service WSDL provided by the DATEXII v2.0 standard [ref 18].  Refer to Section 7.2 for a listing and description of the WSDL.
	DATEXII v2.0 Schema [ref 17]	The standard DATEXII schema is used to format the content of the messages communicated over the interface.  This interface applies Level B extensions to the standard schema; as listed in Section/appendix 7.1.

**Table 4-1 : Interface Protocols**

## 4.3 Interface Messages/Data Exchange

### 4.3.1 Publish Data Message

The Publish Data Message is used for the delivery of all published data from the NTIS system to Subscribers.

The message utilises a HTTP POST request method to deliver data to the target system.

#### Message Header:

```
POST <target Request-URI> HTTP/1.1
Content-Type: text/xml;charset=UTF-8
Content-Encoding: gzip
soapAction: http://datex2.eu/wsdl/supplierPush/2_0/putDatex2Data
User-Agent: <NTIS HTTP client>
Host: <target Host>
Transfer-Encoding: chunked
```

#### Notes:

1. The content is compressed (with gzip), to optimise bandwidth for both the NTIS and Subscriber systems. The XML content of the message body can be of a considerable size and XML documents compress to a significantly smaller volume.
2. <target Host> and <target Request-URI> make up the Subscriber URL - the web service endpoint to which messages are delivered.
3. The message is used to implement the request method (*supplierMessage*) of the *putDatex2Data* operation, as specified in the standard DATEXII Push WSDL [ref 18], listed in Section 7.2. As the WSDL defines the SOAP binding as document/literal, the HTTP *soapAction* header element is used to communicate the operation to the target system.

#### Message Body:

The message body comprises:

1. A basic SOAP envelope, to ensure interoperability of the web service and compliance with the standard DATEXII Push WSDL [ref 18].
2. The XML payload; containing a single <d2lm:d2LogicalModel> element, as defined in the standard DATEXII Schema [ref 17].

The message body is listed below:

```
<SOAP-ENV:Envelope
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <d2lm:d2LogicalModel xmlns:d2lm=http://datex2.eu/schema/2/2_0
      modelBaseVersion="2"
      extensionName="NTIS Published Services"
      extensionVersion="2.0">
```

```

        <!-- d2LogicalModel payload -->
    </d2lm:d2LogicalModel>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

Notes:

1. The *extensionVersion* and *extensionName* attributes of the `<d2lm:d2LogicalModel>` are only included if the payload requires the NTIS-specific DATEXII Schema extensions: refer to Section 7.1 for details.
2. The content of the `<d2lm:d2LogicalModel>` element is dependent on the type of published data contained in the payload. The Published Data Types and corresponding payload content are detailed in Section 5.2.

### 4.3.2 Test Connection Message

The Test Connection Message is used to test the connection to a Subscriber. This message is used by the Data Update and Full Refresh Message Sequence whenever a publication to a Subscriber system fails.

The message utilises a basic HTTP GET request method. The message contains no content/body and is purely used to test the HTTP connection; to determine whether the Subscriber web service endpoint is healthy and ready to receive further publications (refer to Section 4.4.2).

Note that this message is a NTIS-specific extension to the standard DATEXII v2.0 Push service.

#### Message Header:

```

GET <target Request-URI> HTTP/1.1
User-Agent: <NTIS HTTP client>
Host: <target Host>
Accept: text/html, image/gif, image/jpeg *; q=.2, *.*; q=.2
Connection: keep-alive

```

Notes:

1. `<target Host>` and `<target Request-URI>` make up the Subscriber URL - the web service endpoint to which messages are delivered.

#### Message Body:

None.

## 4.4 Interface Functionality

The interface provides a push service; all communications comprise unsolicited transmissions from the NTIS system to individual Subscriber systems. The interface requires no requests from the Subscriber systems, or acknowledgement of received messages.

The advantages of a push service include: reduced interface complexity, a simpler implementation for the Subscriber and data delivered to Subscribers without delay.

The interface utilises a web service to deliver published data to Subscriber systems.

The web service adheres to the DATEXII v2.0 Push WSDL [ref 18] and is based on the push service operation described in the DATEXII User Guide [ref 19] and Developer's Guide [ref 20].

The DATEXII v2.0 Push WSDL defines both a data publication message and a response. The NTIS system implements the publication message (as a Publish Data Message). The response message can be implemented by the Subscriber system, but is ignored by the NTIS system.

The data content of the published data adheres to the standard DATEXII v2.0 Schema [ref 17] with extensions applied specifically for the NTIS Publish Services interfaces (refer to Section 7.1).

### 4.4.1 Publication Operation

The interface publishes a number of Published Data Types to multiple Subscriber systems. Subscription Options (Section 7.3) are specified for each Subscriber:

1. Subscribers can receive data for a single instance of one or more of the Published Data Types.
2. Each received Published Data Type instance can be received on a separate URL, or a URL shared with another Published Data Type received by the Subscriber. The URL defines the target server-side endpoint for the web service.
3. Received data can be filtered on a number of criteria, per Published Data Type, to restrict the data published to the Subscriber.

To accommodate the multiple Subscriber systems, URLs, Published Data Types and Published Data Type-specific data filtering, each Subscriber/Published Data Type combination is managed as a separate, autonomous service and each publication transaction is atomic.

There are two types of publication:

1. Data Update: data updates are sent to Subscribers on occurrence.
2. Full Refresh: a Full Refresh of all data states and values is published to a Subscriber.

For both operations, the data published to a Subscriber is filtered and modified according to the Subscription Options specified for the Subscriber. Subscription Options are detailed in Section 7.3.2.

The message sequences utilised to implement these publications are detailed in Section 4.4.2.

The types of publication operation are illustrated in the activity diagrams, below.

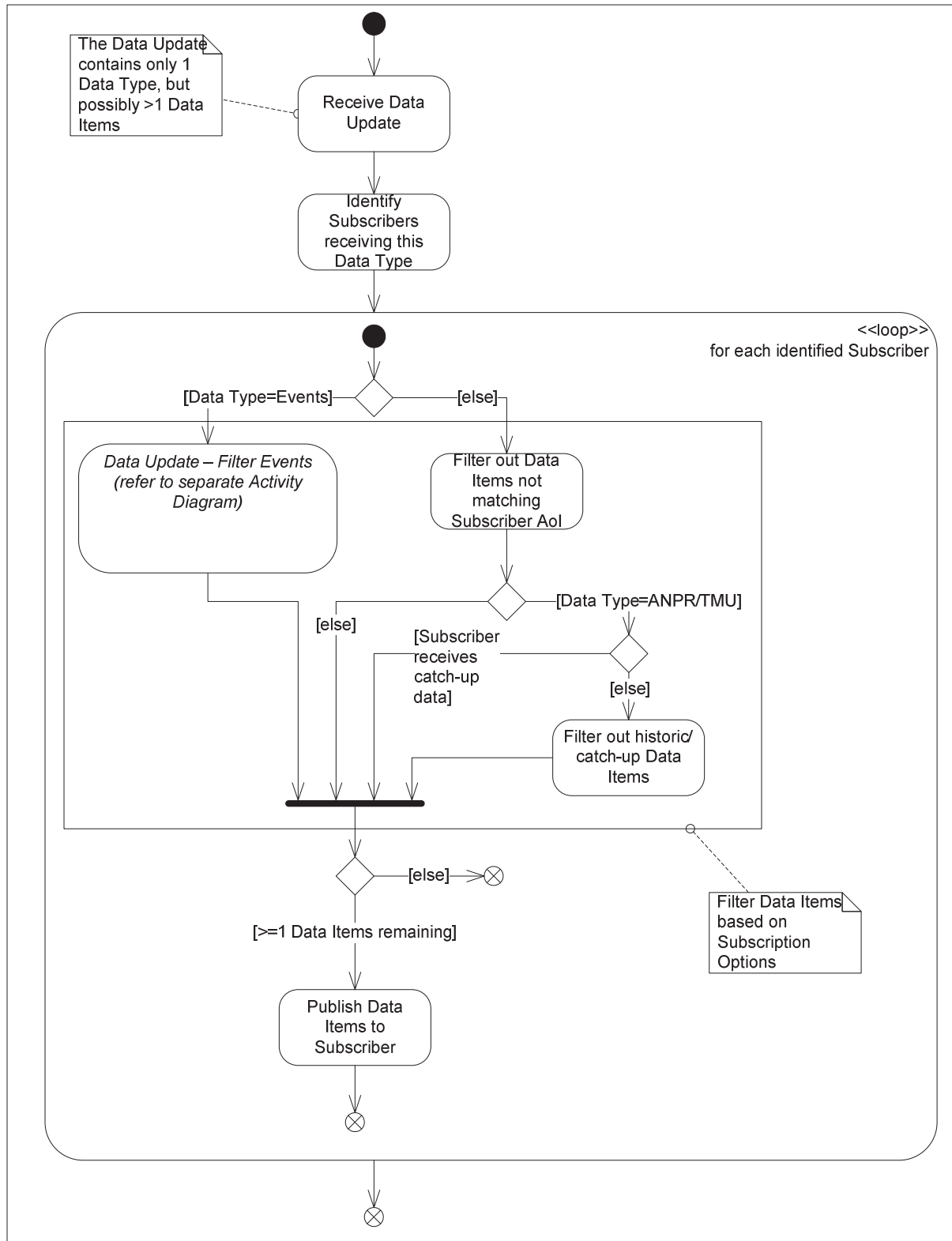


Figure 4-2 : Data Update Publication Activity Diagram

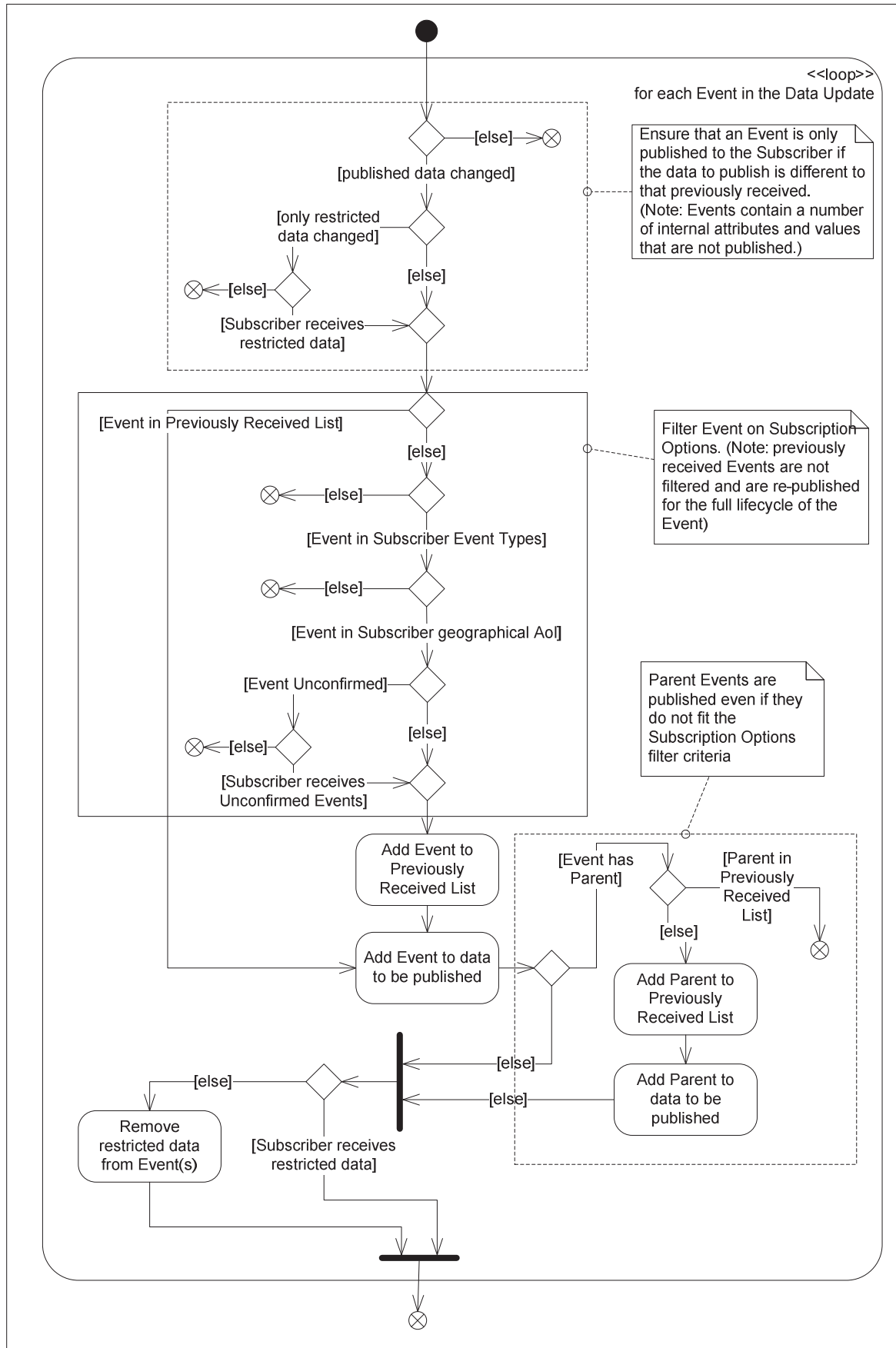
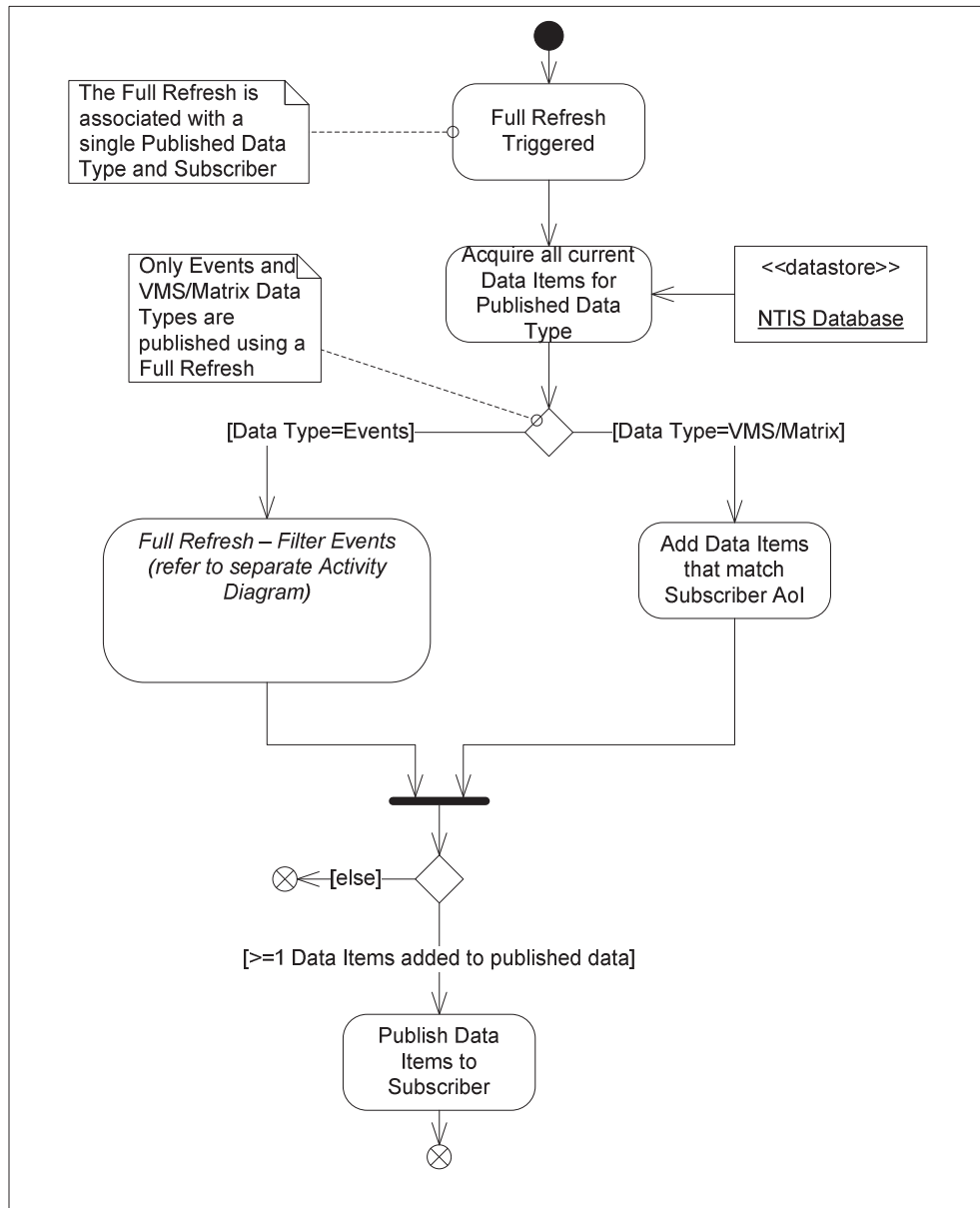
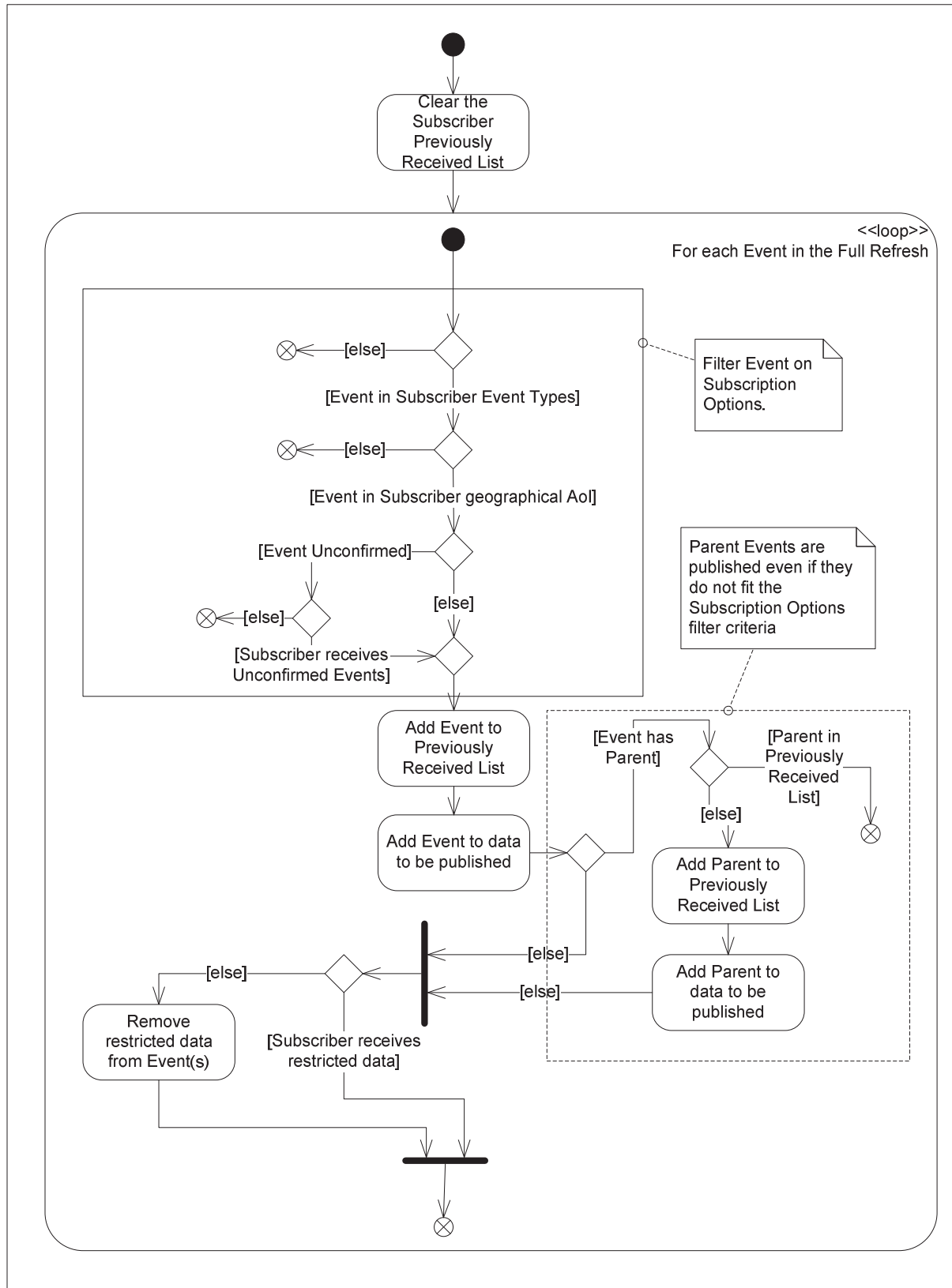


Figure 4-3 : Data Update - Filter Events Activity Diagram



**Figure 4-4 : Full Refresh Publication Activity Diagram**





**Figure 4-5 : Full Refresh – Filter Events Activity Diagram**

#### **4.4.1.1 Published Data Type-Specific Functionality**

##### **4.4.1.1.1 TMU/ANPR/MIDAS**

The Subscription Options, applied per Subscriber, include the option to receive catch-up data. Catch-up data is only available for the following Published Data Types:

- ANPR Travel Times
- TMU Loop Data
- MIDAS Loop Data

Catch-up data is locally buffered by the source measurement outstations and site collection systems whenever a communication link to the NTIS system is unavailable. When communications are re-established, the historical catch-up data is sent to the NTIS system and subsequently published.

This data is filtered out of the publications sent to a Subscriber unless the associated Subscription Option specifies the receipt of catch-up data.

##### **4.4.1.1.2 All Real-Time Data**

All real-time\*\* data can be filtered on geographical areas of interest (AoI). The AoI is specified per Published Data Type as part of the Subscription Options. Refer to Section 7.3.2 for Subscription Option details.

Note\*\*: all Published Data Types published on this interface are considered real-time except for NTIS Model Update Notifications, as they are not location-specific.

##### **4.4.1.1.3 Events**

###### **4.4.1.1.3.1 Publication On Change**

An Event Data Update message is only published to a target Subscriber if the data contained in the publication differs from that previously received by the Subscriber:

1. Previously published data item(s) change in value.
2. New data item(s) are included in the publication.
3. Data item(s) are removed from the publication.

This determination is made on a per-Subscriber basis, as different Subscribers may receive different data content (the Subscription Options specified for the Subscriber may suppress certain data items, such as restricted information).

A Data Update for a newly-created Event is always published as the Event has not previously been received by any Subscriber.

###### **4.4.1.1.3.2 Event Lifecycle**

Once an Event has been published to a Subscriber, the Subscriber continues to receive Data Updates for the Event for the complete lifecycle of the Event.

The first time an Event is published to a Subscriber, the Event is added to a Subscriber-specific Previously Received List.

Data Updates for an Event in the Subscriber's Previously Received List are published to the Subscriber, even if the updated Event now falls outside the filter criteria specified in the associated Subscription Options.

On a Full Refresh publication:

1. The Previously Received List, held for the Subscriber, is cleared.
2. A Full Refresh publication only contains Events that fully adhere to the filter criteria specified in the Subscription Options.
3. All Events contained in the Full Refresh are added to the Subscriber's Previously Received List.

#### **4.4.1.1.3.3 Event Types**

The Events Published Data Type can be filtered on the Event Type(s) specified in the Subscription Options (refer to Section 7.3.2).

Events that do not match the Event Type(s) specified in the Subscription Options are filtered out of publications to the Subscriber.

#### **4.4.1.1.3.4 Completion and Deletion**

An Event can be set to Completed (the Event has terminated) or Deleted (the Event is no longer valid) in the NTIS system. Once Completed or Deleted in the NTIS system, the Event is considered to be at the end of its lifecycle.

The transition to a Completed or Deleted state cannot be reversed.

The Event Completion or Deletion state change is communicated in a Data Update publication, to inform Subscribers that the Event has reached the end of its lifecycle. This publication is only sent once.

Completed and Deleted Events are not included in Full Refresh publications.

#### **4.4.1.1.3.5 Event Confirmation**

Events can be in either a Confirmed or Unconfirmed state. Once Confirmed, Events can be reset to Unconfirmed at any time; and vice versa.

A Subscription Option is used to specify whether a Subscriber receives Unconfirmed Events. Unconfirmed Events are filtered out of any Data Update or Full Refresh publication to a Subscriber that is not specified to receive Unconfirmed Events.

#### **4.4.1.1.3.6 Event Associations – Tight Coupling**

Tightly-coupled associations between Events take the form of a parent-child relationship. There is a single level of association: a parent Event cannot have a parent, a child event cannot have a child.

This type of association is applicable to:

1. Roadworks Events: the parent Event is the roadworks scheme, the child Events are the individual roadworks.
2. Major Events: the parent Event is the Major Event itself, the child Events are the consequential Events, caused by the Major Event.

When a child Event is published, the parent Event is automatically published to the Subscriber; even if the parent Event falls outside the filter criteria specified in the Subscription Options. This enables Subscribers to relate the child Event to the overarching or governing Event. The parent Event is added to the Subscriber-specific Previously Received List.

Note: if the parent Event has already been added to the Previously Received List (it may fall within the filter criteria specified for the Subscriber, or a child/parent update has already been published), then it is not published with child updates.

This association functionality applies to both Data Update and Full Refresh operations.

The parent-child association relationship is included in the published Event data: refer to Section 5.2.2 for details.

#### **4.4.1.1.3.7 Event Associations – Loose Coupling**

Events can be loosely associated. There is no defined relationship structure or constraints on these associations: multiple associations, circular associations, multiple levels of association and so on are all valid.

Hence, unlike tightly-coupled associations, associated Events are not automatically published alongside the original Event; to avoid overloading Subscribers with unnecessary/unwanted associated Events.

All Events associated with a published Event are included, by reference, in the Event publication (refer to Section 5.2.2 for details). It should be noted that the association may refer to an Event outside the Subscriber's current filter criteria, depending on the specified Subscription Options.

#### **4.4.1.1.3.8 Restricted Information**

Events may contain restricted information; not intended for consumption by the general public.

The restricted information contained in Events is only published to Subscribers that are configured, via the associated Subscription Options, to receive restricted data. For a Subscriber without permission to receive restricted information, the Event is published with the restricted data items removed.

The filtering out of restricted data items in a publication is dependent on the data items included in the publication and the Event Type; refer to Section 5.2.2 for details.

#### **4.4.2 Message Sequences**

There are two types of push service employed by the interface, with different message sequences, as detailed in the following sections.

The message sequences are diagrammatically represented in Section 4.5.

##### **4.4.2.1 Data Update Message Sequence**

The Data Update Message Sequence is used to publish data that is stateless, real-time and frequently and constantly updated.

Data updates are published on occurrence, utilising Publish Data Messages. Whenever the NTIS system receives data updates from external sources, or data is updated internally within the system, the data is processed and published to Subscribers immediately.

There is no batch or periodic processing of updated data during the publication process. However, the NTIS system may receive multiple items of data from a source system that batches together updates before sending the updates to the NTIS system. In this case, multiple updates may be published in the same Publish Data Message.

There is no retry mechanism on failure: it is not essential to receive every data update, as there are no state transitions, and subsequent updates are published within a short period of time.

No response is required from the Subscriber system.

This message sequence is employed to publish the following Published Data Types:

1. Raw Traffic Data: MIDAS, TMU and ANPR
2. Processed Traffic Data

Note: although not fully meeting the criteria for real-time or frequently updated, NTIS Model Update Notifications are also published using this method.

##### **4.4.2.2 Data Update and Full Refresh Message Sequence**

The Data Update and Full Refresh Message Sequence is used to publish data types that are stateful and updated infrequently.

The normal operation of this message sequence is to publish data updates to the Subscriber; as per the basic Data Update Message Sequence.

In addition to this normal operation, the Subscriber receives a Full Refresh of all data states and values under the following conditions:

1. The NTIS system, or Publish Services component, (re)starts.
2. The Subscription Options that determine the scope and content of the data published to the Subscriber changes, or the Subscriber is initially created in the NTIS system. This applies only when the change to the Subscription Options results in a change to the data content, scope or types of data published to the Subscriber.

3. The NTIS system fails to publish a message to the Subscriber. Note that the failure of the message does not rely on any response from the Subscriber; the failure is determined by the underlying data exchange protocol.

If the full refresh is triggered by a publication failure, then the NTIS system periodically issues Test Connection Messages to test the connection of the Subscriber system. If it is determined that the Subscriber system is healthy, then a Publish Data Message is issued to update the Subscriber with all values and states to which the Subscriber receives data. During the full refresh delivery (which may contain a large amount of data), data updates intended for the Subscriber are buffered. Following a successful full refresh, the buffered data updates are published to the Subscriber, together with new data updates, using the normal operation and Publish Data Messages.

No response is required from the Subscriber system for any of the Publish Data or Test Connection messages.

If any of the Publish Data Messages fail, then the NTIS system returns to periodically issuing Test Connection Messages to test the connection of the Subscriber system; and the message sequence repeats.

If the Full Refresh is triggered by a non-failure condition, the operation is as described above, but the initial connection test is not performed; the full refresh Publish Data Message is issued immediately.

This message sequence is employed for the following Published Data Types:

1. Events
2. VMS/Matrix Signal Data

## 4.5 Sequence Diagrams

The sequence diagrams, below, illustrate the message sequences utilised by the interface. The message sequences and the scenarios in which they are used are described in Section 4.4.2.

All NTIS-Subscriber message names in the diagrams are purely logical, for the purpose of clarifying the operation. The *publish\*()* messages are all Publish Data Messages, the *connectTest()* message is a Test Connection Message. Refer to Section 4.3 for a list of message types.

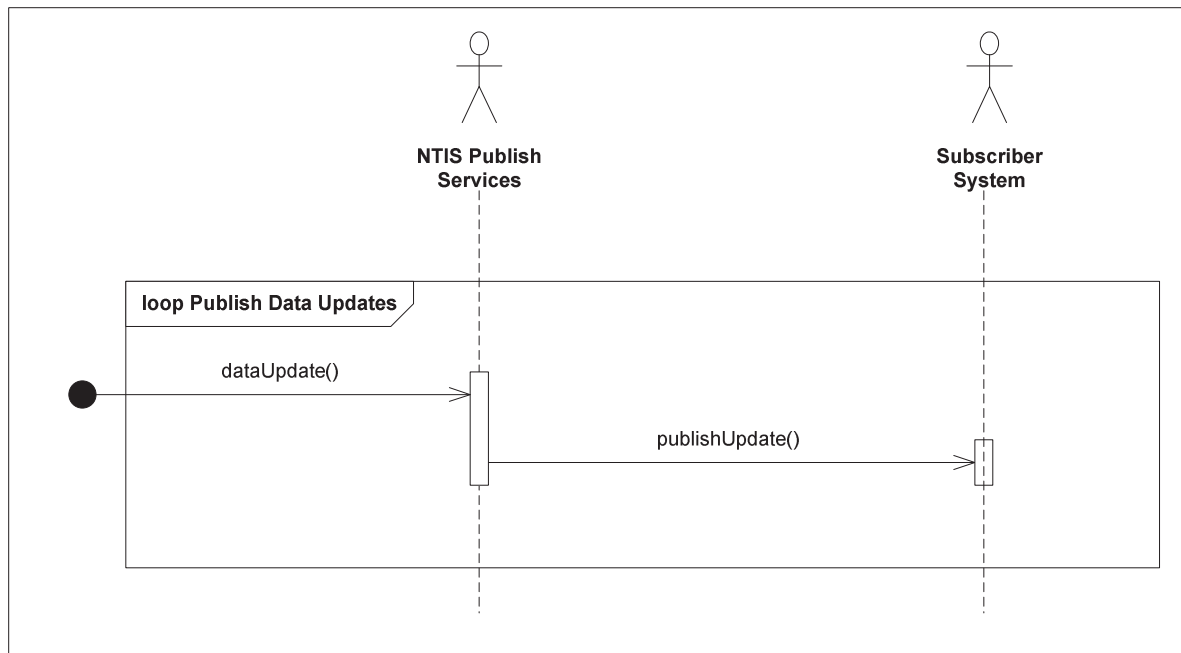


Figure 4-6 : Data Update Sequence Diagram

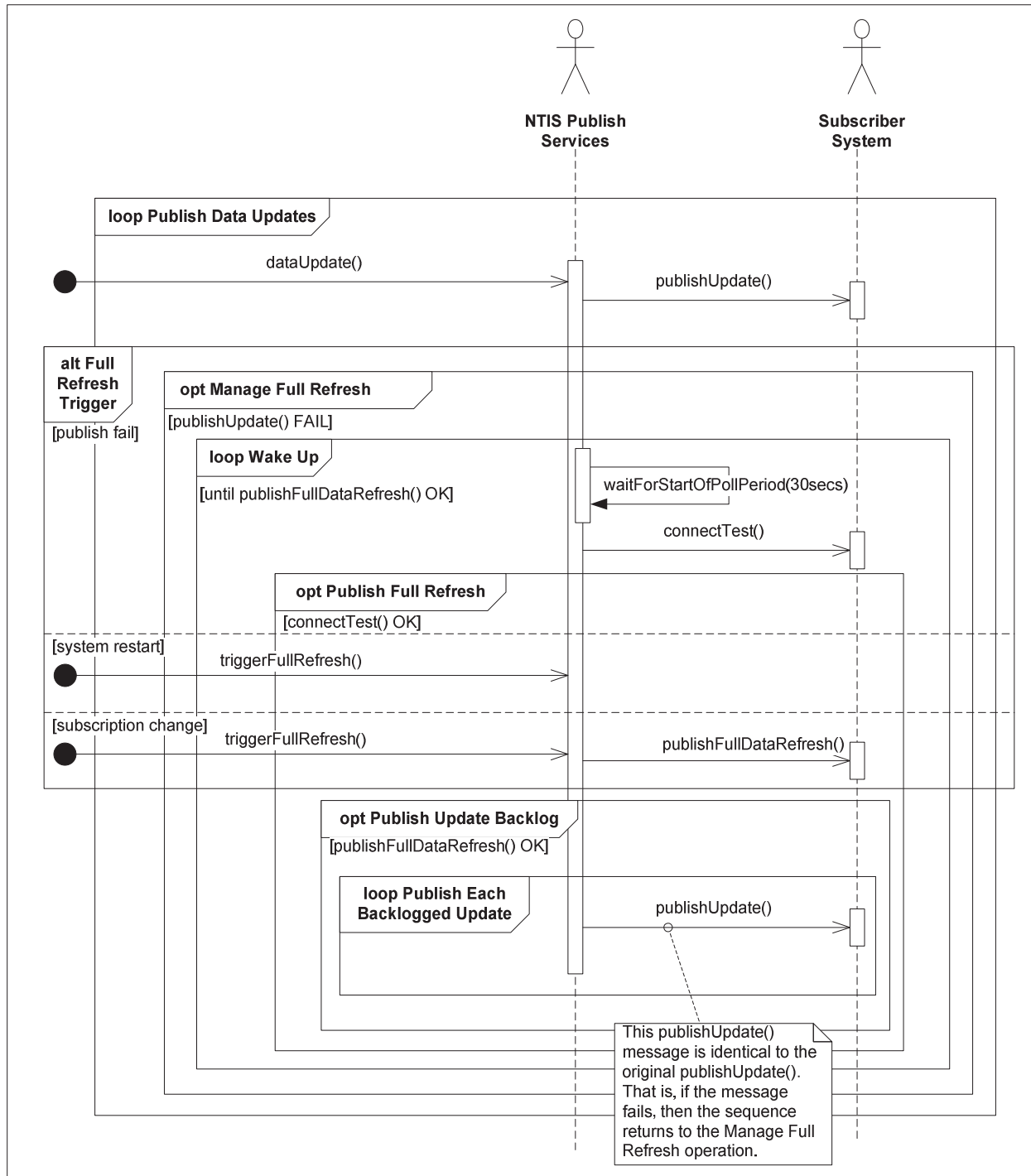


Figure 4-7 : Data Update and Full Refresh Sequence Diagram



## 5. Message Definitions

### 5.1 Message Transfer

Message transfer is automated by the standard network components and transport and data exchange protocols employed by the interface.

### 5.2 Message Lists

This section details the content of the XML payload contained in the Publish Data Message (refer to Section 4.3.1).

Content detail common to all messages:

1. The XML content of the message comprises a single `<d2LogicalModel>` top-level element.
2. The `<d2LogicalModel>` element contains a single `<feedType>` element. This element is used to uniquely identify the type of published data contained within the message; each message instance contains only one type of published data.
3. The content within the messages refers to reference data contained in the published NTIS Model. To fully interpret the data contained within the messages, the Subscriber requires a copy of the appropriate version of the NTIS Model. The content and format of the NTIS Model, and the interface employed to distribute the Model to Subscribers, are detailed in [ref 6].
4. All latitude and longitude values included in the published data utilise the World Geodetic System 1984 (WGS84) coordinate system [ref 30]. The DATEXII schema [ref 17] specifies that latitude/longitude values utilise the European Terrestrial Reference System 1989 (ETRS89) [ref 31]. However, WGS84 is employed in publications as it is more commonly used in the UK and is a system familiar to Subscribers.
5. Unless otherwise stated in the message description, time and date values are presented in the following ISO 8601-compliant format:

`<date>T<local time, to milliseconds><timezone>`

where `<timezone>` takes one of the following values and indicates the timezone offset that has been applied to UTC to generate the `<local time>`:

`'+01:00'` (BST)

`'Z'` (GMT)

Example: 2013-04-26T10:24:31.071+01:00

Notes on interpreting XML listings:

Each message section contains an XML listing detailing the data content of the message. The key for the XML listing is as follows:

`<element>text</element>`      *text* is static and is included, as listed, in all

messages.

<element>*[text]*</element>

*[text]* is variable in value and uniquely identifies a data item that is described in the Data Item Descriptions section, following the XML listing.

<!-- *text* -->

XML comment text is included to add in-line context or explanation to the XML listing. These comments are not included in the message.

<!--x N *text* -->

Indicates that the previous element can be repeated 'N' times (accompanied by a description in the *text*).

## 5.2.1 ANPR Travel Times

### 5.2.1.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:MeasuredDataPublication" lang="en" >
    <d2lm:feedType>ANPR Journey Time Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:measurementSiteTableReference targetClass="MeasurementSiteTable"
      version="[NTIS Model version]" id="NTIS_ANPR_Measurement_Sites" />
    <d2lm:headerInformation>
      <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
      </d2lm:confidentiality>
      <d2lm:informationStatus>real</d2lm:informationStatus>
      <d2lm:urgency>normalUrgency</d2lm:urgency>
    </d2lm:headerInformation>
    <d2lm:siteMeasurements>
      <d2lm:measurementSiteReference version="[NTIS Model version]"
        targetClass="MeasurementSiteRecord" id="[ANPR site ID]" />
      <d2lm:measurementTimeDefault>[default measurement time]</d2lm:measurementTimeDefault>
      <d2lm:measuredValue index="0">
        <!-- Note: index always '0' - there is only a single measurement type at each site -->
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TravelTimeData">
            <d2lm:travelTime>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:duration>[duration value]</d2lm:duration>
            </d2lm:travelTime>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>
    </d2lm:siteMeasurements>
    <!-- x N - Multiple <d2lm:siteMeasurements> elements can exist in the same message -->
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>
```

### 5.2.1.2 General Notes

1. Reference data, contained in the published NTIS Model, is required to interpret the traffic data contained in the message:
  - a. The `<d2lm:measurementSiteTableReference>` element references the version of the NTIS Model to use and specifies that ANPR site data is contained in the `NTIS_ANPR_Measurement_Sites` table within the NTIS Model.
  - b. The ANPR site is uniquely identified within the `NTIS_ANPR_Measurement_Sites` NTIS Model table by the `[ANPR site ID]` attribute of the `<d2lm:measurementSiteReference>` element. The location of the ANPR site on the road network, and any other site-specific characteristics, are contained in the NTIS Model.

- c. To accommodate the DATEXII referencing model, ANPR ‘measurement sites’ contained in the NTIS Model and referenced in this message are purely logical entities, rather than physical sites. Each ‘measurement site’ is defined, in the NTIS Model, by a unique route between 2 physical ANPR camera sites.

#### 5.2.1.3 Data Item Descriptions

Data Item	Description
[ANPR site ID]	<p>The unique ID of the ANPR measurement site; used to reference the ANPR site in the published NTIS Model.</p> <p>Format: ANPR_Measurement_Site_&lt;unique ANPR site id&gt; (e.g. ANPR_Measurement_Site_30070954)</p>
[data error flag]	<p>Boolean flag indicating whether the data value is trusted (false) or is deemed suspect (true).</p> <p>Refer to the Data Validation and Error Handling section, below, for further information.</p>
[data error reason]	<p>Text describing the reason for the data error.</p> <p>This data item, and the containing <i>&lt;d2lm:reasonForDataError&gt;</i> element, is omitted from the message if the corresponding [data error flag] is false.</p> <p>Values:  “suspect data” : determined by the source/reporting system.  “suspect equipment” : specified at the NTIS system.</p> <p>Refer to the Data Validation and Error Handling section, below, for further information.</p>
[default measurement time]	<p>The time and date of all the measurements within the containing <i>&lt;d2lm:siteMeasurements&gt;</i> element; as recorded by the ANPR site. Note: as the measurements are recorded between 2 ANPR sites, the timestamp is taken from the 2<sup>nd</sup> site; the later, more current time.</p>
[duration value]	<p>The value of the travel time in seconds.</p> <p>Valid range: 0-unbounded</p>
[NTIS Model version]	<p>Version of the published NTIS Model against which this message is published.</p> <p>Format: &lt;major version&gt;.&lt;minor version&gt;, e.g. “17.0”</p>
[publication time]	<p>The time and date that the message was published by the NTIS system.</p>

#### 5.2.1.4 Data Validation and Error Handling

1. Validation by the Source: the source collection and reporting systems and equipment can specify that a particular data item is suspect and should be used with caution. This indication is collected by the NTIS system and reported in published data.

2. Suspect Equipment: source/data acquisition equipment can be specified in the NTIS system as 'suspect', following analysis of erroneous data received from the equipment.
3. Indicating Errors in Published Data: erroneous, or potentially erroneous, data items are included in the published data. The data items are marked as in error ([data error flag]=true) and the corresponding [data error reason] set to:
  - a. suspect data: the value received from the reporting outstation/site is reported as suspect.
  - b. suspect equipment: the source equipment has been set as suspect, following analysis of erroneous received data.

Note: If more than one error reason is applicable to a data item, then both reasons are included in the publication. For example, if the equipment is set to suspect, but data is still being received and the reporting system indicates suspect data, the following will be published:

```
<d21m:dataError>true</d21m:dataError>
<d21m:reasonForDataError>
  <d21m:values>
    <d21m:value>suspect equipment</d21m:value>
    <d21m:value>suspect data</d21m:value>
  </d21m:values>
</d21m:reasonForDataError>
```

## 5.2.2 Events

The Events data managed and published by the NTIS system utilises a number of Event Types and Sub-Types. The Types are published with different data content and are listed in separate sections, where appropriate.

### 5.2.2.1 All Event Types

#### 5.2.2.1.1 Common General Notes

The following are general informative notes to accompany the XML listings for all Event Types.

1. Terminology: DATEXII utilises the term 'situation' to define a traffic or network event, the NTIS term for such an occurrence is 'Event'. For the purposes of this document, the terms can be considered wholly interchangeable.
2. Unless otherwise stated, data items are mandated for inclusion in all publications.
3. Omitted elements: no XML elements are included in the publication without data values or child elements; even if allowed by the DATEXII specification. If an optional data item is not included in the publication, then the containing element is also omitted. If the omission of one or more elements results in a containing/parent element being empty, then this element is also omitted from the publication.
4. All Event publications utilise the NTIS-specific extensions to the DATEXII schema. The *extensionName* and *extensionVersion* attributes are added to the `<d2lm:d2LogicalModel>` element to specify that this message utilises NTIS Publish Services-specific extensions to the base DATEXII schema. Refer to Section 7.1 for details.
5. The in-line marker `<!-- NTIS extension -->` is included to indicate where an NTIS-specific Level B extension has been utilised.
6. DATEXII makes provision for multiple `<d2lm:situationRecord>` items to be grouped together into a `<d2lm:situation>`. The NTIS system does not have a concept of grouping Events.
  - a. Each published `<d2lm:situation>` contains a single `<d2lm:situationRecord>`; both equate to the same NTIS Event.
  - b. The ID and version of the `<situation>` are always identical to those of the `<d2lm:situationRecord>`.
7. The multiple `<d2lm:generalPublicComment>` elements contained in the Event publication constitute the 'dissemination text' of the Event:
  - a. The data contained within the dissemination text is an amalgam of items of raw data contained elsewhere in the publication; converted into human-readable textual form and summarized, where applicable.

- b. The dissemination text is designed to be used where a human-readable textual version of the Event is required by the Subscriber, without the need to parse and interpret the raw data items.
- 8. Event versions. The NTIS system does not employ a sequential versioning system for Events.
  - a. The [last mod time] is used to uniquely identify the version of a particular Event and this time/date field can be used to order Event updates.
  - b. The `<d2lm:situation>` and `<d2lm:situationRecord>` elements in DATEXII mandate that a *version* attribute is included in the element; in all instance this attribute is set to an empty string `""`.
  - c. Events are associated with other Events for the full lifecycle of the Event, or until the association is broken. Hence, the *version* attribute of the `<d2lm:relatedSituation>` element is always set to an empty string `""`, rather than the [last mod time] of the associated Event.
- 9. Alternate Routes: alternate routes are included in publications to specify other routes that can be used to minimise or avoid the effects of an Event.
  - a. All Event Types, except Weather Events, can contain alternate routes.
  - b. 0, 1 or multiple alternate routes may be specified for an Event.
  - c. The NTIS system can generate multiple recommended alternate routes for an Event; only those routes accepted and implemented as part of a Strategic Response Plan are included in the Event publication.
  - d. Only alternate routes that are wholly contained within the NTIS road network are published. That is, an alternate route will always contain an ordered list of Network Links, as specified in the NTIS Model, from start to finish.
  - e. An alternate route comprises the following mandatory data item:
    - [alternate route ID]
- 10. The location of an Event may be defined as Off Network; that is, the Event is not located on a road, or is located on a road that is not part of the road network managed by the NTIS system. Refer to individual Event Types for details. If an Event is considered Off Network, the following data items are omitted from the publication, as they are not relevant to the Event:
  - [capacity remaining]
  - [constriction type]
  - [lane ID]
  - [lane status]
  - [num operating lanes]
  - [num original lanes]
  - [num restricted lanes]

11. The following data items are not included in Weather Events:

- [constriction type]
- [num operating lanes]
- [num original lanes]
- [num restricted lanes]
- [capacity remaining]
- [lane ID]
- [lane status]
- [alternate route ID]

#### 5.2.2.1.2 Common Data Item Descriptions

The following table describes the data items that are common to more than one Event Type and are derived/specified utilising an identical method.

Data items specific to an Event Type, or common to a number of Event Types but derived/specified differently, are described in the subsequent Event Type-specific sections and annotated with an [underscore].

Data Item	Description
[additional description]	Free text describing additional information for the Event. The data item is optional. The description is a component of the Event 'dissemination text' (refer to Common General Notes).
[alternate route ID]	The NTIS ID of the alternate route. The ID is unique to an alternate route, but may be used by more than one Event.
[associated event ID]	The unique identifier of an Event associated with this Event. The value is the [event ID] data item of the associated Event.
[capacity remaining]	The calculated remaining capacity of the carriageway, specified as a percentage. The value is derived from the status of each lane; refer to [lane ID] and [lane status] data items for details. Note#1: the value can be > 100% if the management of an Event results in greater capacity (e.g. a normally non-operational lane, such as a hard shoulder, being opened to traffic). Note#2: refer also to the <u>[capacity change]</u> data item, published with specific Event Types, which may be used to override this calculated value.



Data Item	Description
[completed status]	<p>Set to <i>true</i> when the Event complete, else set to <i>false</i>.</p> <p>An Event is determined to be complete when it is cleared and no longer has any material impact on the road network.</p> <p>The status can either be set manually or automatically determined by the NTIS system.</p>
[confirmation source]	<p>The source organisation or system that confirmed the Event.</p> <p>The data item is optional, but is always set/included if the [confirmed status] is set to <i>true</i>.</p>
[confirmed status]	<p>Indicates whether the Event has been confirmed by a source as active/current.</p> <p>Values:</p> <ul style="list-style-type: none"> <li>- <i>certain</i> (confirmed)</li> <li>- <i>probable</i> (unconfirmed)</li> </ul> <p>Note#1: An Event can be set to confirmed at any point in the Event lifecycle; including prior to the scheduled/forecast start of the Event.</p> <p>Note#2: If an Event has multiple valid (active) periods, then a confirmed status is automatically reset to unconfirmed between valid periods of the Event.</p> <p>Note#3: An Event may be active (see the Event Type-specific [validity status] data item) but not yet confirmed. An Event can be completed (see [completed status]) without ever being confirmed.</p>
[constriction type]	<p>The type of traffic constriction caused by the Event.</p> <p>Values:</p> <ul style="list-style-type: none"> <li>- <i>carriagewayBlocked</i> : if all lanes are closed.</li> <li>- <i>lanesBlocked</i> : if one or more, but not all, lanes are blocked</li> <li>- <i>lanesPartiallyObstructed</i> : if one or more lanes are partially obstructed, but no lanes are fully blocked.</li> </ul> <p>The value is derived from the status of each lane; refer to [lane ID] and [lane status] data items for details.</p> <p>Note that the constriction type is also affected by the status of the hard shoulder, where a hard shoulder exists:</p> <ul style="list-style-type: none"> <li>- the carriageway is only considered fully blocked if all normally-operational lanes are closed and the hard shoulder is either in a normal state (that is, not open to traffic) or is open to traffic but blocked by an obstruction.</li> <li>- if the hard shoulder is open to traffic, but is fully blocked, then this constitutes a blocked lane.</li> <li>- if the hard shoulder is open to traffic, but is partially obstructed, then this constitutes a partially obstructed lane.</li> </ul>

Data Item	Description
[creation time]	The time and date that the Event was created in the NTIS system; either created manually or received from an external source.
[deleted status]	Set to <i>true</i> if the Event is deleted/cancelled, else set to <i>false</i> .
[event cause]	A textual description of the cause of the Event.
[event ID]	Unique identifier of the Event. The value is static; unchanged throughout the lifecycle of the Event.  Format: numeric
[event reference]	The unique NTIS reference for the Event, assigned on creation of the Event in the NTIS system. Format:  <event type>-YY-MM-DD-NNNNN  where:  <event type> defines the Event Type – ‘AL’ (Abnormal Loads), ‘RW’ (Roadworks), ‘MO’ (Major Organised), ‘UF’ (Unplanned), ‘WE’ (Weather).  YY-MM-DD is the year, month and day of creation of the Event.  NNNNNN is a non-negative integer, unique for the Event Type and date of creation. The value is reset to 0 at the start of each day and increments for each Event created. The number is always 6 digits in length, right justified and padded with leading zeros.
[key/value pair – AWP]	One of multiple key/value pairs, specified in free text, that describe the Advance Warning Plan (AWP) associated with the Event.  Format:  <key> : <value>  Example:  Schedule : from 10:00 on 15 <sup>th</sup> July 2013 to 17:00 on 17 <sup>th</sup> July 2013  The data item(s) are optional – if no AWP is specified for the Event, then the data item(s) and containing <d2lm:generalPublicComment> element are omitted from the publication.  An AWP is included in the publication if the Event is still scheduled/predicted. In the case of Events with multiple valid periods (e.g. road works that recur each night) an AWP is included until the last valid period becomes active/current.  The Plan description is a component of the Event ‘dissemination text’ (refer to Common General Notes).  Note: the key/value pairs included in the Plan are system configurable and so cannot be listed explicitly in this document.

Data Item	Description
[key/value pair – GDP]	<p>One of multiple key/value pairs, specified in free text, that describe the General Default Plan (GDP) associated with the Event.</p> <p>Format:</p> <p style="padding-left: 40px;">&lt;key&gt; : &lt;value&gt;</p> <p>Example:</p> <p style="padding-left: 40px;">Period : from 10:00 on 15<sup>th</sup> July 2013 to 17:00 on 17<sup>th</sup> July 2013</p> <p>The data item(s) are optional – if no GDP is specified for the Event, then the data item(s) and containing <code>&lt;d2lm:generalPublicComment&gt;</code> element are omitted from the publication.</p> <p>A GDP is included in the publication when the Event becomes active/current. In the case of Events with multiple valid periods (e.g. road works that recur each night) a GDP is included during the period(s) in which the Event is active/current; refer to the <a href="#">[validity status]</a> Event Type-specific data item.</p> <p>The Plan description is a component of the Event ‘dissemination text’ (refer to Common General Notes).</p> <p>Note: the key/value pairs included in the Plan are system configurable and so cannot be listed explicitly in this document.</p>
[lane ID]	<p>The identifier of the lane for which the <a href="#">[lane status]</a> data item describes the status.</p>
[lane status]	<p>The status of the lane identified by the <a href="#">[lane ID]</a> data item.</p> <p>Note#1: the publication includes the status of all lanes on the affected carriageway, regardless of status or whether the lane is impacted by the Event.</p> <p>Note#2: this data item employs the <code>&lt;d2lm:LaneStatusEnum&gt;</code> enumerate; an NTIS-specific extension to the standard DATEXII Schema. Refer to Section 7.1 for details.</p> <p>Note#3: the combined individual lane statuses are used to derive the summarised state of the carriageway, published in the following data items: <a href="#">[num operating lanes]</a>, <a href="#">[num restricted lanes]</a>, <a href="#">[constriction type]</a>, <a href="#">[capacity remaining]</a>. The derivation assumes:</p> <ul style="list-style-type: none"> <li>- If the lane status is ‘unknown’ then the lane is operating normally. That is, hard shoulders are assumed to be closed to traffic (non-operational) and other lane types are fully operational.</li> <li>- Lanes and hard shoulders set to ‘affected’ (declared in the <a href="#">[num restricted lanes]</a> data item) are still operating and count towards the values of the <a href="#">[num operating lanes]</a> and <a href="#">[capacity remaining]</a> data items.</li> </ul>

Data Item	Description
[last mod time]	The date and time of the last modification to the Event in the NTIS system.
[NTIS Model version]	Version of the published NTIS Model against which this message is published. Format: <major version>.<minor version>, e.g. "17.0"
[num operating lanes]	The number of lanes known to still be fully operational. The value is derived from the status of each lane; refer to [lane ID] and [lane status] data items for details.
[num original lanes]	The normal number of lanes in use on the carriageway, at the location of the Event.
[num restricted lanes]	The number of lanes that are restricted/affected, but not fully closed, due to the Event. The value is derived from the status of each lane; refer to [lane ID] and [lane status] data items for details.
[publication time]	The time and date that the message was published by the NTIS system.
[RCC ID]	Text identifying the Regional Control Centre (RCC) that is currently allocated to manage the Event. The data item is optional.
[RCC situation ID]	The ID of the situation, as specified and utilised by the RCC allocated to manage the Event. The data item is optional.
[severity]	The severity of an Event.
[source name]	The name of the source organisation or system that initially reported the Event to the NTIS system, either manually or automatically via an external interface.
[source event ID]	The ID of the Event, specified as a textual value, as defined/used by the source organisation or system. The data item is optional.
[source time]	The time and date that the source organisation or system received the initial information of an Event. The data item is optional.

## 5.2.2.2 Type: Abnormal Load Event

### 5.2.2.2.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2"
  extensionName="NTIS Published Services" extensionVersion="2.0">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:SituationPublication" lang="en">
    <d2lm:feedType>Event Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:situation version="" id="[event ID]">
      <d2lm:relatedSituation version="" targetClass="Situation" id="[associated event ID]" />
      <!-- x N - 0, 1 or multiple associations can exist -->
      <d2lm:headerInformation>
        <d2lm:areaOfInterest>national</d2lm:areaOfInterest>
        <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
        </d2lm:confidentiality>
        <d2lm:informationStatus>real</d2lm:informationStatus>
      </d2lm:headerInformation>
      <d2lm:situationRecord xsi:type="d2lm:VehicleObstruction" version="" id="[event ID]">
        <d2lm:situationRecordCreationReference>[event reference]
        </d2lm:situationRecordCreationReference>
        <d2lm:situationRecordCreationTime>[creation time]</d2lm:situationRecordCreationTime>
        <d2lm:situationRecordVersionTime>[last mod time]</d2lm:situationRecordVersionTime>
        <d2lm:probabilityOfOccurrence>[confirmed status]</d2lm:probabilityOfOccurrence>
        <d2lm:severity>[severity]</d2lm:severity>
        <d2lm:source>
          <d2lm:sourceIdentification>[source name]</d2lm:sourceIdentification>
          <d2lm:sourceExtension>
            <d2lm:sourceSituation> <!-- NTIS extension -->
              <d2lm:sourceSituationId>[source event ID]</d2lm:sourceSituationId>
              <d2lm:sourceSituationCreationTime>[source time]
              </d2lm:sourceSituationCreationTime>
            </d2lm:sourceSituation>
          </d2lm:sourceExtension>
        </d2lm:source>
        <d2lm:validity>
          <d2lm:validityStatus>[validity status]</d2lm:validityStatus>
          <d2lm:validityTimeSpecification>
            <d2lm:overallStartTime>[overall start time]</d2lm:overallStartTime>
            <d2lm:overallEndTime>[overall end time]</d2lm:overallEndTime>
            <d2lm:validPeriod>
              <d2lm:startOfPeriod>[valid period start]</d2lm:startOfPeriod>
              <d2lm:endOfPeriod>[valid period end]</d2lm:endOfPeriod>
            </d2lm:validPeriod>
            <!-- x N - 0, 1 or multiple valid periods can be specified; see General Notes -->
          </d2lm:validityTimeSpecification>
        </d2lm:validity>
        <d2lm:cause xsi:type="d2lm:NonManagedCause">
          <d2lm:causeDescription>
            <d2lm:values>
              <d2lm:value>[event cause]</d2lm:value>
              <!-- x N - the cause text can span multiple lines -->
            </d2lm:values>
          </d2lm:causeDescription>
        </d2lm:cause>
        <d2lm:generalPublicComment>
          <d2lm:comment>
            <d2lm:values>
              <d2lm:value>TYPE : AWP</d2lm:value>
              <d2lm:value>[key/value pair - AWP]</d2lm:value>
              <!-- x N - multiple AWP key/value pairs -->
            </d2lm:values>
          </d2lm:comment>
        </d2lm:generalPublicComment>
      </d2lm:situationRecord>
    </d2lm:situation>
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>
```

```

</d21m:generalPublicComment>
<d21m:generalPublicComment>
  <d21m:comment>
    <d21m:values>
      <d21m:value>TYPE : GDP</d21m:value>
      <d21m:value>[key/value pair - GDP]</d21m:value>
      <!-- x N - multiple AWP key/value pairs -->
    </d21m:values>
  </d21m:comment>
</d21m:generalPublicComment>
<d21m:generalPublicComment>
  <d21m:comment>
    <d21m:values>
      <d21m:value>[additional description]</d21m:value>
      <!-- x N - the comments may contain more than 1 line of text -->
    </d21m:values>
  </d21m:comment>
  <d21m:commentType>internalNote</d21m:commentType>
</d21m:generalPublicComment>
<d21m:groupOfLocations xsi:type="d21m:NonOrderedLocationGroupByList">
  <d21m:locationContainedInGroup xsi:type="d21m:Point">
    <d21m:locationForDisplay>
      <d21m:latitude>[lat]</d21m:latitude>
      <d21m:longitude>[long]</d21m:longitude>
    </d21m:locationForDisplay>
  </d21m:locationContainedInGroup>
  <d21m:locationContainedInGroup xsi:type="d21m:LocationByReference">
    <d21m:predefinedLocationReference targetClass="PredefinedLocation"
    version="[NTIS Model version]" id="[location Network Link ID]"/>
  </d21m:locationContainedInGroup>
  <!-- x N - 1 or multiple network links can define the location of the Event -->
</d21m:groupOfLocations>
<d21m:management>
  <d21m:lifeCycleManagement>
    <d21m:cancel>[deleted status]</d21m:cancel>
    <d21m:end>[completed status]</d21m:end>
  </d21m:lifeCycleManagement>
  <d21m:managementExtension>
    <d21m:situationManagement> <!-- NTIS extension -->
      <d21m:confirmedBy>[confirmation source]</d21m:confirmedBy>
      <d21m:rccInformation>
        <d21m:allocatedRcc>[RCC ID]</d21m:allocatedRcc>
        <d21m:rccSituationId>[RCC event ID]</d21m:rccSituationId>
      </d21m:rccInformation>
      <d21m:alternateRoutes>
        <d21m:alternateRoute>
          <d21m:routeId>[alternate route ID]</d21m:routeId>
        </d21m:alternateRoute>
        <!-- x N - 0, 1 or multiple alternate routes can be specified -->
      </d21m:alternateRoutes>
      <!-- containing element omitted if no alternate routes specified -->
    </d21m:situationManagement>
  </d21m:managementExtension>
</d21m:management>
<d21m:mobilityOfObstruction>
  <d21m:mobilityType>[mobility]</d21m:mobilityType>
</d21m:mobilityOfObstruction>
<d21m:vehicleObstructionType>abnormalLoad</d21m:vehicleObstructionType>
<d21m:obstructingVehicle>
  <d21m:vehicleCharacteristics>
    <d21m:loadType>abnormalLoad</d21m:loadType>
    <d21m:grossWeightCharacteristic>
      <d21m:comparisonOperator>equalTo</d21m:comparisonOperator>
      <d21m:grossVehicleWeight>[vehicle weight]</d21m:grossVehicleWeight>
    </d21m:grossWeightCharacteristic>
    <d21m:heightCharacteristic>
      <d21m:comparisonOperator>equalTo</d21m:comparisonOperator>
      <d21m:vehicleHeight>[vehicle height]</d21m:vehicleHeight>
    </d21m:heightCharacteristic>
    <d21m:lengthCharacteristic>
      <d21m:comparisonOperator>equalTo</d21m:comparisonOperator>
      <d21m:vehicleLength>[vehicle length]</d21m:vehicleLength>
    </d21m:lengthCharacteristic>
    <d21m:widthCharacteristic>
      <d21m:comparisonOperator>equalTo</d21m:comparisonOperator>
      <d21m:vehicleWidth>[vehicle width]</d21m:vehicleWidth>
  </d21m:vehicleCharacteristics>

```

```

</d2lm:widthCharacteristic>
<d2lm:heaviestAxleWeightCharacteristic>
  <d2lm:comparisonOperator>equalTo</d2lm:comparisonOperator>
  <d2lm:heaviestAxleWeight>[axle_weight]</d2lm:heaviestAxleWeight>
</d2lm:heaviestAxleWeightCharacteristic>
<d2lm:numberOfAxlesCharacteristic>
  <d2lm:comparisonOperator>equalTo</d2lm:comparisonOperator>
  <d2lm:numberOfAxles>[num_axles]</d2lm:numberOfAxles>
</d2lm:numberOfAxlesCharacteristic>
</d2lm:vehicleCharacteristics>
</d2lm:obstructingVehicle>
<d2lm:vehicleObstructionExtension>
  <d2lm:abnormalLoadDetails> <!-- NTIS extension -->
    <d2lm:isEscorted>[escorted_flag]</d2lm:isEscorted>
    <d2lm:maximumSpeed>[max_speed]</d2lm:maximumSpeed>
    <d2lm:routeDescription>[route_description]</d2lm:routeDescription>
    <d2lm:currentLocation xsi:type="d2lm:LocationByReference">
      <d2lm:locationForDisplay>
        <d2lm:latitude>[current_lat]</d2lm:latitude>
        <d2lm:longitude>[current_long]</d2lm:longitude>
      </d2lm:locationForDisplay>
      <d2lm:predefinedLocationReference version="[NTIS Model version]"
        targetClass="PredefinedLocation" id="[current Network Link ID]" />
    </d2lm:currentLocation>
  </d2lm:abnormalLoadDetails>
</d2lm:vehicleObstructionExtension>
</d2lm:situationRecord>
</d2lm:situation>
</d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

#### 5.2.2.2.2 General Notes

1. Event Location. The specification of the location of an Abnormal Load Event is as follows:
  - a. 1 or multiple affected Network Links, as defined in the NTIS Model, using the [location Network Link ID] data item(s). The specified Link(s) are those *affected* by the overall Event and are listed sequentially\*\* to define section(s) of the NTIS road network that comprise the route of the abnormal load.
 

*Note\*\*: Abnormal Load Events may exit and enter the NTIS road network. Hence, the Links are listed sequentially, but the list may not be wholly comprised of physically-contiguous Links.*
  - b. A point location, specified as a lat/long coordinate, using the [lat]/[long] data items. The point marks the start point of the abnormal load route. The point is intended for visual display purposes only; it has no other significance.
  - c. Current location. As Abnormal Load Events are mobile Events, possibly traversing long distances, these Events are published with the current, specific location defined:
    - i. Current Network Link: the current location of the abnormal load vehicle, specified as a reference to a Network Link defined in the NTIS Model by the [current Network Link ID] data item.
    - ii. Current point location: the midpoint of the current Network Link, defined above, and specified by the [current lat]/[current long] data items.



*Note: the current location is not always known to the NTIS system and hence this information may be omitted in the published data.*

2. Periods of validity/activity within an Event: an Event can contain zero, one or multiple validity periods within the overall period of the Event:
  - a. If no validity periods are specified for the Event, then the [valid period start] and [valid period end] are set to the [overall start time] and [overall end time], respectively.
  - b. If one or more validity periods are specified for the Event, then it should be noted that the overall period may be greater than the individual validity periods. That is, the time of the last [valid period end] may be earlier than the [overall end time] and the time of the first [valid period start] may be later than the [overall start time].

#### 5.2.2.2.3 Data Item Descriptions

The following table describes the data items that are: a) specific to this Event Type or b) common to more than one Type of Event but derived or specified differently to those included in other Event Types.

Note: for clarity, these data items are annotated with an underscore, both in this table and in the XML listing.

Data Item	Description
[ <u>axle weight</u> ]	The weight of the heaviest axle of the abnormal load vehicle; specified in metric tonnes, to 2 decimal places.  The data item is optional as the information may not be provided to the NTIS system.
[ <u>current lat</u> ]/ [ <u>current long</u> ]	The midpoint of the current link location, as defined by the [ <u>current Network Link ID</u> ] data item.  The data item is optional and is only published if the [ <u>current Network Link ID</u> ] is known to the NTIS system.  Refer to General Notes – Event Location for details.
[ <u>current Network Link ID</u> ]	The current location of the abnormal load vehicle, specified as a reference to a Network Link defined in the NTIS Model.  The data item is optional as the current location of the vehicle may not always be known by, or provided to, the NTIS system.  Refer to General Notes – Event Location for details.
[ <u>escorted flag</u> ]	A flag indicating whether the abnormal load is escorted (true) or not (false) by the haulier, police or other organisation or authority.  The data item is optional as the information may not be provided to the NTIS system.



Data Item	Description
[ <u>lat</u> ]/[ <u>long</u> ]	The point location of the overall Event, specified in latitude/longitude coordinates.  Refer to General Notes – Event Location for details.
[ <u>location Network Link ID</u> ]	The unique ID of a Network Link, as contained in the NTIS Model, that describes the location, or part of the location, of the overall Event.  Refer to General Notes – Event Location for details.
[ <u>max speed</u> ]	The maximum speed that the abnormal load is permitted to travel throughout its route, specified in km/h.  The data item is optional as the information may not be provided to the NTIS system.
[ <u>mobility</u> ]	The mobile/stationary nature of the Event. For Abnormal Load Events this is always set to:  <i>mobile</i>
[ <u>num axles</u> ]	The number of axles on the abnormal load vehicle; specified as an integer.  The data item is optional as the information may not be provided to the NTIS system.
[ <u>overall end time</u> ]	The scheduled end time and date of the Event. The value can be modified at any time in the Event lifecycle.
[ <u>overall start time</u> ]	The start time and date of the Event. Set to the scheduled start time of the Event. The value can be modified at any time in the Event lifecycle.
[ <u>route description</u> ]	Textual description of the overall route taken by the abnormal load.  The data item is mandatory.
[ <u>valid period end</u> ]	The end time and date of a period of scheduled activity within the Event.
[ <u>valid period start</u> ]	The start time and date of a period of scheduled activity within the Event.
[ <u>validity status</u> ]	The active/current status of the Event. Set to:  - <i>definedByValidityTimeSpec</i> : when the Event is still scheduled (the initial [ <u>valid period start</u> ] is in the future) or when the Event is completed (see [ <u>completed status</u> ]).  - <i>active</i> : indicates that the Event is currently active; automatically set when the time of a [ <u>valid period start</u> ] is reached.  - <i>suspended</i> : indicates that the Event is inactive; automatically set when the time of a [ <u>valid period end</u> ] is reached.  Note: the statuses <i>active</i> and <i>suspended</i> can be set manually, to override the automatic system setting, at any time in the Event lifecycle.

Data Item	Description
[ <u>vehicle height</u> ]	<p>The height of the abnormal load vehicle; specified in metres, to 2 decimal places.</p> <p>The data item is optional as the information may not be provided to the NTIS system.</p>
[ <u>vehicle length</u> ]	<p>The length of the abnormal load vehicle; specified in metres, to 2 decimal places.</p> <p>The data item is optional as the information may not be provided to the NTIS system.</p>
[ <u>vehicle weight</u> ]	<p>The weight of the abnormal load vehicle; specified in metric tonnes, to 2 decimal places.</p> <p>The data item is optional as the information may not be provided to the NTIS system.</p>
[ <u>vehicle width</u> ]	<p>The width of the abnormal load vehicle; specified in metres, to 2 decimal places.</p> <p>The data item is optional as the information may not be provided to the NTIS system.</p>

#### 5.2.2.2.4 Data Type Mapping

This section is not applicable to Abnormal Load Events.

#### 5.2.2.2.5 Restricted Data Management

If restricted data is suppressed to a Subscriber, via the Subscription Options, the following XML is omitted from the publication:

1. Additional description text, as this will include text with journalistic colour:

```
<d21m:generalPublicComment>
  <d21m:comment>
    <d21m:values>
      <d21m:value>[additional description]</d21m:value>
    </d21m:values>
  </d21m:comment>
  <d21m:commentType>internalNote</d21m:commentType>
</d21m:generalPublicComment>
```

Refer to Sections 4.4.1.1.3.8 and 7.3.2 for a description of the suppression of restricted data and details of the Subscription Options, respectively.

### 5.2.2.3 Type: Major Organised Event

#### 5.2.2.3.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2"
  extensionName="NTIS Published Services" extensionVersion="2.0">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:SituationPublication" lang="en">
    <d2lm:feedType>Event Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:situation version="" id="[event ID]">
      <d2lm:relatedSituation version="" targetClass="Situation" id="[associated event ID]" />
      <!-- x N - 0, 1 or multiple associations can exist -->
      <d2lm:headerInformation>
        <d2lm:areaOfInterest>national</d2lm:areaOfInterest>
        <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
        </d2lm:confidentiality>
        <d2lm:informationStatus>real</d2lm:informationStatus>
      </d2lm:headerInformation>
      <d2lm:situationRecord xsi:type="d2lm:PublicEvent" version="" id="[event ID]">
        <d2lm:situationRecordCreationReference>[event reference]
        </d2lm:situationRecordCreationReference>
        <d2lm:situationRecordCreationTime>[creation time]</d2lm:situationRecordCreationTime>
        <d2lm:situationRecordVersionTime>[last mod time]</d2lm:situationRecordVersionTime>
        <d2lm:probabilityOfOccurrence>[confirmed status]</d2lm:probabilityOfOccurrence>
        <d2lm:severity>[severity]</d2lm:severity>
        <d2lm:source>
          <d2lm:sourceIdentification>[source name]</d2lm:sourceIdentification>
          <d2lm:sourceExtension>
            <d2lm:sourceSituation> <!-- NTIS extension -->
              <d2lm:sourceSituationId>[source event ID]</d2lm:sourceSituationId>
              <d2lm:sourceSituationCreationTime>[source time]
              </d2lm:sourceSituationCreationTime>
            </d2lm:sourceSituation>
          </d2lm:sourceExtension>
        </d2lm:source>
        <d2lm:validity>
          <d2lm:validityStatus>[validity status]</d2lm:validityStatus>
          <d2lm:validityTimeSpecification>
            <d2lm:overallStartTime>[overall start time]</d2lm:overallStartTime>
            <d2lm:overallEndTime>[overall end time]</d2lm:overallEndTime>
            <d2lm:validPeriod>
              <d2lm:startOfPeriod>[valid period start]</d2lm:startOfPeriod>
              <d2lm:endOfPeriod>[valid period end]</d2lm:endOfPeriod>
            </d2lm:validPeriod>
            <!-- x N - 0, 1 or multiple valid periods can be specified; see General Notes -->
          </d2lm:validityTimeSpecification>
        </d2lm:validity>
        <d2lm:impact>
          <d2lm:capacityRemaining>[capacity remaining]</d2lm:capacityRemaining>
          <d2lm:numberOfLanesRestricted>[num restricted lanes]</d2lm:numberOfLanesRestricted>
          <d2lm:numberOfOperationalLanes>[num operating lanes]</d2lm:numberOfOperationalLanes>
          <d2lm:originalNumberOfLanes>[num original lanes]</d2lm:originalNumberOfLanes>
          <d2lm:trafficConstrictionType>[constriction type]</d2lm:trafficConstrictionType>
          <d2lm:impactExtension>
            <d2lm:impactDetails> <!-- NTIS extension -->
              <d2lm:changeInCapacity>[capacity change]</d2lm:changeInCapacity>
              <d2lm:increaseInDemand>[demand increase]</d2lm:increaseInDemand>
              <d2lm:individualLanesStatus>
                <d2lm:individualLane>
                  <d2lm:laneIdentifier>[lane ID]</d2lm:laneIdentifier>
                  <d2lm:laneStatus>[lane status]</d2lm:laneStatus>
                </d2lm:individualLane>
              <!-- x N - all lanes are included, whether affected by the event or not -->
```

```

        </d2lm:individualLanesStatus>
    </d2lm:impactDetails>
</d2lm:impactExtension>
</d2lm:impact>
<d2lm:cause xsi:type="d2lm:NonManagedCause">
    <d2lm:causeDescription>
        <d2lm:values>
            <d2lm:value>[event cause]</d2lm:value>
            <!-- x N - the cause text can span multiple lines -->
        </d2lm:values>
    </d2lm:causeDescription>
</d2lm:cause>
<d2lm:generalPublicComment>
    <d2lm:comment>
        <d2lm:values>
            <d2lm:value>TYPE : AWP</d2lm:value>
            <d2lm:value>[key/value pair - AWP]</d2lm:value>
            <!-- x N - multiple AWP key/value pairs -->
        </d2lm:values>
    </d2lm:comment>
</d2lm:generalPublicComment>
<d2lm:generalPublicComment>
    <d2lm:comment>
        <d2lm:values>
            <d2lm:value>TYPE : GDP</d2lm:value>
            <d2lm:value>[key/value pair - GDP]</d2lm:value>
            <!-- x N - multiple AWP key/value pairs -->
        </d2lm:values>
    </d2lm:comment>
</d2lm:generalPublicComment>
<d2lm:generalPublicComment>
    <d2lm:comment>
        <d2lm:values>
            <d2lm:value>[additional description]</d2lm:value>
            <!-- x N - the comments may contain more than 1 line of text -->
        </d2lm:values>
    </d2lm:comment>
    <d2lm:commentType>internalNote</d2lm:commentType>
</d2lm:generalPublicComment>
<d2lm:groupOfLocations xsi:type="d2lm:NonOrderedLocationGroupByList">
    <d2lm:locationContainedInGroup xsi:type="d2lm:Point">
        <d2lm:locationForDisplay>
            <d2lm:latitude>[lat]</d2lm:latitude>
            <d2lm:longitude>[long]</d2lm:longitude>
        </d2lm:locationForDisplay>
    </d2lm:locationContainedInGroup>
    <d2lm:locationContainedInGroup xsi:type="d2lm:LocationByReference">
        <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            version="[NTIS Model version]" id="[location Network Link ID]" />
    </d2lm:locationContainedInGroup>
    <!-- x N - 0, 1 or multiple network links can define the location of the Event -->
</d2lm:groupOfLocations>
<d2lm:management>
    <d2lm:lifeCycleManagement>
        <d2lm:cancel>[deleted status]</d2lm:cancel>
        <d2lm:end>[completed status]</d2lm:end>
    </d2lm:lifeCycleManagement>
    <d2lm:managementExtension>
        <d2lm:situationManagement> <!-- NTIS extension -->
            <d2lm:confirmedBy>[confirmation source]</d2lm:confirmedBy>
            <d2lm:rccInformation>
                <d2lm:allocatedRcc>[RCC ID]</d2lm:allocatedRcc>
                <d2lm:rccSituationId>[RCC event ID]</d2lm:rccSituationId>
            </d2lm:rccInformation>
            <d2lm:alternateRoutes>
                <d2lm:alternateRoute>
                    <d2lm:routeId>[alternate route ID]</d2lm:routeId>
                </d2lm:alternateRoute>
                <!-- x N - 0, 1 or multiple alternate routes can be specified -->
            </d2lm:alternateRoutes>
            <!-- containing element omitted if no alternate routes specified -->
        </d2lm:situationManagement>
    </d2lm:managementExtension>
</d2lm:management>
<d2lm:publicEventType>[public event type]</d2lm:publicEventType>
<d2lm:publicEventExtension>

```

```

<d2lm:publicEventDetails> <!-- NTIS extension -->
  <d2lm:publicEventName>[public event name]</d2lm:publicEventName>
  <d2lm:situationParent>
    <d2lm:parentId>[event parent ID]</d2lm:parentId>
  </d2lm:situationParent>
</d2lm:publicEventDetails>
</d2lm:publicEventExtension>
</d2lm:situationRecord>
</d2lm:situation>
</d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

#### 5.2.2.3.2 General Notes

1. Major Organised Events take the form of a single parent Event, which describes the actual public event, and one or more child Events that describe the consequential Events of the parent. For example, a parent Event may be a Show and child Events the diversions and road management instances caused by the parent Event. Refer to Section 4.4.1 for general information on parent/child Event associations.
  - a. A Major Organised Event is always either a parent or child Event.
  - b. Parent and child Events are published as separate entities, with discrete IDs.
  - c. A child Event contains a reference to the parent, using the [event parent ID] data item. A parent Event does not contain a [event parent ID] data item.
2. Parent and child Event publications contain different data items:
  - a. As the parent Event does not directly affect the traffic conditions, the following data items are omitted from a parent Event publication:
    - [lane ID]
    - [lane status]
    - [capacity change]
    - [capacity remaining]
    - [constriction type]
    - [demand increase]
    - [event cause]
    - [num original lanes]
    - [num restricted lanes]
    - [num operating lanes]
  - b. No alternate route information is contained in a parent Event. Hence the `<d2lm:alternateRoutes>` element and the following data items are omitted from a parent Event publication:
    - [alternate route ID]
3. Event Location:
  - a. Parent Event. The location of a parent Event is specified using 2 methods:

- i. 0 or 1 Network Links, as defined in the NTIS Model, using the [location Network Link ID] data item. If no Network Link is specified, the Event is off-network. If a Network Link is specified, then the Event is located on the road network within the specified Link.
- ii. A point location, specified as a lat/long coordinate, using the [lat] and [long] data items. The point location describes the actual geographic location of the Event. The lat/long position can be located on or off the road network.
- iii. The DATEXII schema specifies that a minimum of 2 location items are included in a `<d2lm:groupOfLocations>` container of type `d2lm:NonOrderedLocationGroupByList`. If there are no Network Links associated with the Event, and hence there is only 1 location item (the point location), then the location specification:

```
<d2lm:groupOfLocations xsi:type="d2lm:NonOrderedLocationGroupByList">
... (as specified in the listing above)
</d2lm:groupOfLocations>
```

is replaced with an *Point* container:

```
<d2lm:groupOfLocations xsi:type="d2lm:Point">
<d2lm:locationForDisplay>
  <d2lm:latitude>[lat]</d2lm:latitude>
  <d2lm:longitude>[long]</d2lm:longitude>
</d2lm:locationForDisplay>
</d2lm:groupOfLocations>
```

- b. Child Event. The location of a child Event is specified using 2 methods:

- i. 1 or more Network Links, as defined in the NTIS Model, using the [location Network Link ID] data item. The specified Link(s) describe an unbroken section of the road network comprising physically-contiguous Link(s). The Link(s) are listed sequentially in the publication, in order of carriageway traversal.
- ii. A point location, specified as a lat/long coordinate, using the [lat]/[long] data items. The point marks the midpoint along the total length of the Network Link(s) that specify the Event location. The point is intended for visual display purposes only; it has no other significance.

- c. General:

- i. The Network Links included in the location specification describe the *actual location* of the Event, not the locations/Links *affected* by the Event. Affected locations/Links are included in separate associated Events, such as Congestion Events. Refer to [associated Event ID] for the specification of associated Events.

4. Periods of validity/activity within an Event: an Event can contain zero, one or multiple validity periods within the overall period of the Event:

- a. If no validity periods are specified for the Event, then the [valid period start] and [valid period end] are set to the [overall start time] and [overall end time], respectively.
- b. If one or more validity periods are specified for the Event, then it should be noted that the overall period may be greater than the individual validity periods. That is, the time of the last [valid period end] may be earlier than the [overall end time] and the time of the first [valid period start] may be later than the [overall start time].

### 5.2.2.3.3 Data Item Descriptions

The following table describes the data items that are: a) specific to this Event Type or b) common to more than one Type of Event but derived or specified differently to those included in other Event Types.

Note: for clarity, these data items are annotated with an underscore, both in this table and in the XML listing.

Data Item	Description
<u>[capacity change]</u>	<p>A manually-set value estimating the actual change in capacity of the carriageway due to an Event, specified as a percentage.</p> <ul style="list-style-type: none"> <li>- A -ve value indicates a restriction over normal conditions (for example, a lane is wholly or partially closed).</li> <li>- A +ve value indicates an expansion of the normal capacity (for example, a normally non-operational road is open for traffic).</li> <li>- A zero value affirms that there is no change in capacity.</li> </ul> <p>The data item is optional; the data item is omitted from the publication if the attribute is not specified, or is set to 'unknown'.</p> <p>Note: this data item is used to override the automatically-calculated <u>[capacity remaining]</u> data item.</p>
<u>[demand increase]</u>	<p>The estimated increase in demand of traffic flow due to the Event, specified in vehicles per hour.</p> <p>The increase in demand may be caused by, for example, a diversion of traffic to a location due to roadworks or a public event resulting in increased traffic.</p> <p>A value of 0 indicates that no increase in demand is expected.</p> <p>The data item is optional; if the value is not specified the data item is omitted from the publication.</p>
<u>[event parent ID]</u>	<p>The <u>[event ID]</u> of the parent of this Event.</p> <p>The data item is only included in child Events.</p>
<u>[lat]/[long]</u>	<p>The point location of the Event, specified in latitude/longitude coordinates.</p> <p>Refer to General Notes – Event Location for details.</p>

Data Item	Description
[ <u>location Network Link ID</u> ]	The unique ID of a Network Link, as contained in the NTIS Model, that describes the location, or part of the location, of an Event. Refer to General Notes – Event Location.
[ <u>overall end time</u> ]	The scheduled end time and date of the Event. The value can be modified at any time in the Event lifecycle.
[ <u>overall start time</u> ]	The start time and date of the Event. Set to either: - The scheduled start time of the Event. The value can be modified at any time in the Event lifecycle. - The reported start time of the Event; set if there is no scheduled start time (i.e. the Event has already started when created in the system).
[ <u>public event type</u> ]	The type of public event that describes the Event. Refer to the Data Type Mapping table for details.
[ <u>public event name</u> ]	Text describing the name of the Event.
[ <u>valid period end</u> ]	The end time and date of a period of scheduled activity within the Event.
[ <u>valid period start</u> ]	The start time and date of a period of scheduled activity within the Event.

#### 5.2.2.3.4 Data Type Mapping

The following table defines the mapping of NTIS Major Organised Event Sub-Types to DATEXII types and values included in the published XML.

NTIS Sub-Type 1	NTIS Sub-Type 2	<publicEventType> [ <u>public event type</u> ]
Entertainment	Concert	concert
	Exhibition	exhibition
	Festival	festival
	Show	show
	Other	other
Sports Event	Cricket	cricketMatch
	Football	footballMatch
	Horse Racing	horseRaceMeeting
	Motor Racing	motorSportRaceMeeting
	Rugby	rugbyMatch
	Other	sportsMeeting



NTIS Sub-Type 1	NTIS Sub-Type 2	<publicEventType> [public event type]
Other	N/A	other

#### 5.2.2.3.5 Restricted Data Management

If restricted data is suppressed to a Subscriber, via the Subscription Options, the following XML is omitted from the publication:

1. Additional description text, as this will include text with journalistic colour:

```
<d21m:generalPublicComment>
  <d21m:comment>
    <d21m:values>
      <d21m:value>[additional description]</d21m:value>
    </d21m:values>
  </d21m:comment>
  <d21m:commentType>internalNote</d21m:commentType>
</d21m:generalPublicComment>
```

Refer to Sections 4.4.1.1.3.8 and 7.3.2 for a description of the suppression of restricted data and details of the Subscription Options, respectively.

## 5.2.2.4 Type: Roadworks

### 5.2.2.4.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2"
  extensionName="NTIS Published Services" extensionVersion="2.0">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:SituationPublication" lang="en">
    <d2lm:feedType>Event Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:situation version="" id="[event ID]">
      <d2lm:relatedSituation version="" targetClass="Situation" id="[associated event ID]" />
      <!-- x N - 0, 1 or multiple associations can exist -->
      <d2lm:headerInformation>
        <d2lm:areaOfInterest>national</d2lm:areaOfInterest>
        <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
        </d2lm:confidentiality>
        <d2lm:informationStatus>real</d2lm:informationStatus>
      </d2lm:headerInformation>
      <d2lm:situationRecord xsi:type="d2lm:MaintenanceWorks" version="" id="[event ID]">
        <d2lm:situationRecordCreationReference>[event reference]
        </d2lm:situationRecordCreationReference>
        <d2lm:situationRecordCreationTime>[creation time]</d2lm:situationRecordCreationTime>
        <d2lm:situationRecordVersionTime>[last mod time]</d2lm:situationRecordVersionTime>
        <d2lm:probabilityOfOccurrence>[confirmed status]</d2lm:probabilityOfOccurrence>
        <d2lm:severity>[severity]</d2lm:severity>
        <d2lm:source>
          <d2lm:sourceIdentification>[source name]</d2lm:sourceIdentification>
          <d2lm:sourceExtension>
            <d2lm:sourceSituation> <!-- NTIS extension -->
              <d2lm:sourceSituationId>[source event ID]</d2lm:sourceSituationId>
              <d2lm:sourceSituationCreationTime>[source time]
              </d2lm:sourceSituationCreationTime>
            </d2lm:sourceSituation>
          </d2lm:sourceExtension>
        </d2lm:source>
        <d2lm:validity>
          <d2lm:validityStatus>[validity status]</d2lm:validityStatus>
          <d2lm:validityTimeSpecification>
            <d2lm:overallStartTime>[overall start time]</d2lm:overallStartTime>
            <d2lm:overallEndTime>[overall end time]</d2lm:overallEndTime>
            <d2lm:validPeriod>
              <d2lm:startOfPeriod>[valid period start]</d2lm:startOfPeriod>
              <d2lm:endOfPeriod>[valid period end]</d2lm:endOfPeriod>
            </d2lm:validPeriod>
            <!-- x N - 0, 1 or multiple valid periods can be specified; see General Notes -->
          </d2lm:validityTimeSpecification>
        </d2lm:validity>
        <d2lm:impact>
          <d2lm:capacityRemaining>[capacity remaining]</d2lm:capacityRemaining>
          <d2lm:numberOfLanesRestricted>[num restricted lanes]</d2lm:numberOfLanesRestricted>
          <d2lm:numberOfOperationalLanes>[num operating lanes]</d2lm:numberOfOperationalLanes>
          <d2lm:originalNumberOfLanes>[num original lanes]</d2lm:originalNumberOfLanes>
          <d2lm:trafficConstrictionType>[constriction type]</d2lm:trafficConstrictionType>
          <d2lm:impactExtension>
            <d2lm:impactDetails> <!-- NTIS extension -->
              <d2lm:changeInCapacity>[capacity change]</d2lm:changeInCapacity>
              <d2lm:increaseInDemand>[demand increase]</d2lm:increaseInDemand>
              <d2lm:individualLanesStatus>
                <d2lm:individualLane>
                  <d2lm:laneIdentifier>[lane ID]</d2lm:laneIdentifier>
                  <d2lm:laneStatus>[lane status]</d2lm:laneStatus>
                </d2lm:individualLane>
              <!-- x N - all lanes are included, whether affected by the event or not -->
            </d2lm:impactDetails>
          </d2lm:impactExtension>
        </d2lm:impact>
      </d2lm:situationRecord>
    </d2lm:situation>
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>
```

```

        </d2lm:individualLanesStatus>
    </d2lm:impactDetails>
</d2lm:impactExtension>
</d2lm:impact>
<d2lm:cause xsi:type="d2lm:NonManagedCause">
    <d2lm:causeDescription>
        <d2lm:values>
            <d2lm:value>[event cause]</d2lm:value>
            <!-- x N - the cause text can span multiple lines -->
        </d2lm:values>
    </d2lm:causeDescription>
</d2lm:cause>
<d2lm:generalPublicComment>
    <d2lm:comment>
        <d2lm:values>
            <d2lm:value>TYPE : AWP</d2lm:value>
            <d2lm:value>[key/value pair - AWP]</d2lm:value>
            <!-- x N - multiple AWP key/value pairs -->
        </d2lm:values>
    </d2lm:comment>
</d2lm:generalPublicComment>
<d2lm:generalPublicComment>
    <d2lm:comment>
        <d2lm:values>
            <d2lm:value>TYPE : GDP</d2lm:value>
            <d2lm:value>[key/value pair - GDP]</d2lm:value>
            <!-- x N - multiple AWP key/value pairs -->
        </d2lm:values>
    </d2lm:comment>
</d2lm:generalPublicComment>
<d2lm:generalPublicComment>
    <d2lm:comment>
        <d2lm:values>
            <d2lm:value>[additional description]</d2lm:value>
            <!-- x N - the comments may contain more than 1 line of text -->
        </d2lm:values>
    </d2lm:comment>
    <d2lm:commentType>internalNote</d2lm:commentType>
</d2lm:generalPublicComment>
<d2lm:groupOfLocations xsi:type="d2lm:NonOrderedLocationGroupByList">
    <d2lm:locationContainedInGroup xsi:type="d2lm:Point">
        <d2lm:locationForDisplay>
            <d2lm:latitude>[lat]</d2lm:latitude>
            <d2lm:longitude>[long]</d2lm:longitude>
        </d2lm:locationForDisplay>
    </d2lm:locationContainedInGroup>
    <d2lm:locationContainedInGroup xsi:type="d2lm:LocationByReference">
        <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            version="[NTIS Model version]" id="[location Network Link ID]" />
    </d2lm:locationContainedInGroup>
    <!-- x N - 0, 1 or multiple network links can define the location of the Event -->
</d2lm:groupOfLocations>
<d2lm:management>
    <d2lm:lifecycleManagement>
        <d2lm:cancel>[deleted status]</d2lm:cancel>
        <d2lm:end>[completed status]</d2lm:end>
    </d2lm:lifecycleManagement>
    <d2lm:managementExtension>
        <d2lm:situationManagement> <!-- NTIS extension -->
            <d2lm:speedLimit>[speed limit]</d2lm:speedLimit>
            <d2lm:confirmedBy>[confirmation source]</d2lm:confirmedBy>
            <d2lm:rccInformation>
                <d2lm:allocatedRcc>[RCC ID]</d2lm:allocatedRcc>
                <d2lm:rccSituationId>[RCC event ID]</d2lm:rccSituationId>
            </d2lm:rccInformation>
            <d2lm:alternateRoutes>
                <d2lm:alternateRoute>
                    <d2lm:routeId>[alternate route ID]</d2lm:routeId>
                </d2lm:alternateRoute>
                <!-- x N - 0, 1 or multiple alternate routes can be specified -->
            </d2lm:alternateRoutes>
            <!-- containing element omitted if no alternate routes specified -->
        </d2lm:situationManagement>
    </d2lm:managementExtension>
</d2lm:management>

```

```

<!-- The following block is included for all Roadworks Events, except Contraflow -->
<d2lm:roadworksScale>[roadworks scale]</d2lm:roadworksScale>
<d2lm:urgentRoadworks>[urgent roadworks]</d2lm:urgentRoadworks>
<d2lm:mobility>
  <d2lm:mobilityType>[mobility]</d2lm:mobilityType>
</d2lm:mobility>
<d2lm:subjects>
  <d2lm:subjectTypeOfWorks>[works subject]</d2lm:subjectTypeOfWorks>
</d2lm:subjects>
<d2lm:roadMaintenanceType>[roadworks type]</d2lm:roadMaintenanceType>
<d2lm:maintenanceWorksExtension>
  <d2lm:roadworksEventDetails> <!-- NTIS extension -->
    <d2lm:roadworksSchemeName>[scheme name]</d2lm:roadworksSchemeName>
    <d2lm:situationParent>
      <d2lm:parentId>[event parent ID]</d2lm:parentId>
    </d2lm:situationParent>
  </d2lm:roadworksEventDetails>
</d2lm:maintenanceWorksExtension>

<!-- The following block is included for Contraflow Events only -->
<d2lm:complianceOption>mandatory</d2lm:complianceOption>
<d2lm:roadOrCarriagewayOrLaneManagementType>contraflow
</d2lm:roadOrCarriagewayOrLaneManagementType>

</d2lm:situationRecord>
</d2lm:situation>
</d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

#### 5.2.2.4.2 General Notes

1. Roadworks can be specified as either:
  - a. Parent/children Events: the single parent Event describes the roadworks scheme, with one or multiple child Events that describe the individual roadworks activities within the scheme. Refer to Section 4.4.1 for general information on parent/child Event associations.
    - i. Parent and child Events are published as separate entities, with discrete IDs.
    - ii. A child Event contains a reference to the parent, using the [event parent ID] data item. A parent Event does not contain a [event parent ID] data item.
  - b. Self-contained Event: a single Event with no parent or child.
    - i. A self-contained Event is not part of a wider scheme and so the publication contains no [scheme name] data item.
2. Publications of parent Events omit certain data items that are not pertinent to the description of the overarching scheme:
  - a. The parent Event does not directly affect the traffic conditions and the following data items are omitted from a parent Event publication:
    - [lane ID]
    - [lane status]
    - [capacity change]
    - [capacity remaining]

[constriction type]  
[demand increase]  
[event cause]  
[num original lanes]  
[num restricted lanes]  
[num operating lanes]

- b. No alternate route information is contained in a parent Event. Hence the `<d2lm:alternateRoutes>` element and the following data items are omitted from a parent Event publication:

[alternate route ID]

3. Event Location. The specification of the location of a parent, child or self-contained Roadworks Event is identical:

- a. 0, 1 or multiple Network Links, as defined in the NTIS Model, using the [location Network Link ID] data item. The specified Link(s) describe an unbroken section of the road network comprising physically-contiguous Link(s). The Link(s) are listed sequentially in the publication, in order of carriageway traversal.
- i. Note that a Roadworks Event containing 0 Network Links indicates that the roadworks are situated on a road located off the NTIS road network.
- b. A point location, specified as a lat/long coordinate, using the [lat]/[long] data items. The point marks the midpoint along the total length of the Network Link(s) that specify the Event location. The point is intended for visual display purposes only; it has no other significance.
- c. The Network Links included in the location specification describe the *actual location* of the Event, not the locations/Links *affected* by the Event. Affected locations/Links are included in separate associated Events, such as Congestion Events. Refer to [associated Event ID] for the specification of associated Events.
- d. The DATEXII schema specifies that a minimum of 2 location items are included in a `<d2lm:groupOfLocations>` container of type `d2lm:NonOrderedLocationGroupByList`. If there are no Network Links associated with the Event, and hence there is only 1 location item (the point location), then the location specification:

```
<d2lm:groupOfLocations xsi:type="d2lm:NonOrderedLocationGroupByList">  
... (as specified in the listing above)  
</d2lm:groupOfLocations>
```

is replaced with an *Point* container:

```
<d2lm:groupOfLocations xsi:type="d2lm:Point">  
  <d2lm:locationForDisplay>  
    <d2lm:latitude>[lat]</d2lm:latitude>  
    <d2lm:longitude>[long]</d2lm:longitude>  
  </d2lm:locationForDisplay>  
</d2lm:groupOfLocations>
```

4. Periods of validity/activity within an Event: an Event can contain zero, one or multiple validity periods within the overall period of the Event:
  - a. If no validity periods are specified for the Event, then the [valid period start] and [valid period end] are set to the [overall start time] and [overall end time], respectively.
  - b. If one or more validity periods are specified for the Event, then it should be noted that the overall period may be greater than the individual validity periods. That is, the time of the last [valid period end] may be earlier than the [overall end time] and the time of the first [valid period start] may be later than the [overall start time].
5. The publishing of Contraflow Events differs from other Roadworks Events:
  - a. Contraflow Events are always self-contained Events; they are never published as parent (scheme) or child Events. Contraflow Events are associated with other Roadworks Events using the [associated event ID] attribute.
  - b. The attributes associated with a Contraflow Event differ from those of other Roadworks Events. The following attributes are not applicable to Contraflow Events and hence are not included in publications:
    - [event parent ID]
    - [mobility]
    - [roadworks scale]
    - [roadworks type]
    - [scheme name]
    - [urgent roadworks]
    - [works subject]

These attributes are replaced with standard DATEXII elements describing a contraflow situation; refer to the Message Content section, above, for details.
  - c. To accommodate the different attributes, and to adhere to the DATEXII schema, the `<d2lm:situationRecord>` type is set to:
    - i. *d2lm:RoadOrCarriagewayOrLaneManagement*

#### 5.2.2.4.3 Data Item Descriptions

The following table describes the data items that are: a) specific to this Event Type or b) common to more than one Type of Event but derived or specified differently to those included in other Event Types.

Note: for clarity, these data items are annotated with an underscore, both in this table and in the XML listing.

Data Item	Description
-----------	-------------

Data Item	Description
[ <u>capacity change</u> ]	<p>A manually-set value estimating the actual change in capacity of the carriageway due to an Event, specified as a percentage.</p> <ul style="list-style-type: none"> <li>- A -ve value indicates a restriction over normal conditions (for example, a lane is wholly or partially closed).</li> <li>- A +ve value indicates an expansion of the normal capacity (for example, a normally non-operational lane is open for traffic).</li> <li>- A zero value affirms that there is no change in capacity.</li> </ul> <p>The data item is optional; the data item is omitted from the publication if the attribute is not specified, or is set to 'unknown'.</p> <p>Note: this data item is used to override the automatically-calculated [capacity remaining] data item.</p>
[ <u>demand increase</u> ]	<p>The estimated increase in demand of traffic flow due to the Event, specified in vehicles per hour.</p> <p>The increase in demand may be caused by, for example, a diversion of traffic to a location due to roadworks or a public event resulting in increased traffic.</p> <p>A value of 0 indicates that no increase in demand is expected.</p> <p>The data item is optional; if the value is not specified the data item is omitted from the publication.</p>
[ <u>event parent ID</u> ]	<p>The [event ID] of the parent of this Event.</p> <p>The data item is only included in child Events.</p>
[ <u>lat</u> ]/ [ <u>long</u> ]	<p>The point location of the Event, specified in latitude/longitude coordinates.</p> <p>Refer to General Notes – Event Location for details.</p>
[ <u>location Network Link ID</u> ]	<p>The unique ID of a Network Link, as contained in the NTIS Model, that describes the location, or part of the location, of an Event.</p> <p>Refer to General Notes – Event Location for details.</p>
[ <u>mobility</u> ]	<p>The mobile/stationary nature of the Event.</p> <p>The data item can take the following values:</p> <ul style="list-style-type: none"> <li>- <i>mobile</i> : some mobility is involved in the roadworks. That is, the roadworks activity will move within the specified location of the Event.</li> <li>- <i>stationary</i> : the roadworks activity is static.</li> <li>- <i>unknown</i> : the mobility of the Event is unknown/unspecified.</li> </ul>
[ <u>overall end time</u> ]	<p>The scheduled end time and date of the Event. The value can be modified at any time in the Event lifecycle.</p>

Data Item	Description
[ <u>overall start time</u> ]	<p>The start time and date of the Event. Set to either:</p> <ul style="list-style-type: none"> <li>- The scheduled start time of the Event. The value can be modified at any time in the Event lifecycle.</li> <li>- The reported start time of the Event; set if there is no scheduled start time (i.e. the Event has already started when created in the system).</li> </ul>
[ <u>roadworks scale</u> ]	<p>The scale of the roadworks associated with the Event.</p> <p>Values: <i>major</i>, <i>medium</i> or <i>minor</i>.</p>
[ <u>roadworks type</u> ]	<p>The type of roadworks associated with the Event.</p> <p>The value depends on the Event Sub-Type; refer to the Data Type Mapping table for details.</p>
[ <u>scheme name</u> ]	<p>The name of the roadworks scheme, specified as a textual value.</p> <p>The data item is always included in parent and child Events, as these Events either define a scheme or are part of a scheme, but is omitted from self-contained Events as they are not part of a wider scheme.</p>
[ <u>speed limit</u> ]	<p>The temporary speed limit imposed due to the Event, specified in km/h.</p> <p>The data item is optional. If a speed limit is not specified, or is positively confirmed as 'none' then the data item and containing <code>&lt;d2lm:speedLimit&gt;</code> element are omitted from the publication.</p> <p>Note#1: to adhere to the DATEXII specification, this value is specified in km/h. This value represents the speed displayed on signs or signals associated with the Event. To derive the actual sign/signal display, in the UK, the value needs to be converted to mph.</p>
[ <u>works subject</u> ]	<p>The subject of the roadworks.</p> <p>The data item is optional.</p> <p>The value depends on the Event Sub-Type; refer to the Data Type Mapping table for details.</p>
[ <u>urgent roadworks</u> ]	<p>Set to <i>true</i> if the Event describes urgent roadworks, else set to <i>false</i>.</p>
[ <u>valid period end</u> ]	<p>The end time and date of a period of scheduled activity within the Event.</p>
[ <u>valid period start</u> ]	<p>The start time and date of a period of scheduled activity within the Event.</p>



Data Item	Description
[ <u>validity status</u> ]	<p>The active/current status of the Event. Set to:</p> <ul style="list-style-type: none"> <li>- <i>definedByValidityTimeSpec</i> : when the Event is still scheduled (the initial [<u>valid period start</u>] is in the future) or when the Event is completed (see [<u>completed status</u>]).</li> <li>- <i>active</i> : indicates that the Event is currently active; automatically set when the time of a [<u>valid period start</u>] is reached.</li> <li>- <i>suspended</i> : indicates that the Event is inactive; automatically set when the time of a [<u>valid period end</u>] is reached.</li> </ul> <p>Note: the statuses <i>active</i> and <i>suspended</i> can be set manually, to override the automatic system setting, at any time in the Event lifecycle.</p>

#### 5.2.2.4.4 Data Type Mapping

The following table defines the mapping of NTIS Roadworks Event Sub-Types to DATEXII types and values included in the published XML.

NTIS Sub-Type	<subjectTypeOfWorks> [ <u>works subject</u> ]	<roadMaintenanceType> [ <u>roadworks type</u> ]
Scheme (parent)	-	roadworks
Barrier Repairs	crashBarrier	repairWork
Bridge Repairs	bridge	repairWork
Contraflow**	N/A	N/A
Gantry Works	gantry	overheadWorks
Horticulture Works	-	treeAndVegetationCuttingWork
Lighting Repairs	lightingSystem	repairWork
Litter Clearance	-	litterClearance
Resurfacing	road	resurfacingWork
Road Marking Work	-	roadMarkingWork
Road Repairs	road	repairWork
Rock Fall Prevention	-	rockFallPreventativeMaintenance
Roadside Drains	roadsideDrains	repairWork
Roadside Equipment	roadsideEquipment	repairWork
Salting In Progress	-	saltingInProgress
Snow Ploughs In Use	-	snowploughsInUse
Utility Works - Electric	buriedCables	repairWork
Utility Works - Gas	gasMainWork	repairWork
Utility Works - Water	waterMain	repairWork

NTIS Sub-Type	<subjectTypeOfWorks> [works subject]	<roadMaintenanceType> [roadworks type]
Other	other	roadworks

Notes:

1. A '-' indicates that the data item is indeterminable or not applicable to the Event Type and is not included in the publication.
2. All parent Events are of Sub-Type 'Scheme'. Child and self-contained Events are always set to one of the other Sub-Types.
3. The data included in published Contraflow\*\* Events differs from that of other Sub-Types of Roadworks Event. Refer to the General Notes section, above, for details.

#### 5.2.2.4.5 Restricted Data Management

If restricted data is suppressed to a Subscriber, via the Subscription Options, the following XML is omitted from the publication:

2. Additional description text, as this will include text with journalistic colour:

```
<d2lm:generalPublicComment>
  <d2lm:comment>
    <d2lm:values>
      <d2lm:value>[additional description]</d2lm:value>
    </d2lm:values>
  </d2lm:comment>
  <d2lm:commentType>internalNote</d2lm:commentType>
</d2lm:generalPublicComment>
```

Refer to Sections 4.4.1.1.3.8 and 7.3.2 for a description of the suppression of restricted data and details of the Subscription Options, respectively.

### 5.2.2.5 Type: Unplanned Event

There are a number of Sub-Types of Unplanned Events defined in the NTIS system that utilise different types of `<d2lm:situationRecord>` and hence include different data items. The message content XML listing, below, is divided into common content, for all Sub-Types, and Sub-Type-specific content.

#### 5.2.2.5.1 Message Content - Common

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2"
  extensionName="NTIS Published Services" extensionVersion="2.0">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:SituationPublication" lang="en">
    <d2lm:feedType>Event Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:situation version="" id="[event ID]">
      <d2lm:relatedSituation version="" targetClass="Situation" id="[associated event ID]" />
      <!-- x N = 0, 1 or multiple associations can exist -->
      <d2lm:headerInformation>
        <d2lm:areaOfInterest>national</d2lm:areaOfInterest>
        <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
        </d2lm:confidentiality>
        <d2lm:informationStatus>real</d2lm:informationStatus>
      </d2lm:headerInformation>
      <d2lm:situationRecord xsi:type="[event type]" version="" id="[event ID]">
        <d2lm:situationRecordCreationReference>[event reference]
        </d2lm:situationRecordCreationReference>
        <d2lm:situationRecordCreationTime>[creation time]</d2lm:situationRecordCreationTime>
        <d2lm:situationRecordVersionTime>[last mod time]</d2lm:situationRecordVersionTime>
        <d2lm:probabilityOfOccurrence>[confirmed status]</d2lm:probabilityOfOccurrence>
        <d2lm:severity>[severity]</d2lm:severity>
        <d2lm:source>
          <d2lm:sourceIdentification>[source name]</d2lm:sourceIdentification>
          <d2lm:sourceExtension>
            <d2lm:sourceSituation> <!-- NTIS extension -->
              <d2lm:sourceSituationId>[source event ID]</d2lm:sourceSituationId>
              <d2lm:sourceSituationCreationTime>[source time]
              </d2lm:sourceSituationCreationTime>
            </d2lm:sourceSituation>
          </d2lm:sourceExtension>
        </d2lm:source>
        <d2lm:validity>
          <d2lm:validityStatus>[validity status]</d2lm:validityStatus>
          <d2lm:validityTimeSpecification>
            <d2lm:overallStartTime>[overall start time]</d2lm:overallStartTime>
            <d2lm:overallEndTime>[overall end time]</d2lm:overallEndTime>
          </d2lm:validityTimeSpecification>
        </d2lm:validity>
        <d2lm:impact>
          <d2lm:capacityRemaining>[capacity remaining]</d2lm:capacityRemaining>
          <d2lm:numberOfLanesRestricted>[num restricted lanes]</d2lm:numberOfLanesRestricted>
          <d2lm:numberOfOperationalLanes>[num operating lanes]</d2lm:numberOfOperationalLanes>
          <d2lm:originalNumberOfLanes>[num original lanes]</d2lm:originalNumberOfLanes>
          <d2lm:trafficConstrictionType>[constriction type]</d2lm:trafficConstrictionType>
          <d2lm:delays>
            <d2lm:delayTimeValue>[delay over profile]</d2lm:delayTimeValue>
            <d2lm:delaysExtension>
              <d2lm:relativeDelays> <!-- NTIS extension -->
                <d2lm:delayOverFreeFlow>[delay over free flow]</d2lm:delayOverFreeFlow>
              </d2lm:relativeDelays>
            </d2lm:delaysExtension>
          </d2lm:delays>
        </d2lm:impact>
      </d2lm:situationRecord>
    </d2lm:situation>
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>
```

```

<d21m:impactExtension>
  <d21m:impactDetails> <!-- NTIS extension -->
    <d21m:changeInCapacity>[capacity change]</d21m:changeInCapacity>
    <d21m:individualLanesStatus>
      <d21m:individualLane>
        <d21m:laneIdentifier>[lane ID]</d21m:laneIdentifier>
        <d21m:laneStatus>[lane status]</d21m:laneStatus>
      </d21m:individualLane>
      <!-- x N - all lanes are included, whether affected by the event or not -->
    </d21m:individualLanesStatus>
    <d21m:returnToNormalStatus>
      <d21m:predictedTimeToClear>[time to clear - predicted]</d21m:predictedTimeToClear>
      <d21m:actualTimeToClear>[time to clear - actual]</d21m:actualTimeToClear>
      <d21m:predictedReturnToProfile>[return to profile - predicted]</d21m:predictedReturnToProfile>
      <d21m:actualReturnToProfile>[return to profile - actual]</d21m:actualReturnToProfile>
      <d21m:predictedReturnToFreeFlow>[return to free flow - predicted]</d21m:predictedReturnToFreeFlow>
    </d21m:returnToNormalStatus>
    <d21m:spillageInformation>
      <d21m:spillage>
        <d21m:spillageContents>[spillage contents]</d21m:spillageContents>
        <d21m:spillageSeverity>[spillage severity]</d21m:spillageSeverity>
      </d21m:spillage>
      <!-- x N - 0, 1, multiple types of spillage can be specified -->
    </d21m:spillageInformation>
    <d21m:infrastructureDamage>
      <d21m:infrastructureDamageStatus>
        <d21m:infrastructureType>[infrastructure type]</d21m:infrastructureType>
        <d21m:numberOfItemsDamaged>[items damaged]</d21m:numberOfItemsDamaged>
        <d21m:lengthDamaged>[length damaged]</d21m:lengthDamaged>
      </d21m:infrastructureDamageStatus>
      <!-- x N - 0, 1, multiple types of infrastructure damage can be specified -->
    </d21m:infrastructureDamage>
  </d21m:impactDetails>
</d21m:impactExtension>
</d21m:impact>
<d21m:cause xsi:type="d21m:NonManagedCause">
  <d21m:causeDescription>
    <d21m:values>
      <d21m:value>[event cause]</d21m:value>
      <!-- x N - the cause text can span multiple lines -->
    </d21m:values>
  </d21m:causeDescription>
</d21m:cause>
<d21m:generalPublicComment>
  <d21m:comment>
    <d21m:values>
      <d21m:value>TYPE : AWP</d21m:value>
      <d21m:value>[key/value pair - AWP]</d21m:value>
      <!-- x N - multiple AWP key/value pairs -->
    </d21m:values>
  </d21m:comment>
</d21m:generalPublicComment>
<d21m:generalPublicComment>
  <d21m:comment>
    <d21m:values>
      <d21m:value>TYPE : GDP</d21m:value>
      <d21m:value>[key/value pair - GDP]</d21m:value>
      <!-- x N - multiple AWP key/value pairs -->
    </d21m:values>
  </d21m:comment>
</d21m:generalPublicComment>
<d21m:generalPublicComment>
  <d21m:comment>
    <d21m:values>
      <d21m:value>[additional description]</d21m:value>
      <!-- x N - the comments may contain more than 1 line of text -->
    </d21m:values>
  </d21m:comment>
  <d21m:commentType>internalNote</d21m:commentType>
</d21m:generalPublicComment>
<d21m:groupOfLocations xsi:type="d21m:NonOrderedLocationGroupByList">

```

```

<d2lm:locationContainedInGroup xsi:type="d2lm:Point">
  <d2lm:locationForDisplay>
    <d2lm:latitude>[lat]</d2lm:latitude>
    <d2lm:longitude>[long]</d2lm:longitude>
  </d2lm:locationForDisplay>
</d2lm:locationContainedInGroup>
<d2lm:locationContainedInGroup xsi:type="d2lm:LocationByReference">
  <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
    version="[NTIS Model version]" id="[location Network Link ID]" />
</d2lm:locationContainedInGroup>
<!-- x N - 0, 1 or multiple network links can define the location of the Event -->
</d2lm:groupOfLocations>
<d2lm:management>
  <d2lm:lifeCycleManagement>
    <d2lm:cancel>[deleted status]</d2lm:cancel>
    <d2lm:end>[completed status]</d2lm:end>
  </d2lm:lifeCycleManagement>
  <d2lm:managementExtension>
    <d2lm:situationManagement> <!-- NTIS extension -->
      <d2lm:confirmedBy>[confirmation source]</d2lm:confirmedBy>
      <d2lm:areaTeamInvolved>[area team]</d2lm:areaTeamInvolved>
      <d2lm:rccInformation>
        <d2lm:allocatedRcc>[RCC ID]</d2lm:allocatedRcc>
        <d2lm:rccSituationId>[RCC event ID]</d2lm:rccSituationId>
      </d2lm:rccInformation>
      <d2lm:alternateRoutes>
        <d2lm:alternateRoute>
          <d2lm:routeId>[alternate route ID]</d2lm:routeId>
        </d2lm:alternateRoute>
        <!-- x N - 0, 1 or multiple alternate routes can be specified -->
      </d2lm:alternateRoutes>
      <!-- containing element omitted if no alternate routes specified -->
      <d2lm:emergencyServicesInvolved>
        <d2lm:allocatedPoliceForce>[police force]</d2lm:allocatedPoliceForce>
        <d2lm:emergencyServiceStatus>
          <d2lm:serviceType>[emergency service type]</d2lm:serviceType>
          <d2lm:serviceStatus>[emergency service status]</d2lm:serviceStatus>
        </d2lm:emergencyServiceStatus>
      </d2lm:emergencyServicesInvolved>
      <d2lm:weatherConditions>
        <d2lm:weatherType>[weather type]</d2lm:weatherType>
        <d2lm:visibility>[visibility]</d2lm:visibility>
      </d2lm:weatherConditions>
      <!-- following block is applicable to non-Accident Events only - see Notes -->
      <d2lm:peopleAndVehiclesInvolved>
        <d2lm:totalNumberOfPeopleInvolved>[total people]</d2lm:totalNumberOfPeopleInvolved>
        <d2lm:totalNumberOfVehiclesInvolved>[total vehicles]</d2lm:totalNumberOfVehiclesInvolved>
        <d2lm:groupOfVehiclesInvolved>
          <d2lm:numberOfVehicles>[vehicles number]</d2lm:numberOfVehicles>
          <d2lm:vehicleCharacteristics>
            <d2lm:vehicleType>[vehicle type]</d2lm:vehicleType>
          </d2lm:vehicleCharacteristics>
        </d2lm:groupOfVehiclesInvolved>
        <!-- x N - number of vehicles can be specified for multiple vehicle types -->
        <d2lm:groupOfVehiclesInvolved>
          <d2lm:vehicleStatus>[vehicle fire status]</d2lm:vehicleStatus>
          <d2lm:vehicleCharacteristics>
            <d2lm:vehicleType>[vehicle type]</d2lm:vehicleType>
          </d2lm:vehicleCharacteristics>
        </d2lm:groupOfVehiclesInvolved>
        <!-- x N - 'on fire' status can be specified for multiple vehicle types -->
        <d2lm:groupOfPeopleInvolved>
          <d2lm:numberOfPeople>[people number]</d2lm:numberOfPeople>
          <d2lm:injuryStatus>[people status]</d2lm:injuryStatus>
        </d2lm:groupOfPeopleInvolved>
        <!-- x N - multiple types of injury/people can be specified -->
      </d2lm:peopleAndVehiclesInvolved>
    </d2lm:situationManagement>
  </d2lm:managementExtension>
</d2lm:management>

<!-- Sub-Type-specific content (see below) -->

</d2lm:situationRecord>

```

```

    </d2lm:situation>
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

### 5.2.2.5.2 Message Content – Sub-Types

#### Accident:

```

<d2lm:accidentCause>[accident_cause]</d2lm:accidentCause>
<d2lm:accidentType>[accident_type]</d2lm:accidentType>
<d2lm:totalNumberOfPeopleInvolved>[total_people]</d2lm:totalNumberOfPeopleInvolved>
<d2lm:totalNumberOfVehiclesInvolved>[total_vehicles]
</d2lm:totalNumberOfVehiclesInvolved>
<d2lm:groupOfVehiclesInvolved>
  <d2lm:numberOfVehicles>[vehicles_number]</d2lm:numberOfVehicles>
  <d2lm:vehicleCharacteristics>
    <d2lm:vehicleType>[vehicle_type]</d2lm:vehicleType>
  </d2lm:vehicleCharacteristics>
</d2lm:groupOfVehiclesInvolved>
<!-- x N - number of vehicles can be specified for multiple vehicle types -->
<d2lm:groupOfVehiclesInvolved>
  <d2lm:vehicleStatus>[vehicle_fire_status]</d2lm:vehicleStatus>
  <d2lm:vehicleCharacteristics>
    <d2lm:vehicleType>[vehicle_type]</d2lm:vehicleType>
  </d2lm:vehicleCharacteristics>
</d2lm:groupOfVehiclesInvolved>
<!-- x N - 'on fire' status can be specified for multiple vehicle types -->
<d2lm:groupOfPeopleInvolved>
  <d2lm:numberOfPeople>[people_number]</d2lm:numberOfPeople>
  <d2lm:injuryStatus>[people_status]</d2lm:injuryStatus>
</d2lm:groupOfPeopleInvolved>
<!-- x N - multiple types of injury/people can be specified -->

```

#### Congestion:

```

<d2lm:abnormalTrafficType>[abnormal_traffic_type]</d2lm:abnormalTrafficType>

```

#### High-Sided Vehicle Closure:

```

<d2lm:complianceOption>mandatory</d2lm:complianceOption>
<d2lm:forVehiclesWithCharacteristicsOf>
  <d2lm:vehicleType>[road_mgt_vehicle_type]</d2lm:vehicleType>
</d2lm:forVehiclesWithCharacteristicsOf>
<d2lm:roadOrCarriagewayOrLaneManagementType>[road_mgt_type]
</d2lm:roadOrCarriagewayOrLaneManagementType>

```

#### Managed Motorway:

```

—————<d2lm:complianceOption>mandatory</d2lm:complianceOption>
—————<d2lm:roadOrCarriagewayOrLaneManagementType>[road_mgt_type]
—————</d2lm:roadOrCarriagewayOrLaneManagementType>

```

#### Obstruction:

one of the following (refer to Data Type Mapping section, below):

```

    <d2lm:animalPresenceType>[animal_presence]</d2lm:animalPresenceType>
<!-- OR -->
    <d2lm:environmentalObstructionType>[environment_type]
</d2lm:environmentalObstructionType>
<!-- OR -->
    <d2lm:obstructionType>[obstruction_type]</d2lm:obstructionType>
<!-- OR -->
    <d2lm:vehicleObstructionType>[vehicle_obstruction_type]</d2lm:vehicleObstructionType>
<!-- OR -->
    <d2lm:weatherRelatedRoadConditionType>[road_condition]
</d2lm:weatherRelatedRoadConditionType>

```

### Operation Stack:

```
<d2lm:complianceOption>mandatory</d2lm:complianceOption>
<d2lm:applicableForTrafficType>[applicable traffic]</d2lm:applicableForTrafficType>
<d2lm:roadOrCarriagewayOrLaneManagementType>[road mgt type]
</d2lm:roadOrCarriagewayOrLaneManagementType>
```

### Other Road Management:

```
<d2lm:complianceOption>mandatory</d2lm:complianceOption>
<d2lm:roadOrCarriagewayOrLaneManagementType>[road mgt type]
</d2lm:roadOrCarriagewayOrLaneManagementType>
```

### Police Incident:

```
<d2lm:authorityOperationType>[operation type]</d2lm:authorityOperationType>
```

### Spillage in Road:

```
<d2lm:obstructionType>[obstruction type]</d2lm:obstructionType>
```

#### **5.2.2.5.3 General Notes**

1. The content of Unplanned Events is dependent on the Sub-Type of Event. Many data items are optional and it is more probable that they will be included in certain Sub-Types than others. The following list defines the only unconditional differences between Sub-Types of Events:
  - a. A number of data items depend on the *<d2lm:situationRecord>* type / [event type] and the restrictions and options available within the DATEXII schema. These are listed in the 'Message Content – Sub-Types' section, above.
  - b. Unplanned Congestion Events differ from other Unplanned Event Sub-Types:
    - i. Time to clear data items, [time to clear – actual] and [time to clear – predicted], are not included in Congestion Event publications.
    - ii. Automatically-calculated values for the delay data items, [delay over profile] and [delay over free flow], are only performed for Congestion Events. However, a manual override value can still be set for non-Congestion Events.
    - iii. Congestion Events do not have a material affect on individual lanes. Therefore, the following data items are omitted from the publication of Congestion Events:

[capacity change]

[capacity remaining]

[constriction type]

[lane ID]

[lane status]

[num operating lanes]

[num original lanes]



[num restricted lanes]

- c. The standard DATEXII schema allows access to data types specifying the people and vehicles involved in an Event only to a `<d2lm:situationRecord>` of type *Accident*. To enable other Unplanned Event Sub-Types to access these data types, the `<d2lm:peopleAndVehiclesInvolved>` type is introduced into the NTIS-specific extensions applied to the standard DATEXII schema (refer to Section 7.1). This extension contains identically-named copies of the data items available to *Accident* types.
  - i. Accident Events utilise the standard DATEXII elements to specify the people and vehicles involved in the Event.
  - ii. All other Events utilise the `<d2lm:peopleAndVehiclesInvolved>` extension element, and contained elements, to specify the people and vehicles involved in the Event.

2. Event Location. The specification of the location of the Event is as follows:

- a. 0, 1 or multiple Network Links, as defined in the NTIS Model, using the `[location Network Link ID]` data item. The specified Link(s) describe an unbroken section of the road network comprising physically-contiguous Link(s). The Link(s) are listed sequentially in the publication, in order of carriageway traversal.
  - i. Note that an Unplanned Event containing 0 Network Links indicates that the Event is situated either off-road or on a road located off the NTIS road network.
- b. A point location, specified as a lat/long coordinate, using the `[lat]/[long]` data items. The point marks the midpoint along the total length of the Network Link(s) that specify the Event location. The point is intended for visual display purposes only; it has no other significance.
- c. The Network Links included in the location specification describe the *actual location* of the Event, not the locations/Links *affected* by the Event. Affected locations/Links are included in separate associated Events, such as Congestion Events. Refer to `[associated Event ID]` for the specification of associated Events.
- d. The DATEXII schema specifies that a minimum of 2 location items are included in a `<d2lm:groupOfLocations>` container of type `d2lm:NonOrderedLocationGroupByList`. If there are no Network Links associated with the Event, and hence there is only 1 location item (the point location), then the location specification:

```
<d2lm:groupOfLocations xsi:type="d2lm:NonOrderedLocationGroupByList">
... (as specified in the listing above)
</d2lm:groupOfLocations>
```

is replaced with an *Point* container:

```
<d2lm:groupOfLocations xsi:type="d2lm:Point">
<d2lm:locationForDisplay>
<d2lm:latitude>[lat]</d2lm:latitude>
```



```

        <d2lm:longitude>[long]</d2lm:longitude>
    </d2lm:locationForDisplay>
</d2lm:groupOfLocations>

```

#### 5.2.2.5.4 Data Item Descriptions

The following table describes the data items that are: a) specific to this Event Type or b) common to more than one Type of Event but derived or specified differently to those included in other Event Types.

Note: for clarity, these data items are annotated with an underscore, both in this table and in the XML listing.

Data Item	Description
[ <u>abnormal traffic type</u> ]	<p>The type of abnormal traffic associated with the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>accident cause</u> ]	<p>The cause of the accident associated with the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>accident type</u> ]	<p>The type of accident associated with the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>animal presence</u> ]	<p>The nature of the animal presence, on or near the roadway, that is causing the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>applicable traffic</u> ]	<p>The type of traffic to which a road, lane or carriageway management activity applies.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>area team</u> ]	<p>Text identifying the HA Area Team allocated to assist with the management of the Event.</p> <p>The data item is optional.</p>

Data Item	Description
[ <u>capacity change</u> ]	<p>A manually-set value estimating the actual change in capacity of the carriageway due to an Event, specified as a percentage.</p> <ul style="list-style-type: none"> <li>- A -ve value indicates a restriction over normal conditions (for example, a lane is wholly or partially closed).</li> <li>- A +ve value indicates an expansion of the normal capacity (for example, a normally non-operational road is open for traffic).</li> <li>- A zero value affirms that there is no change in capacity.</li> </ul> <p>The data item is optional; the data item is omitted from the publication if the attribute is not specified, or is set to 'unknown'.</p> <p>Note: this data item is used to override the automatically-calculated [capacity remaining] data item.</p>
[ <u>delay over free flow</u> ]	<p>The current average delay compared to the Free Flow journey time, caused by the Event.</p> <p>The value is the total delay over the full extent of the location(s) affected by the Event. Refer to the General Notes for details of the specification of location(s) affected by an Event.</p> <p>The delay is specified in seconds.</p> <p>The value is either:</p> <ul style="list-style-type: none"> <li>- A manual override, set by operators.</li> <li>- An automatically calculated value, if no manual override is set.</li> </ul> <p>The data item is optional; the automatically calculated value is only included in the publication if the system has enough information to determine the delay.</p>
[ <u>delay over profile</u> ]	<p>The current average delay compared to the profile journey time, caused by the Event.</p> <p>The value is the total delay over the full extent of the location(s) affected by the Event. Refer to the General Notes for details of the specification of location(s) affected by an Event.</p> <p>The delay is specified in seconds.</p> <p>The value is either:</p> <ul style="list-style-type: none"> <li>- A manual override, set by operators.</li> <li>- An automatically calculated value, if no manual override is set.</li> </ul> <p>The data item is optional; the automatically calculated value is only included in the publication if the system has enough information to determine the delay.</p>
[ <u>disturbance type</u> ]	<p>The type of disturbance activity, or incident, causing the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>

Data Item	Description
[ <u>emergency service status</u> ]	<p>The status of the specified type of emergency service (see [<u>emergency service type</u>]).</p> <p>The data item is only included if a corresponding [<u>emergency service type</u>] item is specified in the publication.</p> <p>The data item utilises the NTIS-specific extension enumerate <code>&lt;d2lm:EmergencyServiceStatusEnum&gt;</code>. Refer to Section 7.1 for details of NTIS-specific schema extensions.</p> <p>If the status is unspecified or set to 'unknown' in the NTIS system, then this data item and the corresponding [<u>emergency service type</u>] data item are omitted from the publication.</p>
[ <u>emergency service type</u> ]	<p>The type of emergency service involved in the Event.</p> <p>The status of the specified emergency service type is indicated by a corresponding [<u>emergency service status</u>] data item.</p> <p>The data item is optional.</p> <p>The data item utilises the NTIS-specific extension enumerate <code>&lt;d2lm:EmergencyServiceTypeEnum&gt;</code>. Refer to Section 7.1 for details of NTIS-specific schema extensions.</p>
[ <u>environment type</u> ]	<p>The type of environmental conditions causing the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>event type</u> ]	<p>The type of Unplanned Event.</p> <p>This data item depends on the NTIS Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>infrastructure type</u> ]	<p>The type of infrastructure damaged as a result of the Event.</p> <p>The data item is optional; 0, 1 or multiple types of infrastructure damage can be specified in an Event.</p> <p>Note: the extent of the damage to the type of infrastructure can be specified in one of two ways: number of items or length. Only one of [<u>items damaged</u>] or [<u>length damaged</u>] are included in the publication.</p> <p>The data item utilises the NTIS-specific extension enumerate <code>&lt;d2lm:InfrastructureTypeEnum&gt;</code>. Refer to Section 7.1 for details of NTIS-specific schema extensions.</p>
[ <u>items damaged</u> ]	<p>The number of infrastructure items, of type [<u>infrastructure type</u>], that are damaged.</p> <p>The data item is only included if a corresponding [<u>infrastructure type</u>] item is specified in the publication.</p> <p>The value can be a positive integer, 0 or 'unknown'. 0 affirms no damage to the infrastructure. If set to 'unknown', the data item is omitted from the publication.</p>

Data Item	Description
[ <u>lat</u> ]/[ <u>long</u> ]	<p>The point location of the Event, specified in latitude/longitude coordinates.</p> <p>Refer to General Notes – Event Location for details.</p>
[ <u>length damaged</u> ]	<p>The length of infrastructure, of type [<u>infrastructure type</u>], that are damaged; measured in metres.</p> <p>The data item is only included if a corresponding [<u>infrastructure type</u>] item is specified in the publication.</p> <p>The value can be a positive integer, 0 or ‘unknown’. 0 affirms no damage to the infrastructure. If set to ‘unknown’, the data item is omitted from the publication.</p>
[ <u>location Network Link ID</u> ]	<p>The unique ID of a Network Link, as contained in the NTIS Model, that describes the location, or part of the location, of an Event.</p> <p>Refer to General Notes – Event Location for details.</p>
[ <u>obstruction type</u> ]	<p>This type of obstruction causing the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>operation type</u> ]	<p>The type of authority operation causing the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[ <u>overall end time</u> ]	<p>The end time and date of the Event. Set, in order of precedence, to one of:</p> <ol style="list-style-type: none"> <li>1. The actual, know time and date – when the Event is completed: <ol style="list-style-type: none"> <li>a. The [<u>return to profile - actual</u>] time and date.</li> <li>b. The [<u>time to clear - actual</u>] time and date, if there is no [<u>return to profile - actual</u>] specified.</li> </ol> </li> <li>2. The predicted end time of the Event, set to either: <ol style="list-style-type: none"> <li>a. The [<u>return to profile - predicted</u>] time and date.</li> <li>b. The [<u>time to clear - predicted</u>] time and date, if there is no [<u>return to profile - predicted</u>] specified.</li> </ol> </li> </ol> <p>Note: this data item may not be set on Event creation, until the appropriate data item(s) are specified. If not set, the data item, and the containing &lt;d2lm:overallEndTime&gt; element, are omitted from the published data.</p>
[ <u>overall start time</u> ]	<p>The start time and date of the Event. Set to the time when the Event was created in the NTIS system.</p>

Data Item	Description
[ <u>people number</u> ]	<p>The number of people involved in the Event with a specified injury status (see [<u>people status</u>]).</p> <p>The value can be set in the NTIS system to one of the following:</p> <ul style="list-style-type: none"> <li>- a positive integer: specifying the exact number of people with this injury status. The data item is included in the publication.</li> <li>- zero : to positively affirm that no people with this injury status are involved in the Event. The data item is included in the publication.</li> <li>- multiple : specifying that more than one person has this injury type, but the exact number is unknown. In this case, the [<u>people number</u>] data item is omitted from the publication, but the [<u>people status</u>] and containing elements are still published.</li> <li>- unknown/unspecified : this data item and the corresponding [<u>people status</u>] data item are omitted from the publication.</li> </ul>
[ <u>people status</u> ]	<p>Specifies the type of injury status of people involved in the Event.</p> <p>The number of people with this type of injury involved in the Event is specified by a corresponding [<u>people number</u>] data item.</p> <p>The data item is optional.</p>
[ <u>police force</u> ]	<p>Text representing the name of the primary police force allocated to manage the Event.</p> <p>The data item is optional.</p>
[ <u>police operation type</u> ]	<p>The type of police operation causing the Event.</p> <p>The data item utilises the NTIS-specific extension enumerate <code>&lt;d2lm:PoliceOperationTypeEnum&gt;</code>. Refer to Section 7.1 for details of NTIS-specific schema extensions.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>

Data Item	Description
[ <u>return to free flow – predicted</u> ]	<p>The predicted time and date that the traffic conditions are expected to return to a free flow status, following clearance of the impact on traffic due to the Event.</p> <p>Free flow status is the situation where traffic flow is constrained only by the speed limit imposed on the carriageway.</p> <p>The value is either:</p> <ul style="list-style-type: none"> <li>- A manual override, set by operators. The override can contain a specific date/time or an ‘unspecified’ status. The ‘unspecified’ status indicates that the automatically calculated date/time cannot be trusted and operators cannot accurately set a date/time override.</li> <li>- An automatically calculated value, if the system has enough traffic information to determine the predicted time and no manual override is set.</li> </ul> <p>The published data item is optional and is omitted from the publication if either:</p> <ul style="list-style-type: none"> <li>- the override is set to ‘unspecified’.</li> <li>- there is no calculated or manually overridden date/time value.</li> </ul>
[ <u>return to profile – actual</u> ]	<p>The actual time and date that the traffic conditions return to profile; after the impact on traffic, caused by the Event, is removed.</p> <p>The profile is the normal traffic flow conditions expected at the current time and day.</p> <p>The data item is optional:</p> <ul style="list-style-type: none"> <li>- No return to profile value is provided unless there is congestion associated with the Event.</li> <li>- The data item is not included in the publication until the profile status has been achieved. When an Event has returned to profile the Event is typically complete; refer to the [completed status] data item.</li> </ul>

Data Item	Description
<u>[return to profile – predicted]</u>	<p>The predicted time and date that the traffic conditions are expected to return to profile; after the impact on traffic, caused by the Event, is removed.</p> <p>The profile is the normal traffic flow conditions expected at the current time and day.</p> <p>The value is either:</p> <ul style="list-style-type: none"> <li>- A manual override, set by operators. The override can contain a specific date/time or an ‘unspecified’ status. The ‘unspecified’ status indicates that the automatically calculated date/time cannot be trusted and operators cannot accurately set a date/time override.</li> <li>- An automatically calculated value, if the system has enough traffic information to determine the predicted time and no manual override is set.</li> </ul> <p>The published data item is optional and is omitted from the publication if either:</p> <ul style="list-style-type: none"> <li>- the override is set to ‘unspecified’.</li> <li>- there is no calculated or manually overridden date/time value.</li> </ul>
<u>[road condition]</u>	<p>The type of road condition that is the cause of the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
<u>[road mgt type]</u>	<p>The type of road, lane or carriageway management associated with the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
<u>[road mgt vehicle type]</u>	<p>The type of vehicle for which the road, lane or carriageway management activity has been instigated.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
<u>[spillage contents]</u>	<p>The contents of a spillage onto the carriageway as a result of the Event.</p> <p>The data item is optional; 0, 1 or multiple spillage types can be specified in an Event.</p> <p>The data item utilises the NTIS-specific extension enumerate <i>&lt;d2lm:SpillageContentsEnum&gt;</i>. Refer to Section 7.1 for details of NTIS-specific schema extensions.</p>

Data Item	Description
[ <u>spillage severity</u> ]	<p>The severity of the spillage described by the corresponding [<u>spillage contents</u>] data item.</p> <p>The data item is only included if a corresponding [<u>spillage contents</u>] item is specified in the publication.</p> <p>Refer to the Data Type Mapping section for severity values defined in NTIS and the mapping to DATEXII values.</p>
[ <u>time to clear - actual</u> ]	<p>The time and date that the material impact or traffic impediment caused by the Event ceased to have a material impact on the traffic.</p> <p>The data item is optional and only included in the publication when the time and date is known.</p>
[ <u>time to clear - predicted</u> ]	<p>The time and date the Event is predicted to no longer have any material impact on the road network. That is, the original traffic impediment has been removed, but there still may be residual effects on the traffic (the Event is not necessarily completed).</p> <p>The value is either:</p> <ul style="list-style-type: none"> <li>- A manual override, set by operators. The override can contain a specific date/time or an 'unspecified' status. The 'unspecified' status indicates that the automatically calculated date/time cannot be trusted and operators cannot accurately set a date/time override.</li> <li>- An automatically calculated value, if the system has enough traffic information to determine the predicted time and no manual override is set.</li> </ul> <p>The published data item is optional and is omitted from the publication if either:</p> <ul style="list-style-type: none"> <li>- the override is set to 'unspecified'.</li> <li>- there is no calculated or manually overridden date/time value.</li> </ul>
[ <u>total people</u> ]	<p>The total number of people involved in, or affected by, the Event.</p> <p>The value is set to the total of all the numeric values included in all of the [<u>people number</u>] instances.</p> <p>Note#1: only [<u>people number</u>] instances set to zero or a positive integer are included in the total.</p> <p>Note#2: if all [<u>people number</u>] instances are set to unknown/unspecified or 'multiple' in the NTIS system, then no total number can be determined and this data item is not included in the publication.</p>



Data Item	Description
[total vehicles]	<p>The total number of vehicles involved in, or affected by, the Event.</p> <p>The value is set to the total of all the numeric values included in all of the [vehicles number] instances.</p> <p>Note#1: only [vehicles number] instances set to zero or a positive integer are included in the total.</p> <p>Note#2: if all [vehicles number] instances are set to unknown/unspecified or 'multiple' in the NTIS system, then no total number can be determined and this data item is not included in the publication.</p>
[validity status]	<p>The active/current status of the Event. Set to:</p> <ul style="list-style-type: none"> <li>- <i>active</i> : when the Event is created.</li> <li>- <i>definedByValidityTimeSpec</i> : when the Event is completed (see [completed status])</li> </ul>
[vehicle fire status]	<p>Set to <i>onFire</i> if one or more vehicles of the associated [vehicle type] involved in the Event are on fire.</p> <p>If no vehicles of [vehicle type] are on fire, the data item and the containing &lt;d2lm:groupOfVehiclesInvolved&gt; element are omitted from the publication.</p>
[vehicle obstruction type]	<p>The type of vehicular obstruction associated with the Event.</p> <p>The inclusion and value of this data item depends on the Event Sub-Type; refer to the Data Type Mapping section, below.</p>
[vehicle type]	<p>Specifies the type of vehicle involved in the Event.</p> <p>The number of vehicles of this type involved in the Event is specified by a corresponding [vehicles number] data item.</p> <p>The data item is optional.</p> <p>Refer to the Data Type Mapping section for vehicle type values defined in NTIS and the mapping to DATEXII values.</p>

Data Item	Description
[ <u>vehicles number</u> ]	<p>The number of vehicles involved in the Event of a specified type (see [<u>vehicle type</u>]).</p> <p>The value can be set in the NTIS system to one of the following:</p> <ul style="list-style-type: none"> <li>- a positive integer: specifying the exact number of vehicles of this type. The data item is included in the publication.</li> <li>- zero : to positively affirm that no vehicles of this type are involved in the Event. The data item is included in the publication.</li> <li>- multiple : specifying that more than one vehicle of this type is involved, but the exact number is unknown. In this case, the [<u>vehicles number</u>] data item is omitted from the publication, but the [<u>vehicle type</u>] and containing elements are still published.</li> <li>- unknown/unspecified : this data item and the corresponding [<u>vehicle type</u>] data item are omitted from the publication.</li> </ul>
[ <u>visibility</u> ]	<p>The level of visibility affecting the resolution or management of the Event.</p> <p>The data item is optional.</p> <p>The data item utilises the NTIS-specific extension enumerate <i>&lt;d2lm:VisibilityStatusEnum&gt;</i>. Refer to Section 7.1 for details of NTIS-specific schema extensions.</p>
[ <u>weather type</u> ]	<p>The type of weather affecting the resolution or management of the Event.</p> <p>The data item is optional.</p> <p>The data item utilises the NTIS-specific extension enumerate <i>&lt;d2lm:WeatherConditionsEnum&gt;</i>. Refer to Section 7.1 for details of NTIS-specific schema extensions.</p>

#### 5.2.2.5.5 Data Type Mapping

The following tables define the mapping of NTIS data items to standard DATEXII enumerate types/values.

NTIS Spillage Severity	DATEXII Type: <d2lm:SeverityEnum> [ <u>spillage severity</u> ]
None	none
Minor	low
Major	high

NTIS Vehicle Type	DATEXII Type: <d2lm:VehicleTypeEnum> [vehicle type]
HGV	articulatedVehicle
LGV	lorry
Car	car
Motorbike	motorcycle
Trailer	trailer
Other	other

NTIS Injury Severity	DATEXII Type: <d2lm:InjuryStatusTypeEnum> [people status]
Minor	slightlyInjured
Serious	seriouslyInjured
Fatal	dead

The following tables define the mapping of NTIS Unplanned Event Sub-Types to DATEXII types and values included in the published XML.

NTIS Sub-Type: Accident

NTIS Accident Sub-Type	<situationRecord type> [event type]	<accidentType> [accident type]	Other Data Items Specified
Bridge Strike	Accident	collisionWithObstruction	-
Cross Over	Accident	accident	[accident cause] = onTheWrongSideOfTheRoad
RTC	Accident	collision	-
Overturned Vehicle	Accident	overturnedVehicle	-
Vehicle Left Carriageway	Accident	vehicleOffRoad	-

NTIS Sub-Type: Congestion

NTIS Congestion Sub-Type	<situationRecord type> [event type]	<abnormalTrafficType> [abnormal traffic type]	Other Data Items Specified
N/A	AbnormalTraffic	unspecifiedAbnormalTraffic	-

NTIS Sub-Type: High Sided Vehicle Closure

NTIS High Sided Vehicle Closure Sub-Type	<situationRecordType> [event type]	<roadOrCarriagewayOrLaneManagement Type> [road mgt type]	Other Data Items Specified
N/A	RoadOrCarriagewayOrLaneManagement	roadClosed	[road mgt vehicle type] = highSidedVehicle

### NTIS Sub-Type: Managed Motorway

NTIS Managed Motorway Sub-Type	<situationRecordType> [event type]	<roadOrCarriagewayOrLaneManagement Type> [road mgt type]	Other Data Items Specified
N/A	RoadOrCarriagewayOrLaneManagement	hardShoulderRunningInOperation	-

### NTIS Sub-Type: Obstruction

NTIS Obstruction Sub-Type	<situationRecord Type> [event type]	<obstructionType> [obstruction type]	<vehicleObstruction Type> [vehicle obstruction type]	<animalPresence Type> [animal presence]	<weatherRelated RoadCondition Type> [road condition]	<environmental ObstructionType> [environment type]
Abandoned Vehicle	VehicleObstruction	-	abandonedVehicle	-	-	-
Animals in road	AnimalPresence Obstruction	-	-	animalsOnThe Road	-	-
Broken Down Vehicle	VehicleObstruction	-	brokenDownVehicle	-	-	-
Debris in road	GeneralObstruction	debris	-	-	-	-

NTIS Obstruction Sub-Type	<situationRecord Type> [event type]	<obstructionType> [obstruction type]	<vehicleObstruction Type> [vehicle obstruction type]	<animalPresence Type> [animal presence]	<weatherRelated RoadCondition Type> [road condition]	<environmental ObstructionType> [environment type]
Flooding	Environmental Obstruction	-	-	-	-	flooding
Medical Emergency	VehicleObstruction	-	other	-	-	-
People in road	GeneralObstruction	peopleOnRoadway	-	-	-	-
Shifted Load	VehicleObstruction	-	vehicleInDifficulty	-	-	-
Snow	WeatherRelated RoadConditions	-	-	-	snowOnTheRoad	-
Tyre Change	GeneralObstruction	rescueAndRecoveryWork	-	-	-	-
Unmanaged Road Blockage	GeneralObstruction	obstructionOnTheRoad	-	-	-	-
Unprotected Accident Area	GeneralObstruction	unprotectedAccidentArea	-	-	-	-
Vehicle Fire	VehicleObstruction	-	vehicleOnFire	-	-	-
Vehicle Recovery	GeneralObstruction	rescueAndRecoveryWork	-	-	-	-
Wrong Way Driver	VehicleObstruction	-	vehicleOnWrong Carriageway	-	-	-

## NTIS Sub-Type: Operation Stack

NTIS Operation Stack Sub-Type	<situationRecord type> [event type]	<roadOrCarriagewayOrLaneManagement Type> [road mgt type]	Other Data Items Specified
N/A	RoadOrCarriagewayOrLaneManagement	carriagewayClosures	[applicable traffic] = destinedForFerryService

NTIS Sub-Type: Other Road Management

NTIS Other Road Management Sub-Type	<situationRecord type> [event type]	<roadOrCarriagewayOrLaneManagement Type> [road mgt type]	Other Data Items Specified
N/A	RoadOrCarriagewayOrLaneManagement	other	-

NTIS Sub-Type: Police Incident

NTIS Police Incident Sub-Type	<situationRecord type> [event type]	<authorityOperationType> [operation type]	Other Data Items Specified
Person on Overbridge	AuthorityOperation	other	-
Protestor	AuthorityOperation	other	-
Reconstruction	AuthorityOperation	other	-
Training Exercise	AuthorityOperation	other	-
Other	AuthorityOperation	other	-

NTIS Sub-Type: Spillage in Road

NTIS Spillage Sub-Type	<situationRecord type> [event type]	<obstructionType> [obstruction type]	Other Data Items Specified
Shed Load	GeneralObstruction	shedLoad	-
Spillage	GeneralObstruction	spillageOnTheRoad	-

Notes:

1. A ' ' indicates that the data item is not included in the publication, or is not applicable, for the NTIS Event Type.



#### 5.2.2.5.6 Restricted Data Management

1. If restricted data is suppressed to a Subscriber, via the Subscription Options, the following XML is omitted from the publication:
  - a. Additional description text, as this will include text with journalistic colour:

```
<d21m:generalPublicComment>
  <d21m:comment>
    <d21m:values>
      <d21m:value>[additional description]</d21m:value>
    </d21m:values>
  </d21m:comment>
  <d21m:commentType>internalNote</d21m:commentType>
</d21m:generalPublicComment>
```

Refer to Sections 4.4.1.1.3.8 and 7.3.2 for a description of the suppression of restricted data and details of the Subscription Options, respectively.

2. Permanently suppressed data. The following data is omitted from the publication if [people status] is set to 'dead'; information concerning fatalities is not published:

```
<d21m:groupOfPeopleInvolved>
  <d21m:numberOfPeople>[people number]</d21m:numberOfPeople>
  <d21m:injuryStatus>[people status]</d21m:injuryStatus>
</d21m:groupOfPeopleInvolved>
```

If a [people status] data item is set to 'dead', then the global [total people] value is reduced by the number of people specified in the corresponding 'dead' [people number] data item.

## 5.2.2.6 Type: Weather Event

### 5.2.2.6.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2"
  extensionName="NTIS Published Services" extensionVersion="2.0">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:SituationPublication" lang="en">
    <d2lm:feedType>Event Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:situation version="" id="[event ID]">
      <d2lm:relatedSituation version="" targetClass="Situation" id="[associated event ID]" />
      <!-- x N - 0, 1 or multiple associations can exist -->
      <d2lm:headerInformation>
        <d2lm:areaOfInterest>national</d2lm:areaOfInterest>
        <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
        </d2lm:confidentiality>
        <d2lm:informationStatus>real</d2lm:informationStatus>
      </d2lm:headerInformation>
      <!-- only 1 situationRecord per Situation, see comments above -->
      <d2lm:situationRecord xsi:type="d2lm:PoorEnvironmentConditions" version=""
        id="[event ID]">
        <d2lm:situationRecordCreationReference>[event reference]
        </d2lm:situationRecordCreationReference>
        <d2lm:situationRecordCreationTime>[creation time]</d2lm:situationRecordCreationTime>
        <d2lm:situationRecordVersionTime>[last mod time]</d2lm:situationRecordVersionTime>
        <d2lm:probabilityOfOccurrence>[confirmed status]</d2lm:probabilityOfOccurrence>
        <d2lm:severity>[severity]</d2lm:severity>
        <d2lm:source>
          <d2lm:sourceIdentification>[source name]</d2lm:sourceIdentification>
          <d2lm:sourceExtension>
            <d2lm:sourceSituation> <!-- NTIS extension -->
              <d2lm:sourceSituationId>[source event ID]</d2lm:sourceSituationId>
              <d2lm:sourceSituationCreationTime>[source time]
              </d2lm:sourceSituationCreationTime>
            </d2lm:sourceSituation>
          </d2lm:sourceExtension>
        </d2lm:source>
        <d2lm:validity>
          <d2lm:validityStatus>[validity status]</d2lm:validityStatus>
          <d2lm:validityTimeSpecification>
            <d2lm:overallStartTime>[overall start time]</d2lm:overallStartTime>
            <d2lm:overallEndTime>[overall end time]</d2lm:overallEndTime>
          </d2lm:validityTimeSpecification>
        </d2lm:validity>
        <d2lm:impact>
          <d2lm:impactExtension>
            <d2lm:impactDetails>
            </d2lm:impactDetails>
          </d2lm:impactExtension>
        </d2lm:impact>
        <d2lm:cause xsi:type="d2lm:NonManagedCause">
          <d2lm:causeDescription>
            <d2lm:values>
              <d2lm:value>[event cause]</d2lm:value>
              <!-- x N - the cause text can span multiple lines -->
            </d2lm:values>
          </d2lm:causeDescription>
        </d2lm:cause>
        <d2lm:generalPublicComment>
          <d2lm:comment>
            <d2lm:values>
              <d2lm:value>TYPE : AWP</d2lm:value>
              <d2lm:value>[key/value pair - AWP]</d2lm:value>
            </d2lm:values>
          </d2lm:comment>
        </d2lm:generalPublicComment>
      </d2lm:situationRecord>
    </d2lm:situation>
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>
```

```

        <!-- x N - multiple AWP key/value pairs -->
    </d2lm:values>
</d2lm:comment>
</d2lm:generalPublicComment>
<d2lm:generalPublicComment>
    <d2lm:comment>
        <d2lm:values>
            <d2lm:value>TYPE : GDP</d2lm:value>
            <d2lm:value>[key/value pair - GDP]</d2lm:value>
            <!-- x N - multiple AWP key/value pairs -->
        </d2lm:values>
    </d2lm:comment>
</d2lm:generalPublicComment>
<d2lm:generalPublicComment>
    <d2lm:comment>
        <d2lm:values>
            <d2lm:value>[additional description]</d2lm:value>
            <!-- x N - the comments may contain more than 1 line of text -->
        </d2lm:values>
    </d2lm:comment>
    <d2lm:commentType>internalNote</d2lm:commentType>
</d2lm:generalPublicComment>
<d2lm:groupOfLocations xsi:type="d2lm:NonOrderedLocationGroupByList">
    <d2lm:locationContainedInGroup xsi:type="d2lm:LocationByReference">
        <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            version="[NTIS Model version]" id="[location Network Link ID]" />
    </d2lm:locationContainedInGroup>
    <!-- x N - 0, 1 or multiple network links may be affected by the event. -->
    <d2lm:locationContainedInGroup xsi:type="d2lm:Area">
        <d2lm:areaExtension>
            <d2lm:areaExtension>
                <d2lm:polygonArea>
                    <d2lm:pointCoordinates index="0">
                        <d2lm:pointCoordinates>
                            <d2lm:latitude>[polygon lat]</d2lm:latitude>
                            <d2lm:longitude>[polygon long]</d2lm:longitude>
                        </d2lm:pointCoordinates>
                    </d2lm:pointCoordinates>
                    <!-- x N - minimum 4 points in a polygon -->
                </d2lm:polygonArea>
            </d2lm:areaExtension>
        </d2lm:areaExtension>
    </d2lm:locationContainedInGroup>
</d2lm:groupOfLocations>
<d2lm:management>
    <d2lm:lifeCycleManagement>
        <d2lm:cancel>[deleted status]</d2lm:cancel>
        <d2lm:end>[completed status]</d2lm:end>
    </d2lm:lifeCycleManagement>
    <d2lm:managementExtension>
        <d2lm:situationManagement> <!-- NTIS extension -->
            <d2lm:confirmedBy>[confirmation source]</d2lm:confirmedBy>
            <d2lm:rccInformation>
                <d2lm:allocatedRcc>[RCC ID]</d2lm:allocatedRcc>
                <d2lm:rccSituationId>[RCC event ID]</d2lm:rccSituationId>
            </d2lm:rccInformation>
        </d2lm:situationManagement>
    </d2lm:managementExtension>
</d2lm:management>
<d2lm:poorEnvironmentType>[weather type]</d2lm:poorEnvironmentType>
<!-- x N - an Event can comprise 1 or multiple weather types/attributes -->
<d2lm:precipitationDetail>
    <d2lm:precipitationType>[precipitation type]</d2lm:precipitationType>
</d2lm:precipitationDetail>
<d2lm:visibility>
    <d2lm:minimumVisibilityDistance>
        <d2lm:integerMetreDistance>[visibility]</d2lm:integerMetreDistance>
    </d2lm:minimumVisibilityDistance>
</d2lm:visibility>
</d2lm:situationRecord>
</d2lm:situation>
</d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

### 5.2.2.6.2 General Notes

1. Event Location: a Weather Event affects a single geographical area. The area location is specified using 2 methods:
  - a. A polygon, defined by a series of sequential lat/long coordinate points. The coordinates describe a closed-form polygon; the last coordinate point in the polygon is the same as the first, to 'close' the shape. The polygon is specified using the [polygon lat]/[polygon long] data items.
  - b. The list of Network Links contained, wholly or partially, within the polygon (above). There may be 0, 1 or multiple Network Links contained in the publication; 0 Network Links indicates that the Weather Event is wholly off-network. The Link(s) are specified using the [location Network Link ID] data item(s).
  - c. The DATEXII schema specifies that a minimum of 2 location items are included in a `<d2lm:groupOfLocations>` container of type `d2lm:NonOrderedLocationGroupByList`. If there are no Network Links contained within the Event Area, and hence there is only 1 location item (the Area), then the location specification:

```
<d2lm:groupOfLocations xsi:type="d2lm:NonOrderedLocationGroupByList">
  ... (as specified in the listing above)
</d2lm:groupOfLocations>
```

is replaced with an *Area* container:

```
<d2lm:groupOfLocations xsi:type="d2lm:Area">
  <d2lm:areaExtension>
    <d2lm:areaExtension>
      <d2lm:polygonArea>
        <d2lm:pointCoordinates index="0">
          <d2lm:pointCoordinates>
            <d2lm:latitude>[polygon lat]</d2lm:latitude>
            <d2lm:longitude>[polygon long]</d2lm:longitude>
          </d2lm:pointCoordinates>
        </d2lm:pointCoordinates>
        <!-- x N - minimum 4 points in a polygon -->
      </d2lm:polygonArea>
    </d2lm:areaExtension>
  </d2lm:areaExtension>
</d2lm:groupOfLocations>
```

### 5.2.2.6.3 Data Item Descriptions

The following table describes the data items that are: a) specific to this Event Type or b) common to more than one Type of Event but derived or specified differently to those included in other Event Types.

Note: for clarity, these data items are annotated with an underscore, both in this table and in the XML listing.

Data Item	Description
<u>[location Network Link ID]</u>	The unique ID of a Network Link, as contained in the NTIS Model. Refer to General Notes – Event Location for details.

Data Item	Description
[ <u>polygon lat</u> ]/ [ <u>polygon long</u> ]	A sequence of ordered lat/long coordinate point locations that specify a polygon shape; used to describe the geographical area affected by the Event.  Refer to General Notes – Event Location for details.
[ <u>overall end time</u> ]	The forecast end time and date of the Event. The value can be modified at any time in the Event lifecycle.
[ <u>overall start time</u> ]	The start time and date of the Event. Set to either:  - The forecast start time of the Event. The value can be modified at any time in the Event lifecycle.  - The actual start time of the Event – set if there is no scheduled start time (i.e. the Event has already started when created in the system).
[ <u>precipitation type</u> ]	The type of precipitation associated with the Weather Event.  The data item is optional and only applied to certain [ <u>weather type</u> ] values.  Refer to the Data Type Mapping table for details.
[ <u>validity status</u> ]	The active/current status of the Event. Set to:  - <i>definedByValidityTimeSpec</i> : when the Event is still forecast (the [ <u>overall start time</u> ] is in the future) or when the Event is completed (see [ <u>completed status</u> ]).  - <i>active</i> : indicates that the Event is currently active; automatically set when the [ <u>overall start time</u> ] is reached.  - <i>suspended</i> : indicates that the Event is inactive; never automatically set by the system.  Note: the statuses <i>active</i> and <i>suspended</i> can be set manually, to override the automatic system setting, at any time in the Event lifecycle.
[ <u>visibility</u> ]	The visibility, due to the Weather Event, specified in metres.  The data item is optional.
[ <u>weather type</u> ]	The type of weather that describes the Event.  A Weather Event can contain 1 or multiple [ <u>weather type</u> ] elements, the combination of which fully describe the type(s) of weather associated with the Event.  Refer to the Data Type Mapping table for details.

#### 5.2.2.6.4 Data Type Mapping

The following table defines the mapping of NTIS Weather Event attributes to DATEXII types and values included in the published XML.

NTIS Sub-Type	NTIS Weather Attribute	<poorEnvironmentType> [weather type]	<precipitationDetail> [precipitation type]
N/A	Atmospheric Pollution	pollution	-
N/A	Fog	fog	-
N/A	High Winds	strongWinds	-
N/A	Ice	heavyFrost	-
N/A	Low Sun	lowSunGlare	-
N/A	Rain – Drizzle*	rain	drizzle
N/A	Rain – Freezing Rain*	rain	freezingRain
N/A	Rain*	rain	rain
N/A	Snow – Hail*	snowfall	hail
N/A	Snow – Sleet*	snowfall	sleet
N/A	Snow*	snowfall	snow
N/A	Temperature – High**	extremeHeat	-
N/A	Temperature – Low**	extremeCold	-

Notes:

1. There are no NTIS Sub-Types of a Weather Event; the Event is described using the NTIS Weather Attributes. One or more of these attributes can be specified to describe the weather associated with the Event.
2. Precipitation attributes (marked with a \*) are mutually exclusive. Only one of these attributes is specified per Event. (Note: the DATEXII schema only allows one <d2lm:precipitationDetail> element per Event)
3. Temperature attributes (marked with a \*\*) are mutually exclusive. Only one of these attributes is specified per Event.
4. A '-' indicates that the data item is indeterminable or not applicable to the Event attribute and is not included in the publication.

#### 5.2.2.6.5 Restricted Data Management

If restricted data is suppressed to a Subscriber, via the Subscription Options, the following XML is omitted from the publication:

1. Additional description text, as this will include text with journalistic colour:

```

<d2lm:generalPublicComment>
  <d2lm:comment>
    <d2lm:values>
      <d2lm:value>[additional description]</d2lm:value>
    </d2lm:values>
  </d2lm:comment>
  <d2lm:commentType>internalNote</d2lm:commentType>

```

</d2lm:generalPublicComment>

Refer to Sections 4.4.1.1.3.8 and 7.3.2 for a description of the suppression of restricted data and details of the Subscription Options, respectively.

## 5.2.3 MIDAS Loop Data

### 5.2.3.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:MeasuredDataPublication" lang="en" >
    <d2lm:feedType>MIDAS Loop Traffic Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:measurementSiteTableReference targetClass="MeasurementSiteTable"
      version="[NTIS Model version]" id="NTIS_MIDAS_Measurement_Sites" />
    <d2lm:headerInformation>
      <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
      </d2lm:confidentiality>
      <d2lm:informationStatus>real</d2lm:informationStatus>
      <d2lm:urgency>normalUrgency</d2lm:urgency>
    </d2lm:headerInformation>
    <d2lm:siteMeasurements>
      <d2lm:measurementSiteReference version="[NTIS Model version]"
        targetClass="MeasurementSiteRecord" id="[MIDAS site ID]" />
      <d2lm:measurementTimeDefault>[default measurement time]</d2lm:measurementTimeDefault>
      <d2lm:measuredValue index="0">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficSpeed">
            <d2lm:averageVehicleSpeed>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:speed>[speed value]</d2lm:speed>
            </d2lm:averageVehicleSpeed>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>
      <d2lm:measuredValue index="1">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficHeadway">
            <d2lm:averageTimeHeadway>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:duration>[headway value]</d2lm:duration>
            </d2lm:averageTimeHeadway>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>
      <d2lm:measuredValue index="2">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficConcentration">
            <d2lm:occupancy>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:percentage>[occupancy value]</d2lm:percentage>
            </d2lm:occupancy>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>
    </d2lm:siteMeasurements>
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>
```



```

    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="3">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #1]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="4">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #2]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="5">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #3]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="6">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #4]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="7">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #5]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>

```

```

    </d2lm:measuredValue>
    <!-- x N - All the values, above, are for a single lane. This set of traffic data is
repeated for each lane reported by the MIDAS site, with continuing increments of the index
number of the <d2lm:measuredValue> element -->
    </d2lm:siteMeasurements>
    <!-- x N - Multiple <d2lm:siteMeasurements> elements can exist in the same message -->
    </d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

### 5.2.3.2 General Notes

1. Reference data, contained in the published NTIS Model, is required to interpret the traffic data contained in the message:
  - a. The *<d2lm:measurementSiteTableReference>* element references the version of the NTIS Model to use and specifies that MIDAS site data is contained in the *NTIS\_MIDAS\_Measurement\_Sites* table within the NTIS Model.
  - b. The MIDAS site is uniquely identified within the *NTIS\_MIDAS\_Measurement\_Sites* NTIS Model table by the [MIDAS site ID] attribute of the *<d2lm:measurementSiteReference>* element. The location of the MIDAS site on the road network, and any other site-specific characteristics, are contained in the NTIS Model.
  - c. The characteristics of each site measurement (for example, the vehicle lengths associated with individual flow measurements, or the lane associated with a measurement) are included in the NTIS Model. The *index* attribute of the *<d2lm:measuredValue>* element, unique per MIDAS site, maps the measurements contained in this traffic data message to the measurement characteristics contained in the NTIS Model.
2. The traffic data values contained in the message are received by the NTIS system, and subsequently published, on a per-lane, per-MIDAS site basis. Data values within the site publication are specific to a particular lane monitored by the MIDAS site.
3. Each individual traffic data value is reported by a MIDAS outstation in a single byte with a value of 0-255. Any subsequent processing, conversion or range validation on this raw data is described in the Data Item Descriptions section, below.

### 5.2.3.3 Data Item Descriptions

Data Item	Description
[data error flag]	<p>Boolean flag indicating whether the data value is valid (false) or known to be in error/suspect (true).</p> <p>Refer to the Data Validation and Error Handling section, below, for further information.</p>

Data Item	Description
[data error reason]	<p>Text describing the reason for the data error.</p> <p>This data item, and the containing <i>&lt;d2lm:reasonForDataError&gt;</i> element, is omitted from the message if the corresponding [data error flag] is false.</p> <p>Values:  “out of range” : determined by the NTIS system  “suspect equipment” : specified at the NTIS system.</p> <p>Refer to the Data Validation and Error Handling section, below, for further information.</p>
[default measurement time]	The time and date of all the measurements within the containing <i>&lt;siteMeasurements&gt;</i> element; as recorded by the source MIDAS outstation.
[flow value #1-5]	<p>Vehicular flow rate, measured in vehicles/hour (the value is converted from the vehicles/minute value reported by the site/outstation).</p> <p>The 5 flow values comprise: 4 flow values associated with specific vehicle lengths, 1 flow value which is an aggregate flow for all vehicle types. The message will either contain the 4 vehicle length-specific values or the aggregated flow value. Refer to the Data Validation and Error Handling section, below, for further information.</p> <p>Which flow values correspond to which length-specific or aggregate measurement is defined in the NTIS Model; based on the associated <i>&lt;d2lm:measuredValue&gt;</i> index attribute (see General Notes, above).</p> <p>Valid range: 0-[system configurable parameter].  (Note: the system configurable parameter can be modified by NTIS operations, so this value cannot be explicitly declared in this document)</p>
[headway value]	<p>Average time, in seconds, between vehicles.</p> <p>Valid range: 0-25.5</p> <p>Note that a maximum value of 25.5 indicates 25.5 or greater. MIDAS outstations report headway values in a single byte, in deciseconds: the maximum raw value of a single byte, 255, equates to 25.5 seconds. As a consequence, headway values cannot be out of range.</p>
[NTIS Model version]	<p>Version of the published NTIS Model against which this message is published.</p> <p>Format: &lt;major version&gt;.&lt;minor version&gt;, e.g. “17.0”</p>
[occupancy value]	<p>Percentage of time that the section of road is occupied by vehicles.</p> <p>Valid range: 0-100</p>
[publication time]	The time and date that the message was published by the NTIS system.

Data Item	Description
[speed value]	Average speed of vehicles, measured in km/h.  Valid range: 0-[system configurable parameter]. (Note: the system configurable parameter can be modified by NTIS operations, so this value cannot be explicitly declared in this document)
[MIDAS site ID]	The unique ID of the MIDAS measurement site; used to reference the MIDAS site in the published NTIS Model.

#### 5.2.3.4 Data Validation and Error Handling

1. Validation on Data Acquisition. The data acquisition interface utilised to collect MIDAS Loop Data performs validation checks on the received raw data:
  - a. Some outstations are configured to only report a subset of the possible traffic data items. Data items that are not included in the message received from the outstation are set as follows:
    - i. Value: 255
    - ii. Error flag: true/invalid
  - b. Out-of-range checks are performed on each data item received from the outstation. Out-of-range data items are set as follows:
    - i. Value: <original outstation value>
    - ii. Error flag: true/invalid
2. Suspect Equipment: source/ data acquisition equipment can be specified in the NTIS system as 'suspect', following analysis of erroneous data received from the equipment.
3. Indicating Errors in Published Data: erroneous, or potentially erroneous, data items are included in the published data. The data items are marked as in error ([data error flag]=true) and the corresponding [data error reason] set to:
  - a. out of range: the value received from the reporting outstation/site is determined by the NTIS system to be outside of an acceptable range.
  - b. suspect equipment: the source equipment has been set as suspect, following analysis of erroneous received data.

Note: If more than one error reason is applicable to a data item, then all reasons are included in the publication. For example, if the equipment is set to suspect, but data is still being received and the out-of-range check fails for one of the data items, the following will be published:

```
<d21m:dataError>true</d21m:dataError>
<d21m:reasonForDataError>
  <d21m:values>
    <d21m:value>suspect equipment</d21m:value>
    <d21m:value>out of range</d21m:value>
```

```
</d2lm:values>  
</d2lm:reasonForDataError>
```

4. Managing Non-Operational Loops and Flow Aggregation: With only 1 operational loop, only an aggregated flow is supplied by the outstation, the average speed value cannot be determined whilst occupancy and headway values can still be measured.

Unlike TMU Loop Data, the messages received from the MIDAS outstation do not explicitly state that only one loop is operational. Hence, this status is determined if the received data is set as follows:

- a. flow 1: value = 255 and error status = true
- b. flow 2: value = 255 and error status = true
- c. flow 3: value = 255 and error status = true
- d. flow 4: error status = false
- e. Speed: value = 255 and error status = true

Published data items:

- a. Flow values: only aggregated flow is included in the published data; all other flow values are omitted from the published data.
- b. Speed value: the value is omitted from the published data.
- c. Headway value: the value is included in the published data.
- d. Occupancy: the value is included in the published data.

## 5.2.4 NTIS Model Update Notifications

### 5.2.4.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2"
  extensionName="NTIS Published Services" extensionVersion="2.0" >
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:GenericPublication" lang="en" >
    <d2lm:feedDescription>
      <d2lm:values>
        <d2lm:value lang="en">NTIS Network and Asset Reference Model: update
notification</d2lm:value>
        <d2lm:value lang="en">This publication contains details of the new version of the NTIS
Model, available for download from the NTIS system</d2lm:value>
      </d2lm:values>
    </d2lm:feedDescription>
    <d2lm:feedType>NTIS Model Update Notification</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:genericPublicationName>NTIS Model Update Notification</d2lm:genericPublicationName>
    <d2lm:genericPublicationExtension>
      <d2lm:ntisModelVersionInformation>
        <d2lm:modelVersion>[NTIS Model version]</d2lm:modelVersion>
        <d2lm:modelPublicationTime>[NTIS Model publication time]</d2lm:modelPublicationTime>
        <d2lm:modelFilename>[NTIS Model file name]</d2lm:modelFilename>
      </d2lm:ntisModelVersionInformation>
    </d2lm:genericPublicationExtension>
  </d2lm:payloadPublication>
</ntispub:d2LogicalModel>
```

### 5.2.4.2 General Notes

1. The *extensionName* and *extensionVersion* attributes are added to the `<d2lm:d2LogicalModel>` element to specify that this message utilises an NTIS Publish Services-specific extension to the base DATEXII schema. The extension comprises the `<d2lm:ntisModelVersionInformation>` element and child elements. Refer to Section 7.1 for details of extensions applied to the DATEXII schema.

### 5.2.4.3 Data Item Descriptions

Data Item	Description
[NTIS Model file name]	The name of the file that contains this version of the NTIS Model and is downloaded by subscribers via the NTIS Model Download interface [ref 6].  Format: NTISModel-<date>-<version>.zip Example: NTISModel-2013-06-18-v97.0.zip
[NTIS Model publication time]	The time and date that this version of the published NTIS Model was generated and made available via the NTIS Model Download interface [ref 6].

Data Item	Description
[NTIS Model version]	Version of the published NTIS Model against which this message is published. Format: <major version>.<minor version>, e.g. "17.0"
[publication time]	The time and date that the message was published by the NTIS system.

#### 5.2.4.4 Data Validation and Error Handling

None required.

## 5.2.5 Processed Traffic Data – Fused FVD and Sensor Data

### 5.2.5.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2"
  extensionName="NTIS Published Services" extensionVersion="2.0" >
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:ElaboratedDataPublication" lang="en" >
    <d2lm:feedType>Fused FVD and Sensor PTD</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:forecastDefault>false</d2lm:forecastDefault>
    <!-- Data is for current, rather than predicted, time unless otherwise specified. -->
    <d2lm:timeDefault>[default derived time]</d2lm:timeDefault>
    <d2lm:headerInformation>
      <d2lm:areaOfInterest>national</d2lm:areaOfInterest>
      <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
      </d2lm:confidentiality>
      <d2lm:informationStatus>real</d2lm:informationStatus>
    </d2lm:headerInformation>
    <!-- Current Speed Data -->
    <d2lm:elaboratedData>
      <d2lm:basicData xsi:type="d2lm:TrafficSpeed">
        <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
          <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            id="[Network Link ID]" version="[NTIS Model version]"/>
        </d2lm:pertinentLocation>
        <d2lm:averageVehicleSpeed>
          <d2lm:speed>[fused average speed]</d2lm:speed>
        </d2lm:averageVehicleSpeed>
        <d2lm:trafficSpeedExtension>
          <d2lm:speedFvdOnly>
            <d2lm:speed>[FVD average speed]</d2lm:speed>
          </d2lm:speedFvdOnly>
        </d2lm:trafficSpeedExtension>
      </d2lm:basicData>
    </d2lm:elaboratedData>
    <!-- Current Travel Time Data -->
    <d2lm:elaboratedData>
      <d2lm:basicData xsi:type="d2lm:TravelTimeData">
        <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
          <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            id="[Network Link ID]" version="[NTIS Model version]"/>
        </d2lm:pertinentLocation>
        <d2lm:travelTime>
          <d2lm:duration>[fused average travel time]</d2lm:duration>
        </d2lm:travelTime>
        <d2lm:freeFlowTravelTime>
          <d2lm:duration>[fused free flow travel time]</d2lm:duration>
        </d2lm:freeFlowTravelTime>
        <d2lm:normallyExpectedTravelTime>
          <d2lm:duration>[fused profile travel time]</d2lm:duration>
        </d2lm:normallyExpectedTravelTime>
      </d2lm:basicData>
    </d2lm:elaboratedData>
    <!-- Speed Predictions -->
    <d2lm:elaboratedData>
      <d2lm:forecast>true</d2lm:forecast>
      <d2lm:basicData xsi:type="d2lm:TrafficSpeed">
        <d2lm:measurementOrCalculationTime>[forecast time]</d2lm:measurementOrCalculationTime>
        <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
          <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            id="[Network Link ID]" version="[NTIS Model version]"/>
        </d2lm:pertinentLocation>
        <d2lm:averageVehicleSpeed>
```



```

        <d2lm:speed>[forecast fused average speed]</d2lm:speed>
      </d2lm:averageVehicleSpeed>
    </d2lm:basicData>
  </d2lm:elaboratedData>
<!-- x 8 - Speed predictions are specified for the next 2hrs at 15min intervals -->
<!-- Travel Time Predictions -->
<d2lm:elaboratedData>
  <d2lm:forecast>true</d2lm:forecast>
  <d2lm:basicData xsi:type="d2lm:TravelTimeData">
    <d2lm:measurementOrCalculationTime>[forecast time]</d2lm:measurementOrCalculationTime>
    <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
      <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
        id="[Network Link ID]" version="[NTIS Model version]"/>
    </d2lm:pertinentLocation>
    <d2lm:travelTime>
      <d2lm:duration>[forecast fused average travel time]</d2lm:duration>
    </d2lm:travelTime>
  </d2lm:basicData>
</d2lm:elaboratedData>
<!-- x 8 - Travel time predictions are specified for the next 2hrs at 15min intervals -->
<!-- x N - The sequence of <d2lm:elaboratedData> items, above, are for a single location
(Network Link). The message can contain the same sequence of data items for multiple
locations -->
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

### 5.2.5.2 General Notes

1. Each data item in the message is published against a single Network Link, as defined in the published NTIS Model:
  - a. The `<d2lm:predefinedLocationReference>` element references the version of the NTIS Model to use and specifies the Network Link associated with the `<d2lm:elaboratedData>` item.
2. Unless otherwise stated in the Data Item Descriptions section, below, the data items included in the message are calculated from fusing both FVD and sensor data.
3. The *extensionName* and *extensionVersion* attributes are added to the `<d2lm:d2LogicalModel>` element to specify that this message utilises NTIS Publish Services-specific extensions to the base DATEXII schema. Refer to Section 7.1 and the Data Item Descriptions, below, for details.

### 5.2.5.3 Data Item Descriptions

Data Item	Description
[default derived time]	The default time and date at which the values were derived: applies to all non-forecast values included in the message.
[fused average speed]	Average speed of vehicles, measured in km/h.
[fused average travel time]	Average time, in seconds, to traverse the length of the Network Link.
[fused free flow travel time]	Average time, in seconds, to traverse the length of the Network Link under Free Flow conditions.
[fused profile travel time]	Average time, in seconds, to traverse the length of the Network Link under conditions normal/expected for the current time and day (the current profile time).

Data Item	Description
[forecast time]	The future time and date to which a forecast value applies. Forecast values are specified for a 2 hour period, at 15 minute intervals, ahead of the [default derived time].
[forecast fused average speed]	Average speed of vehicles, measured in km/h, at the specified [forecast time].
[forecast fused average travel time]	Forecast average time, in seconds, to traverse the length of the Network Link at the specified [forecast time].
[FVD average speed]	<p>Average speed of vehicles, measured in km/h.</p> <p>The value is based on FVD data only.</p> <p>Note: The containing element for this data item, <i>&lt;d2lm:speedFvdOnly&gt;</i>, is an NTIS-specific extension to the standard DATEXII Schema. Refer to Section 7.1 for details.</p>
[Network Link ID]	The unique ID of the Network Link to which the data applies; as contained in the NTIS Model.
[NTIS Model version]	<p>Version of the published NTIS Model against which this message is published.</p> <p>Format: &lt;major version&gt;.&lt;minor version&gt;, e.g. "17.0"</p>
[publication time]	The time and date that the message was published by the NTIS system.

#### 5.2.5.4 Data Validation and Error Handling

1. The pre-publication validation of Processed Traffic Data is described in [ref 10].
2. If the raw data used to calculate the Processed Traffic Data is of insufficient quality, reliability or volume, individual data items are omitted from the published message:
  - a. Individual data items are omitted from the message by not including the corresponding element in the XML.
  - b. If all data items/elements within a containing *<d2lm:elaboratedData>* element are omitted, then the entire *<d2lm:elaboratedData>* is omitted from the message. An empty *<d2lm:elaboratedData>* element is not published.
  - c. If all *<d2lm:elaboratedData>* elements are omitted from the message, the message is not published.

## 5.2.6 Processed Traffic Data – Fused Sensor-only Data

### 5.2.6.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2" >
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:ElaboratedDataPublication" lang="en">
    <d2lm:feedType>Fused Sensor-only PTD</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:timeDefault>[default derived time]</d2lm:timeDefault>
    <d2lm:headerInformation>
      <d2lm:areaOfInterest>national</d2lm:areaOfInterest>
      <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers</d2lm:confidentiality>
      <d2lm:informationStatus>real</d2lm:informationStatus>
    </d2lm:headerInformation>
    <d2lm:elaboratedData>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
          <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            id="[Network Link ID]" version="[NTIS Model version]"/>
        </d2lm:pertinentLocation>
        <d2lm:vehicleFlow>
          <d2lm:vehicleFlowRate>[flow value]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:elaboratedData>
    <d2lm:elaboratedData>
      <d2lm:basicData xsi:type="d2lm:TrafficConcentration">
        <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
          <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            id="[Network Link ID]" version="[NTIS Model version]"/>
        </d2lm:pertinentLocation>
        <d2lm:occupancy>
          <d2lm:percentage>[occupancy value]</d2lm:percentage>
        </d2lm:occupancy>
      </d2lm:basicData>
    </d2lm:elaboratedData>
    <d2lm:elaboratedData>
      <d2lm:basicData xsi:type="d2lm:TrafficHeadway">
        <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
          <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            id="[Network Link ID]" version="[NTIS Model version]"/>
        </d2lm:pertinentLocation>
        <d2lm:averageTimeHeadway>
          <d2lm:duration>[headway value]</d2lm:duration>
        </d2lm:averageTimeHeadway>
      </d2lm:basicData>
    </d2lm:elaboratedData>
    <d2lm:elaboratedData>
      <d2lm:basicData xsi:type="d2lm:TrafficSpeed">
        <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
          <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
            id="[Network Link ID]" version="[NTIS Model version]"/>
        </d2lm:pertinentLocation>
        <d2lm:averageVehicleSpeed>
          <d2lm:speed>[speed value]</d2lm:speed>
        </d2lm:averageVehicleSpeed>
      </d2lm:basicData>
    </d2lm:elaboratedData>
    <d2lm:elaboratedData>
      <d2lm:basicData xsi:type="d2lm:TravelTimeData">
        <d2lm:pertinentLocation xsi:type="d2lm:LocationByReference">
          <d2lm:predefinedLocationReference targetClass="PredefinedLocation"
```

```

        id="[Network Link ID]" version="[NTIS Model version]"/>
    </d2lm:pertinentLocation>
    <d2lm:travelTime>
        <d2lm:duration>[travel time value]</d2lm:duration>
    </d2lm:travelTime>
    <d2lm:freeFlowTravelTime>
        <d2lm:duration>[free flow travel time]</d2lm:duration>
    </d2lm:freeFlowTravelTime>
    <d2lm:normallyExpectedTravelTime>
        <d2lm:duration>[profile travel time]</d2lm:duration>
    </d2lm:normallyExpectedTravelTime>
    </d2lm:basicData>
</d2lm:elaboratedData>
<!-- x N - The sequence of <d2lm:elaboratedData> items, above, are for a single location
(Network Link). The message can contain the same sequence of data items for multiple
locations -->
</d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

### 5.2.6.2 General Notes

1. Each data item in the message is published against a single Network Link, as defined in the published NTIS Model:
  - a. The `<d2lm:predefinedLocationReference>` element references the version of the NTIS Model to use and specifies the Network Link associated with the `<d2lm:elaboratedData>` item.
2. The data items included in the message are calculated from fusing sensor data (no FVD-based data is used for the calculations).

### 5.2.6.3 Data Item Descriptions

Data Item	Description
[default derived time]	The time and date at which the values were derived: applies to all values included in the message.
[flow value]	Vehicular flow rate, measured in vehicles/hour.
[free flow travel time]	Average time, in seconds, to traverse the length of the Network Link under Free Flow conditions.
[headway value]	Average time, in seconds, between vehicles.
[Network Link ID]	The unique ID of the Network Link to which the data applies; as contained in the NTIS Model.
[NTIS Model version]	Version of the published NTIS Model against which this message is published. Format: <major version>.<minor version>, e.g. "17.0"
[occupancy value]	Percentage of time that the section of road is occupied by vehicles. Valid range: 0-100
[profile travel time]	Average time, in seconds, to traverse the length of the Network Link under conditions normal/expected for the current time and day (the current profile time).
[publication time]	The time and date that the message was published by the NTIS system.

Data Item	Description
[speed value]	Average speed of vehicles, measured in km/h.
[travel time value]	Average time, in seconds, to traverse the length of the Network Link.

#### 5.2.6.4 Data Validation and Error Handling

1. The pre-publication validation of Processed Traffic Data is described in [ref 10].
2. If the raw data used to calculate the Processed Traffic Data is of insufficient quality, reliability or volume, individual data items are omitted from the published message:
  - a. Individual data items are omitted from the message by not including the corresponding element in the XML.
  - b. If all data items/elements within a containing *<d2lm:elaboratedData>* element are omitted, then the entire *<d2lm:elaboratedData>* is omitted from the message. An empty *<d2lm:elaboratedData>* element is not published.
  - c. If all *<d2lm:elaboratedData>* elements are omitted from the message, the message is not published.

## 5.2.7 TMU Loop Data

### 5.2.7.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:MeasuredDataPublication" lang="en" >
    <d2lm:feedType>TMU Loop Traffic Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:measurementSiteTableReference targetClass="MeasurementSiteTable"
      version="[NTIS Model version]" id="NTIS_TMU_Measurement_Sites" />
    <d2lm:headerInformation>
      <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
      </d2lm:confidentiality>
      <d2lm:informationStatus>real</d2lm:informationStatus>
      <d2lm:urgency>normalUrgency</d2lm:urgency>
    </d2lm:headerInformation>
    <d2lm:siteMeasurements>
      <d2lm:measurementSiteReference version="[NTIS Model version]"
        targetClass="MeasurementSiteRecord" id="[TMU site ID]" />
      <d2lm:measurementTimeDefault>[default measurement time]</d2lm:measurementTimeDefault>
      <d2lm:measuredValue index="0">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficSpeed">
            <d2lm:averageVehicleSpeed>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:speed>[speed value]</d2lm:speed>
            </d2lm:averageVehicleSpeed>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>
      <d2lm:measuredValue index="1">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficHeadway">
            <d2lm:averageTimeHeadway>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:duration>[headway value]</d2lm:duration>
            </d2lm:averageTimeHeadway>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>
      <d2lm:measuredValue index="2">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficConcentration">
            <d2lm:occupancy>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:percentage>[occupancy value]</d2lm:percentage>
            </d2lm:occupancy>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>
    </d2lm:siteMeasurements>
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>
```

```

    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="3">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #1]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="4">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #2]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="5">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #3]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="6">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #4]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>
  <d2lm:measuredValue index="7">
    <d2lm:measuredValue>
      <d2lm:basicData xsi:type="d2lm:TrafficFlow">
        <d2lm:vehicleFlow>
          <d2lm:dataError>[data error flag]</d2lm:dataError>
          <d2lm:reasonForDataError>
            <d2lm:values>
              <d2lm:value>[data error reason]</d2lm:value>
            </d2lm:values>
          </d2lm:reasonForDataError>
          <d2lm:vehicleFlowRate>[flow value #5]</d2lm:vehicleFlowRate>
        </d2lm:vehicleFlow>
      </d2lm:basicData>
    </d2lm:measuredValue>
  </d2lm:measuredValue>

```

```

    </d2lm:measuredValue>
  </d2lm:siteMeasurements>
  <!-- x N - multiple <d2lm:siteMeasurements> elements can exist in the same message -->
</d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

### 5.2.7.2 General Notes

1. Reference data, contained in the published NTIS Model, is required to interpret the traffic data contained in the message:
  - a. The `<d2lm:measurementSiteTableReference>` element references the version of the NTIS Model to use and specifies that TMU site data is contained in the *NTIS\_TMU\_Measurement\_Sites* table within the NTIS Model.
  - b. The TMU site is uniquely identified within the *NTIS\_TMU\_Measurement\_Sites* NTIS Model table by the [TMU site ID] attribute of the `<d2lm:measurementSiteReference>` element. The location of the TMU site on the road network, and any other site-specific characteristics, are contained in the NTIS Model.
  - c. The characteristics of each site measurement (for example, the vehicle lengths associated with individual flow measurements) are included in the NTIS Model. The *index* attribute of the `<d2lm:measuredValue>` element, unique per TMU site, maps the measurements contained in this traffic data message to the measurement characteristics contained in the NTIS Model.
2. The traffic data values contained in the message are received by the NTIS system, and subsequently published, on a per-TMU site basis: data values apply to all lanes monitored by the TMU site.
3. Each individual traffic data value is reported by a TMU outstation in a single byte with a value of 0-255. Any subsequent processing, conversion or range validation on this raw data is described in the Data Item Descriptions section, below.

### 5.2.7.3 Data Item Descriptions

Data Item	Description
[data error flag]	<p>Boolean flag indicating whether the data value is valid (false) or known to be in error/suspect (true).</p> <p>Refer to the Data Validation and Error Handling section, below, for further information.</p>



Data Item	Description
[data error reason]	<p>Text describing the reason for the data error.</p> <p>This data item, and the containing <i>&lt;d2lm:reasonForDataError&gt;</i> element, is omitted from the message if the corresponding [data error flag] is false.</p> <p>Values:</p> <ul style="list-style-type: none"> <li>“out of range” : determined by the NTIS system</li> <li>“outstation error” : flagged by the TMU outstation</li> <li>“suspect equipment” : specified at the NTIS system.</li> </ul> <p>Refer to the Data Validation and Error Handling section, below, for further information.</p>
[default measurement time]	<p>The time and date of all the measurements within the containing <i>&lt;d2lm:siteMeasurements&gt;</i> element; as recorded by the source TMU outstation.</p>
[flow value #1-5]	<p>Vehicular flow rate, measured in vehicles/hour (the value is converted from the vehicles/minute value reported by the site/outstation).</p> <p>The 5 flow values comprise: 4 flow values associated with specific vehicle lengths, 1 flow value which is an aggregate flow for all vehicle types. The message will either contain the 4 vehicle length-specific values or the aggregated flow value. Refer to the Data Validation and Error Handling section, below, for further information.</p> <p>Which flow values correspond to which length-specific or aggregate measurement is defined in the NTIS Model; based on the associated <i>&lt;d2lm:measuredValue&gt;</i> index attribute (see General Notes, above).</p> <p>Valid range: 0-[system configurable parameter]. (Note: the system configurable parameter can be modified by NTIS operations, so this value cannot be explicitly declared in this document)</p>
[headway value]	<p>Average time, in seconds, between vehicles.</p> <p>Valid range: 0-25.5</p> <p>Note that a maximum value of 25.5 indicates 25.5 or greater. TMU outstations report headway values in a single byte, in deciseconds: the maximum raw value of a single byte, 255, equates to 25.5 seconds. As a consequence, headway values cannot be out of range.</p>
[NTIS Model version]	<p>Version of the published NTIS Model against which this message is published.</p> <p>Format: <i>&lt;major version&gt;.&lt;minor version&gt;</i>, e.g. “17.0”</p>
[occupancy value]	<p>Percentage of time that the section of road is occupied by vehicles.</p> <p>Valid range: 0-100</p>
[publication time]	<p>The time and date that the message was published by the NTIS system.</p>

Data Item	Description
[speed value]	Average speed of vehicles, measured in km/h.  Valid range: 0-[system configurable parameter] (Note: the system configurable parameter can be modified by NTIS operations, so this value cannot be explicitly declared in this document)
[TMU site ID]	The unique ID of the TMU measurement site; used to reference the TMU site in the published NTIS Model.

#### 5.2.7.4 Data Validation and Error Handling

##### 1. General principles:

- a. Missing data items: measured values that are purposefully not included in traffic data sent from the reporting site/outstation are also omitted from the published data. The entire corresponding `<d2lm:measuredValue>` element is omitted from the published data.
- b. Erroneous data items: measured values flagged as being in error by the reporting site/outstation, or determined to be in error by the NTIS system, are included in the published data. The data items are marked as in error ([data error flag]=true) and the corresponding [data error reason] set to:
  - i. out of range: the value received from the reporting outstation/site is determined by the NTIS system to be outside of an acceptable range.
  - ii. outstation error: the data item has been flagged as erroneous by the reporting outstation/site.
  - iii. suspect equipment: the source equipment has been set as suspect, following analysis of erroneous received data.

Note: If more than one error reason is applicable to a data item, then all reasons are included in the publication. For example, if the equipment is set to suspect, but data is still being received and the out-of-range check fails for one of the data items, the following will be published:

```
<d2lm:dataError>true</d2lm:dataError>
  <d2lm:reasonForDataError>
    <d2lm:values>
      <d2lm:value>suspect equipment</d2lm:value>
      <d2lm:value>out of range</d2lm:value>
    </d2lm:values>
  </d2lm:reasonForDataError>
```

##### 2. Validation and Error flags: The following validation and error flags are received from the site/outstation with each traffic data message:

- a. 'Statistics Selection': a bitmask indicating which items are include and omitted from the reported traffic data; outstations can be configured to only report specific measurements.

- b. 'Data Status Indication': 0=all data is valid, 1=flow is aggregated as only 1 loop sensor is operational, 2=all data items are invalid.
- 3. Managing the 'Statistics Selection' flag:
  - a. Measured values specified as being omitted from the traffic data received from the outstation/site are also omitted from the published data.
  - b. Measured values specified as being included in the traffic data received from the site/outstation are included in the published data. These values are subject to further processing, dependent on the 'Data Status Indication' flag, as detailed below.
- 4. Managing the 'Data Status Indication' flag:
  - a. Data Status Indication=0: All measured values are subject to out-of-range checks and the [data error flag] and [data error reason] values set accordingly. All values are included in the published data.
  - b. Data Status Indication=1: principally set to specify that flow is aggregated, the status also indicates that only 1 sensor loop is operational. With only 1 operational loop, the average speed value cannot be determined and the outstation includes a dummy/default value in the traffic data, whilst occupancy and headway values can still be measured.
    - i. Flow values: only aggregated flow is included in the published data; all other flow values are omitted from the published data.
    - ii. Speed value: the value is omitted from the published data.
    - iii. Headway value: the value is included in the published data.
    - iv. Occupancy: the value is included in the published data.
    - v. All values are subjected to an out-of-range check, as per the Data Status Indication=0 scenario, above.
  - c. Data Status Indication=2: No further validation is performed on the data. All values are included in the published data, with the [data error flag] and [data error reason] values set accordingly.
- 5. If the 'Data Status Indication' and 'Statistics Selection' flags combine in a way that results in all data being deemed 'missing', then the entire corresponding `<d2lm:siteMeasurements>` element is omitted from the published data. If there are no `<d2lm:siteMeasurements>` to be included in the published data, then the message is not sent.

## 5.2.8 VMS and Matrix Signal Data

### 5.2.8.1 Message Content

```
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2"
  extensionName="NTIS Published Services" extensionVersion="2.0">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:type="d2lm:VmsPublication" lang="en" >
    <d2lm:feedType>VMS and Matrix Signal Status Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:headerInformation>
      <d2lm:areaOfInterest>national</d2lm:areaOfInterest>
      <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
      </d2lm:confidentiality>
      <d2lm:informationStatus>real</d2lm:informationStatus>
    </d2lm:headerInformation>
    <!-- Matrix Signal Data -->
    <d2lm:vmsUnit>
      <d2lm:vmsUnitTableReference targetClass="VmsUnitTable"
        version="[NTIS Model version]" id="NTIS_Matrix_Units"/>
      <d2lm:vmsUnitReference targetClass="VmsUnitRecord"
        version="[NTIS Model version]" id="[unit ID]"/>
      <d2lm:vms vmsIndex="0">
        <d2lm:vms>
          <d2lm:vmsWorking>[unit working]</d2lm:vmsWorking>
          <d2lm:vmsMessage messageIndex="0">
            <d2lm:vmsMessage>
              <d2lm:reasonForSetting>
                <d2lm:values>
                  <d2lm:value lang="en">[reason for setting]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForSetting>
              <d2lm:timeLastSet>[time last set]</d2lm:timeLastSet>
              <d2lm:vmsPictogramDisplayArea pictogramDisplayAreaIndex="0">
                <d2lm:vmsPictogramDisplayArea>
                  <d2lm:vmsPictogram pictogramSequencingIndex="0">
                    <d2lm:vmsPictogram>
                      <d2lm:pictogramDescription>[pictogram type]</d2lm:pictogramDescription>
                      <d2lm:pictogramCode>[aspect code]</d2lm:pictogramCode>
                      <d2lm:presenceOfRedTriangle>[red triangle]</d2lm:presenceOfRedTriangle>
                      <d2lm:speedAttribute>[speed display]</d2lm:speedAttribute>
                      <d2lm:vmsPictogramExtension>
                        <d2lm:vmsPictogramUK>
                          <d2lm:pictogramDescriptionUK>[pictogram type UK]
                          </d2lm:pictogramDescriptionUK>
                        </d2lm:vmsPictogramUK>
                      </d2lm:vmsPictogramExtension>
                    </d2lm:vmsPictogram>
                  </d2lm:vmsPictogram>
                </d2lm:vmsPictogramDisplayArea>
              </d2lm:vmsPictogramDisplayArea>
            </d2lm:vmsMessage>
          </d2lm:vmsMessage>
        </d2lm:vms>
      </d2lm:vms>
    </d2lm:vmsUnit>
    <!-- VMS Data -->
    <d2lm:vmsUnit>
      <d2lm:vmsUnitTableReference targetClass="VmsUnitTable"
        version="[NTIS Model version]" id="NTIS_VMS_Units"/>
      <d2lm:vmsUnitReference targetClass="VmsUnitRecord"
        version="[NTIS Model version]" id="[unit ID]"/>
      <d2lm:vms vmsIndex="0">
        <d2lm:vms>
```

```

<d2lm:vmsWorking>[unit working]</d2lm:vmsWorking>
<d2lm:vmsMessage messageIndex="0">
  <d2lm:vmsMessage>
    <d2lm:messageSetBy>
      <d2lm:values>
        <d2lm:value lang="en">[message set by]</d2lm:value>
      </d2lm:values>
    </d2lm:messageSetBy>
    <d2lm:reasonForSetting>
      <d2lm:values>
        <d2lm:value lang="en">[reason for setting]</d2lm:value>
      </d2lm:values>
    </d2lm:reasonForSetting>
    <d2lm:timeLastSet>[time last set]</d2lm:timeLastSet>
    <d2lm:textPage pageNumber="0">
      <d2lm:vmsText>
        <d2lm:vmsTextLine lineIndex="0">
          <d2lm:vmsTextLine>
            <d2lm:vmsTextLine>[text line #1]</d2lm:vmsTextLine>
          </d2lm:vmsTextLine>
        </d2lm:vmsTextLine>
        <!--x N - Multiple lines of text can be displayed on a VMS unit. The
              lineIndex value increments with each vmsTextLine -->
      </d2lm:vmsText>
    </d2lm:textPage>
    <d2lm:vmsPictogramDisplayArea pictogramDisplayAreaIndex="0">
      <d2lm:vmsPictogramDisplayArea>
        <d2lm:vmsPictogram pictogramSequencingIndex="0">
          <d2lm:vmsPictogram>
            <d2lm:pictogramDescription>[pictogram type]</d2lm:pictogramDescription>
            <d2lm:additionalPictogramDescription>
              <d2lm:values>
                <d2lm:value lang="en">[pictogram code]</d2lm:value>
              </d2lm:values>
            </d2lm:additionalPictogramDescription>
            <d2lm:presenceOfRedTriangle>[red triangle]</d2lm:presenceOfRedTriangle>
          </d2lm:vmsPictogram>
        </d2lm:vmsPictogram>
      </d2lm:vmsPictogramDisplayArea>
    </d2lm:vmsPictogramDisplayArea>
  </d2lm:vmsMessage>
</d2lm:vmsMessage>
</d2lm:vms>
</d2lm:vms>
</d2lm:vmsUnit>
<!--x N - Multiple VMS and/or Matrix Signal status data can be included in the message -->
</d2lm:payloadPublication>
</d2lm:d2LogicalModel>

```

### 5.2.8.2 General Notes

1. The XML listing, above, is for a Data Update message. The Full Refresh message is identical in content, rules and formatting; the only difference is that the `<d2lm:feedType>` is set to the following value:
 

```
<d2lm:feedType>VMS and Matrix Signal Status Data - Full Refresh</d2lm:feedType>
```
2. Reference data, contained in the published NTIS Model, is required to interpret the status data contained in the message:
  - a. The `<d2lm:vmsUnitTableReference>` element references the version of the NTIS Model to use and specifies that Matrix unit data is contained in the *NTIS\_Matrix\_Units* table and VMS unit data in the *NTIS\_VMS\_Units* table within the NTIS Model.
  - b. The Matrix/VMS unit is uniquely identified within the *NTIS\_Matrix\_Units* or *NTIS\_VMS\_Units* table by the [unit ID] attribute of the `<d2lm:vmsUnitReference>` element. The location of the unit on the road

network, and any other unit-specific characteristics, are contained in the NTIS Model.

3. The DATEXII protocol defines a Matrix Signal as a sub-type of VMS unit. Hence, Matrix Signal and VMS status data are published in the same message, using the same DATEXII *<vmsUnit>* constructs.
4. The DATEXII protocol accommodates complex VMS configurations and sequencing operations. The VMS and Matrix Signal data received by the NTIS system is significantly simpler. As a result, the following elements are only included in each containing element once, with index=0:
  - a. *<d2lm:vms>*
  - b. *<d2lm:vmsMessage>*
  - c. *<d2lm:vmsPictogramDisplayArea>*
  - d. *<d2lm:vmsPictogram>*
  - e. *<d2lm:textPage>* (VMS only)
5. The *extensionName* and *extensionVersion* attributes are added to the *<d2lm:d2LogicalModel>* element to specify that this message utilises NTIS Publish Services-specific extensions to the base DATEXII schema. Refer to Section 7.1 and the Data Item Descriptions, below, for details.
6. The complete display status of the unit is contained in the message. If a VMS unit pictogram changes, but the textual display does not, both pictogram and lines of text are included in the message; and vice versa.

### 5.2.8.3 Data Item Descriptions

Data Item	Description
[aspect code] (Matrix only)	<p>The raw aspect code received by the NTIS system and a numeric value.</p> <p>The aspect code is included in the publication to identify the Matrix display as specified in the HA-produced Signal display specification document [ref 35].</p> <p>If the aspect code received by the NTIS system is not recognised as a valid code, the received [aspect code] is published unmodified, the [pictogram type] is set to 'other' and the [pictogram type UK] is set to 'undefined'.</p>
[message set by] (VMS only)	<p>Free text indicating the system, operator or organisation that set the current display status of the unit.</p> <p>Note#1: the value may be split over multiple lines of text, each line contained in a separate <i>&lt;d2lm:value&gt;</i> element.</p> <p>Note#2: this data item is not always specified. If not specified, the data item and containing <i>&lt;d2lm:messageSetBy&gt;</i> element are omitted from the message.</p>

Data Item	Description																		
[NTIS Model version]	Version of the published NTIS Model against which this message is published. Format: <major version>.<minor version>, e.g. "17.0"																		
[pictogram code] (VMS only)	The raw pictogram code received by the NTIS system as a text field. This code is included in the message as not all [pictogram code] values can be translated into DATEXII-compliant [pictogram type] descriptions.																		
[pictogram type] (VMS variant)	<p>The type of pictogram currently displayed by the unit. The raw [pictogram code] received by the NTIS system is translated into a &lt;d2lm:VmsDatexPictogramEnum&gt; type. Not all [pictogram code] values map to a DATEXII-compliant &lt;d2lm:VmsDatexPictogramEnum&gt; type. The translation is listed below:</p> <table border="1"> <thead> <tr> <th>[pictogram code]</th><th>[pictogram type]</th></tr> </thead> <tbody> <tr> <td>SY01</td><td>accident</td></tr> <tr> <td>SY02</td><td>trafficCongestion</td></tr> <tr> <td>SY03</td><td>otherDangers</td></tr> <tr> <td>SY04</td><td>roadworks</td></tr> <tr> <td>SY05</td><td>slipperyRoad</td></tr> <tr> <td>SY06</td><td>snow</td></tr> <tr> <td>SY07</td><td>crossWind</td></tr> <tr> <td><i>any other value</i></td><td>other</td></tr> </tbody> </table> <p>Refer to [ref 13] for details of pictogram codes.</p> <p>The following value is used to indicate the display of the pictogram component of a VMS unit that is 'cleared' or powered off: blankVoid</p>	[pictogram code]	[pictogram type]	SY01	accident	SY02	trafficCongestion	SY03	otherDangers	SY04	roadworks	SY05	slipperyRoad	SY06	snow	SY07	crossWind	<i>any other value</i>	other
[pictogram code]	[pictogram type]																		
SY01	accident																		
SY02	trafficCongestion																		
SY03	otherDangers																		
SY04	roadworks																		
SY05	slipperyRoad																		
SY06	snow																		
SY07	crossWind																		
<i>any other value</i>	other																		
[pictogram type] (Matrix variant)	<p>The type of pictogram currently displayed by the unit.</p> <p>If the pictogram cannot be described by a standard DATEXII &lt;d2lm:VmsDatexPictogramEnum&gt; type, then the value is set to 'other' (a valid &lt;d2lm:VmsDatexPictogramEnum&gt; type) and the [pictogram type UK] data item is used to describe the pictogram.</p> <p>The following value is used to indicate the display of a Matrix unit that is 'cleared' or powered off: blankVoid</p>																		



Data Item	Description
[pictogram type UK] (Matrix only)	<p>The type of pictogram currently displayed by the unit. This data item is used as the standard DATEXII <code>&lt;d2lm:VmsDatexPictogramEnum&gt;</code> enumerate, used by the [pictogram type] data item, does not describe all of the Matrix pictogram types utilised in the UK.</p> <p>Note#1: If [pictogram type] can be described by a standard <code>&lt;d2lm:VmsDatexPictogramEnum&gt;</code> type, then this data item, and the containing <code>&lt;d2lm:vmsPictogramUK&gt;</code> element are omitted from the message.</p> <p>Note#2: The containing element for this data item, <code>&lt;d2lm:vmsPictogramUK&gt;</code>, is an NTIS-specific extension to the standard DATEXII Schema. Refer to Section 7.1 for details.</p>
[publication time]	The time and date that the message was published by the NTIS system.
[reason for setting]	<p>Free text indicating the reason for the current display setting of the unit.</p> <p>Note#1: the value may be split over multiple lines of text, each line contained in a separate <code>&lt;d2lm:value&gt;</code> element.</p> <p>Note#2: this data item is not always specified. If not specified, the data item and containing <code>&lt;d2lm:reasonForSetting&gt;</code> element are omitted from the message.</p>
[red triangle]	This status is not collected by the NTIS system, but is mandated by the DATEXII schema. Always set to: false
[speed display] (Matrix only)	<p>The value of the speed displayed on the signal, in km/h.</p> <p>Note#1: to adhere to the DATEXII specification, this value is specified in km/h. To derive the actual display, in the UK, the value needs to be converted to mph.</p> <p>Note#2: this data item and the containing <code>&lt;d2lm:speedAttribute&gt;</code> element are only included in the message if the [pictogram type] is set to one of:</p> <ul style="list-style-type: none"> <li>• <i>advisorySpeed</i></li> <li>• <i>maximumSpeedLimitedToTheFigureIndicated</i></li> </ul>



Data Item	Description
[text line #1-n] (VMS only)	<p>Free text values, specifying the text displayed on each line of the VMS. Different VMS units and display modes support a different number of text lines, so the number of [text line #n] data items is unbounded.</p> <p>If any single text line is blank/empty, then the corresponding <code>&lt;d2lm:vmsTextLine&gt;</code> element is included in the message as follows:</p> <pre> &lt;d2lm:vmsTextLine lineIndex="x"&gt;   &lt;d2lm:vmsTextLine&gt;     &lt;d2lm:vmsTextLine /&gt;   &lt;/d2lm:vmsTextLine&gt; &lt;/d2lm:vmsTextLine&gt; </pre> <p>If no text is displayed on the unit, this state is positively confirmed by retaining the <code>&lt;d2lm:vmsText&gt;</code> element, but including no <code>&lt;d2lm:vmsTextLine&gt;</code> elements.</p>
[time last set]	<p>The time that the current status of the unit was set.</p> <p>Note that the system that supplies NTIS with Matrix and VMS data does not include any source timestamps; the value is set to the time the status update was received by the NTIS system.</p>
[unit ID]	The unique ID of the Matrix or VMS unit, used to reference the unit in the published NTIS Model.
[unit working]	Boolean flag indicating whether the Matrix or VMS unit is working (false) or known to be failed/non-operational (true).

#### 5.2.8.4 Data Validation and Error Handling

The majority of the validation required of the received data is performed by the data acquisition interface [ref 9]. Validation of specific data items, and the subsequent translations, transformations and management of the different data items for publishing are described in the General Notes and Data Item Description sections, above.

### 5.3 Byte Ordering Policy

The interface utilises standard interoperable transport and application layer protocols; no specific byte ordering policy is required.

## 6. Qualification

The interface is designed to meet the system requirements specified in [ref 5].

The validation and testing of this and all other system interfaces are described in the NTIS Test Strategy [ref 2].

## 7. List of Annexes

### 7.1 Annex A – DATEXII v2.0 Schema: Extensions

This section details the NTIS Publish Services-specific extensions applied to the standard DATEXII v2.0 Schema [ref 17] to publish data on the interface.

The extensions are all backwardly-compatible Level B Extensions, as defined in the DATEXII extension guide [ref 21].

#### 7.1.1 D2LogicalModel

Two new attributes are added to the standard *D2LogicalModel* <complexType>. These attributes are required to enable data published against the extended schema to reference the extension, where required.

```
<xs:complexType name="D2LogicalModel">
  <!-- ... -->
  <xs:attribute name="extensionName" use="optional" default="NTIS Published Services" />
  <xs:attribute name="extensionVersion" use="optional" default="2.0" />
</xs:complexType>
```

#### 7.1.2 Processed Traffic Data

A new extension type is added to the schema to include the new *SpeedFvdOnly* type; utilised to contain FVD-only speed values:

```
<xs:complexType name="_TrafficSpeedExtensionType">
  <xs:sequence>
    <xs:element name="speedFvdOnly" type="D2LogicalModel:SpeedFvdOnly" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

The standard DATEXII *TrafficSpeed* type is modified to use the new extension type (modification grey):

```
<xs:complexType name="TrafficSpeed">
  <!-- ... -->
  <xs:element name="trafficSpeedExtension"
    type="D2LogicalModel:_TrafficSpeedExtensionType" minOccurs="0" />
  <!-- ... -->
</xs:complexType>
```

A new complex type is created to contain the FVD-only speed value:

```
<xs:complexType name="SpeedFvdOnly">
  <xs:annotation>
    <xs:documentation>NTIS TrafficSpeed extension class: includes attributes for speed
calculations derived from combinations of Floating Vehicle Data (FVD) and Sensor (Measurement
Site) Data.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="speed" type="D2LogicalModel:KilometresPerHour"
      minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Calculated speed value, derived from Floating Vehicle Data
(FVD).</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

### 7.1.3 NTIS Model Update Notifications

A new extension type is added to include the new *NtisModelVersionInformation* type; utilised to contain NTIS Model version information:

```
<xs:complexType name="_GenericPublicationExtensionType">
  <xs:sequence>
    <xs:element name="ntisModelVersionInformation"
      type="D2LogicalModel:NtisModelVersionInformation"
      minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

The standard D2EXII *GenericPublication* type is modified to use the new extension type (modification in grey):

```
<xs:complexType name="GenericPublication">
  <!-- ... -->
  <xs:element name="genericPublicationExtension"
    type="D2LogicalModel:GenericPublicationExtensionType" minOccurs="0" />
  <!-- ... -->
</xs:complexType>
```

A new complex type is created to contain the NTIS Model version information:

```
<xs:complexType name="NtisModelVersionInformation">
  <xs:annotation>
    <xs:documentation>Version information for an instance of a published NTIS Network and
    Asset Reference Model.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="modelVersion" type="D2LogicalModel:String" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Version of the NTIS Model.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="modelPublicationTime" type="D2LogicalModel:DateTime"
      minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Time and date that this version of the NTIS Model was made available
        for publication.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="modelFilename" type="D2LogicalModel:String" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Name of the packaged NTIS Model file, as published by the NTIS
        system.</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

### 7.1.4 VMS and Matrix Signal Data

A new extension type is added to the schema to include the new *VmsPictogramUK* type; utilised to extend the types of Matrix pictograms to include all those utilised in the UK.

```
<xs:complexType name="_VmsPictogramExtensionType">
  <xs:sequence>
    <xs:element name="vmsPictogramUK" type="D2LogicalModel:VmsPictogramUK" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

The standard D2EXII *VmsPictogram* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="VmsPictogram">
  <!-- ... -->
  <xs:element name="vmsPictogramExtension"
    type="D2LogicalModel:VmsPictogramExtensionType" minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type is created to contain the pictogram UK display types:

```

<xs:complexType name="VmsPictogramUK">
  <xs:annotation>
    <xs:documentation>NTIS VMS Pictogram extension class for UK pictogram
types.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="pictogramDescriptionUK"
      type="D2LogicalModel:VmsDatexPictogramEnumUK" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Type of UK pictogram.</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

A new enumerate is created to include the Matrix pictogram types not included in the standard DATEXII *VmsDatexPictogramEnum* enumerate:

```

<xs:simpleType name="VmsDatexPictogramEnumUK">
  <xs:annotation>
    <xs:documentation>NTIS extension: includes pictogram types used in the UK, additional to
those included in the standard D2LogicalModel:VmsDatexPictogramEnum.</xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="off">
      <xs:annotation>
        <xs:documentation>VMS is switched off.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="undefined">
      <xs:annotation>
        <xs:documentation>VMS has an undefined setting.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="stop">
      <xs:annotation>
        <xs:documentation>Stop.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="motorwayDivertLeft">
      <xs:annotation>
        <xs:documentation>Motorway divert left.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="motorwayDivertRight">
      <xs:annotation>
        <xs:documentation>Motorway divert right.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="midasOff">
      <xs:annotation>
        <xs:documentation>MIDAS is switched off.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="amberFlashers">
      <xs:annotation>
        <xs:documentation>Amber flashers are switched on.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="hardShoulderDivert">
      <xs:annotation>
        <xs:documentation>Divert onto hard shoulder.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="1Wicket">

```

```

    <xs:annotation>
      <xs:documentation>1 Wicket.</xs:documentation>
    </xs:annotation>
  </xs:enumeration>
<xs:enumeration value="2Wickets">
  <xs:annotation>
    <xs:documentation>2 Wickets.</xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="3Wickets">
  <xs:annotation>
    <xs:documentation>3 Wickets.</xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="4Wickets">
  <xs:annotation>
    <xs:documentation>4 Wickets.</xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="nationalSpeedLimit">
  <xs:annotation>
    <xs:documentation>Mandatory maximum speed, set to the national speed limit. No actual
speed value is displayed, as the speed limit is specific to the type of road and type of
vehicle being driven.</xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="testPattern">
  <xs:annotation>
    <xs:documentation>Display pattern used to test or exercise the signal.
  </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="redFlashers">
  <xs:annotation>
    <xs:documentation>Red flashers are switched on.</xs:documentation>
  </xs:annotation>
</xs:enumeration>
</xs:restriction>
</xs:simpleType>

```

## 7.1.5 Events

### 7.1.5.1 Area

A new extension type is added to the schema to include the new *AreaExtension* type; utilised to include a polygon shape into a geographical area definition:

```

<xs:complexType name="_AreaExtensionType">
  <xs:sequence>
    <xs:element name="areaExtension" type="D2LogicalModel:AreaExtension" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

The standard DATEXII *Area* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="Area">
  <!-- ... -->
  <xs:element name="areaExtension" type="D2LogicalModel:AreaExtensionType"
    minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type is created as a container for the items required in the *Area* extension:

```

<xs:complexType name="AreaExtension">
  <xs:annotation>
    <xs:documentation>Extension class for Area.</xs:documentation>
  </xs:annotation>

```

```

</xs:annotation>
<xs:sequence>
  <xs:element name="geographicArea" type="D2LogicalModel:GeographicArea" minOccurs="0" />
  <xs:element name="polygonArea" type="D2LogicalModel:PolygonArea" minOccurs="0"
    maxOccurs="unbounded" />
</xs:sequence>
</xs:complexType>

```

New complex types are created to contain the geographical area information and polygon area definition data items:

```

<xs:complexType name="GeographicArea">
  <xs:annotation>
    <xs:documentation>Geographic area defined in terms of known boundaries, such as country or
    county boundaries or allocated control area of particular authority.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="country" type="D2LogicalModel:CountryEnum" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>ISO 3166-1 two character country code.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="nation" type="D2LogicalModel:MultilingualString" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Name of a nation (e.g. Wales) which is a sub-division of a ISO
        recognised country.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="county" type="D2LogicalModel:MultilingualString" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Name of a county (administrative sub-division).</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="areaName" type="D2LogicalModel:MultilingualString" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Name of an area.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="policeForceControlArea" type="D2LogicalModel:MultilingualString"
      minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Name of a police force area.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="roadOperatorControlArea" type="D2LogicalModel:MultilingualString"
      minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Name of a road operator control area.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="geographicAreaExtension" type="D2LogicalModel:_ExtensionType"
      minOccurs="0" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="PolygonArea">
  <xs:annotation>
    <xs:documentation>Defines points for a closed polygon shape describing the area.
  </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="sectionName" type="D2LogicalModel:MultilingualString" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Name of the polygon Area.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="pointCoordinates"
      type="D2LogicalModel:_PolygonAreaIndexPointCoordinates" minOccurs="0"
      maxOccurs="unbounded" />
    <xs:element name="polygonAreaExtension" type="D2LogicalModel:_ExtensionType"

```



```

        minOccurs="0"/>
    </xs:sequence>
</xs:complexType>

```

A new indexed type is created to enable the *PolygonArea:pointCoordinates* element to use indexing (and thus enable the polygon point coordinates to be listed as an ordered sequence):

```

<xs:complexType name="_PolygonAreaIndexPointCoordinates">
  <xs:sequence>
    <xs:element name="pointCoordinates" type="D2LogicalModel:PointCoordinates" minOccurs="1"
      maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="index" type="xs:int" use="required" />
</xs:complexType>

```

### 7.1.5.2 Delays

A new extension type is added to the schema to include the new *RelativeDelays* type; utilised to add further delay values to the standard *Delays* type:

```

<xs:complexType name="_DelaysExtensionType">
  <xs:sequence>
    <xs:element name="relativeDelays" type="D2LogicalModel:RelativeDelays" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

The standard DATEXII *Delays* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="Delays">
  <!-- ... -->
  <xs:element name="delaysExtension" type="D2LogicalModel:DelaysExtensionType"
    minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type is added to include delay against defined road states or conditions (the DATEXII standard only defines a delay over profile value):

```

<xs:complexType name="RelativeDelays">
  <xs:annotation>
    <xs:documentation>Delays associated with a situation/event, relative to defined road
states/conditions.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="delayOverFreeFlow" type="D2LogicalModel:Seconds" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The current average delay over free flow road conditions.
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

### 7.1.5.3 Impact

A new extension type is added to the schema to include the new *ImpactDetails* type; utilised to add further details of the Event impact to the publication:

```

<xs:complexType name="_ImpactExtensionType">
  <xs:sequence>
    <xs:element name="impactDetails" type="D2LogicalModel:ImpactDetails" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

```

    </xs:sequence>
</xs:complexType>

```

The standard DATEXII *Impact* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="Impact">
  <!-- ... -->
  <xs:element name="impactExtension" type="D2LogicalModel:_ImpactExtensionType"
    minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type is added as a container for items used to provide the additional details of the impact of an Event; including both standard DATEXII and extended types:

```

<xs:complexType name="ImpactDetails">
  <xs:annotation>
    <xs:documentation>Details of the impact of a situation/event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="changeInCapacity" type="D2LogicalModel:Percentage" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The change in road capacity due to the event, as a percentage. The
value can be positive (e.g. opening of a normally non-operational lane) or negative (e.g. lane
closures) .</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="increaseInDemand" type="D2LogicalModel:VehiclesPerHour" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The estimated increase in demand caused by the situation/event.
      </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="individualLanesStatus" type="D2LogicalModel:IndividualLanesStatus"
      minOccurs="0" />
    <xs:element name="returnToNormalStatus" type="D2LogicalModel:ReturnToNormalStatus"
      minOccurs="0" />
    <xs:element name="spillageInformation" type="D2LogicalModel:SpillageInformation"
      minOccurs="0" />
    <xs:element name="infrastructureDamage" type="D2LogicalModel:InfrastructureDamage"
      minOccurs="0" />
  </xs:sequence>
</xs:complexType>

```

A number of new complex types and enumerates are added to specify the additional impact details contained in the extension, including: the status of individual lanes, the times that the carriageway is expected to return to various normal states, spillage information, and the specifics of any infrastructure damage.

```

<xs:complexType name="IndividualLanesStatus">
  <xs:annotation>
    <xs:documentation>The status of individual lanes affected by a situation/event.
  </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="individualLane" type="D2LogicalModel:IndividualLane"
      maxOccurs="unbounded" />
    <xs:element name="individualLanesStatusExtension" type="D2LogicalModel:_ExtensionType"
      minOccurs="0" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="IndividualLane">
  <xs:annotation>
    <xs:documentation>The status of an individual lane.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="laneIdentifier" type="D2LogicalModel:LaneEnum" minOccurs="1"

```

```

        maxOccurs="1">
        <xs:annotation>
            <xs:documentation>The lane identifier.</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element name="laneStatus" type="D2LogicalModel:LaneStatusEnum" minOccurs="1"
        maxOccurs="1">
        <xs:annotation>
            <xs:documentation>The status of the lane.</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element name="individualLaneExtension" type="D2LogicalModel:_ExtensionType"
        minOccurs="0" />
</xs:sequence>
</xs:complexType>

<xs:simpleType name="LaneStatusEnum">
    <xs:annotation>
        <xs:documentation>Types of status of an individual lane impacted by a situation/event.
    </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:string">
        <xs:enumeration value="normal">
            <xs:annotation>
                <xs:documentation>The lane is operating normally.</xs:documentation>
            </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="affected">
            <xs:annotation>
                <xs:documentation>The lane operation is partially affected.</xs:documentation>
            </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="closed">
            <xs:annotation>
                <xs:documentation>The lane is fully closed.</xs:documentation>
            </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="hardShoulderRunning">
            <xs:annotation>
                <xs:documentation>The hard shoulder lane is open for traffic (applies to hard shoulder
lanes only).</xs:documentation>
            </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="unknown">
            <xs:annotation>
                <xs:documentation>The lane status is unknown.</xs:documentation>
            </xs:annotation>
        </xs:enumeration>
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="InfrastructureDamage">
    <xs:annotation>
        <xs:documentation>Infrastructure damage associated with a situation/event.
    </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="infrastructureDamageStatus"
            type="D2LogicalModel:InfrastructureDamageStatus" maxOccurs="unbounded" />
        <xs:element name="infrastructureDamageExtension" type="D2LogicalModel:_ExtensionType"
            minOccurs="0" />
    </xs:sequence>
</xs:complexType>

<xs:complexType name="InfrastructureDamageStatus">
    <xs:annotation>
        <xs:documentation>The status of the damage associated with a type of infrastructure.
    </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="infrastructureType" type="D2LogicalModel:InfrastructureTypeEnum"
            minOccurs="1" maxOccurs="1">
            <xs:annotation>
                <xs:documentation>The type of infrastructure damaged.</xs:documentation>
            </xs:annotation>
        </xs:element>
    </xs:sequence>

```

```

<xs:element name="numberOfItemsDamaged" type="D2LogicalModel:NonNegativeInteger"
  minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation>The number of damaged items of a particular infrastructure type.
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="lengthDamaged" type="D2LogicalModel:MetresAsNonNegativeInteger"
  minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation>The length/distance over which a particular infrastructure type is
damaged.</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="infrastructureDamageStatusExtension"
  type="D2LogicalModel:_ExtensionType" minOccurs="0" />
</xs:sequence>
</xs:complexType>

<xs:simpleType name="InfrastructureTypeEnum">
  <xs:annotation>
    <xs:documentation>The types of infrastructure affected by a situation/event.
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="barrier">
      <xs:annotation>
        <xs:documentation>Barrier.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="cctvColumn">
      <xs:annotation>
        <xs:documentation>CCTV column.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="equipmentCabinet">
      <xs:annotation>
        <xs:documentation>Equipment cabinet.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="fencing">
      <xs:annotation>
        <xs:documentation>Fencing.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="gantry">
      <xs:annotation>
        <xs:documentation>Gantry.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="lighting">
      <xs:annotation>
        <xs:documentation>Lighting.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="signs">
      <xs:annotation>
        <xs:documentation>Signs.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="structure">
      <xs:annotation>
        <xs:documentation>Permanent structure.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="transmissionStation">
      <xs:annotation>
        <xs:documentation>Transmission station.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="other">
      <xs:annotation>
        <xs:documentation>Other type of infrastructure.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>

```

```

</xs:simpleType>

<xs:complexType name="ReturnToNormalStatus">
  <xs:annotation>
    <xs:documentation>Information regarding the return to normal status of the situation.
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="predictedTimeToClear" type="D2LogicalModel:DateTime" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The time that the situation/event is predicted to no longer have any
material impact on the road network.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="actualTimeToClear" type="D2LogicalModel:DateTime" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The actual time that the situation/event is no longer having any
material impact on the road network.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="predictedReturnToProfile" type="D2LogicalModel:DateTime" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The time that the road section affected by a situation/event is
predicted to return to profile (expected/normal traffic conditions).</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="actualReturnToProfile" type="D2LogicalModel:DateTime" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The actual time that the road section affected by a situation/event
has returned to profile (expected/normal traffic conditions).</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="predictedReturnToFreeFlow" type="D2LogicalModel:DateTime" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The time that the road section affected by a situation/event is
predicted to return to free flow conditions.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="returnToNormalStatusExtension" type="D2LogicalModel:_ExtensionType"
      minOccurs="0" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="SpillageInformation">
  <xs:annotation>
    <xs:documentation>Road spillage information associated with a situation/event.
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="spillage" type="D2LogicalModel:Spillage" maxOccurs="unbounded" />
    <xs:element name="spillageInformationExtension" type="D2LogicalModel:_ExtensionType"
      minOccurs="0" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="Spillage">
  <xs:annotation>
    <xs:documentation>Spillage information.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="spillageContents" type="D2LogicalModel:SpillageContentsEnum"
      minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Material content of the spillage.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="spillageSeverity" type="D2LogicalModel:SeverityEnum"
      minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Severity of the spillage.</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

```

    </xs:element>
    <xs:element name="spillageExtension" type="D2LogicalModel:_ExtensionType" minOccurs="0" />
  </xs:sequence>
</xs:complexType>

<xs:simpleType name="SpillageContentsEnum">
  <xs:annotation>
    <xs:documentation>Types of material content of a spillage.</xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="chemicals">
      <xs:annotation>
        <xs:documentation>Chemicals.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="fuel">
      <xs:annotation>
        <xs:documentation>Fuel.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="milk">
      <xs:annotation>
        <xs:documentation>Milk.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="hazardous">
      <xs:annotation>
        <xs:documentation>Undefined material of a hazardous nature.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="nonHazardous">
      <xs:annotation>
        <xs:documentation>Undefined material of a non-hazardous nature.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>

```

#### 7.1.5.4 Maintenance Works

A new extension type is added to the schema to include the new *RoadworksEventDetails* type; utilised to add further details of road works associated with a *MaintenanceWorks* Event:

```

<xs:complexType name="_MaintenanceWorksExtensionType">
  <xs:sequence>
    <xs:element name="roadworksEventDetails" type="D2LogicalModel:RoadworksEventDetails"
      minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

The standard DATEXII *MaintenanceWorks* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="MaintenanceWorks">
  <!-- ... -->
  <xs:element name="maintenanceWorksExtension"
    type="D2LogicalModel:MaintenanceWorksExtensionType" minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type is added to include the additional information required for *MaintenanceWorks* Events:

```

<xs:complexType name="RoadworksEventDetails">
  <xs:annotation>
    <xs:documentation>Additional details of a Roadworks Event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="roadworksSchemeName" type="D2LogicalModel:String" minOccurs="0"
      maxOccurs="1">

```

```

    <xs:annotation>
      <xs:documentation>The name of the roadworks scheme to which the roadworks
situation/event is associated.</xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="situationParent" type="D2LogicalModel:SituationParent" minOccurs="0" />
</xs:sequence>
</xs:complexType>

```

A common complex type (also used by *PublicEvent* type Events) is added to contain information on the Parent Event:

```

<xs:complexType name="SituationParent">
  <xs:annotation>
    <xs:documentation>Details of the parent situation/event of this situation/event.
  </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="parentId" type="D2LogicalModel:String" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The ID of the parent situation/event.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="situationParentExtension" type="D2LogicalModel:_ExtensionType"
      minOccurs="0" />
  </xs:sequence>
</xs:complexType>

```

### 7.1.5.5 Management

A new extension type is added to the schema to include the new *SituationManagement* type; utilised to provide additional information concerning the management of the Event not already included in the standard *Management* type:

```

<xs:complexType name="_ManagementExtensionType">
  <xs:sequence>
    <xs:element name="situationManagement" type="D2LogicalModel:SituationManagement"
      minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

The standard DATEXII *Management* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="Management">
  <!-- ... -->
  <xs:element name="managementExtension" type="D2LogicalModel:_ManagementExtensionType"
    minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type is added as a container for items used to provide the additional details associated with the management of an Event:

```

<xs:complexType name="SituationManagement">
  <xs:annotation>
    <xs:documentation>Information regarding the managment of a
situation/event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="speedLimit" type="D2LogicalModel:KilometresPerHour" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Temporary change to the speed limit in force during the Public
Event.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="confirmedBy" type="D2LogicalModel:String" minOccurs="0" maxOccurs="1">

```



```

        <xs:annotation>
          <xs:documentation>The organisation or system that has confirmed the start of situation
occurrence.</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="areaTeamInvolved" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1">
        <xs:annotation>
          <xs:documentation>The name of the Area Team that are assisting with the situation
management.</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="rccInformation" type="D2LogicalModel:RccInformation" minOccurs="0" />
      <xs:element name="alternateRoutes" type="D2LogicalModel:AlternateRoutes" minOccurs="0" />
      <xs:element name="emergencyServicesInvolved"
type="D2LogicalModel:EmergencyServicesInvolved" minOccurs="0" />
      <xs:element name="weatherConditions" type="D2LogicalModel:WeatherConditions"
minOccurs="0"/>
      <xs:element name="peopleAndVehiclesInvolved"
type="D2LogicalModel:PeopleAndVehiclesInvolved" minOccurs="0" />
    </xs:sequence>
  </xs:complexType>

```

A number of new complex types and enumerates are added to specify the additional Event management details contained in the extension, including: alternate routes (proposed diversions), emergency services involvement, people and vehicles involved, RCC information and the general weather conditions.

```

<xs:complexType name="AlternateRoutes">
  <xs:annotation>
    <xs:documentation>A list of alternate routes available to avoid or minimise the impact of
a situation/event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="alternateRoute" type="D2LogicalModel:AlternateRoute"
maxOccurs="unbounded" />
    <xs:element name="alternateRoutesExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="AlternateRoute">
  <xs:annotation>
    <xs:documentation>An alternate route, specified to avoid or minimise the impact of a
situation/event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="routeId" type="D2LogicalModel:String" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Identifier for the alternate route.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="alternateRouteExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="EmergencyServicesInvolved">
  <xs:annotation>
    <xs:documentation>Emergency services involvement in a situation/event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="allocatedPoliceForce" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The name of the police force allocated to attend or manage the
situation/event.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="emergencyServiceStatus" type="D2LogicalModel:EmergencyServiceStatus"
maxOccurs="unbounded" />
    <xs:element name="emergencyServicesInvolvedExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
  </xs:sequence>
</xs:complexType>

```



```

    </xs:sequence>
</xs:complexType>

<xs:complexType name="EmergencyServiceStatus">
  <xs:annotation>
    <xs:documentation>Situation/event attendance information for a particular emergency
service.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="serviceType" type="D2LogicalModel:EmergencyServiceTypeEnum"
      minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Emergency service type.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="serviceStatus" type="D2LogicalModel:EmergencyServiceStatusEnum"
      minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Emergency service status.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="emergencyServiceStatusExtension" type="D2LogicalModel:_ExtensionType"
      minOccurs="0" />
  </xs:sequence>
</xs:complexType>

<xs:simpleType name="EmergencyServiceStatusEnum">
  <xs:annotation>
    <xs:documentation>The types of emergency service involvement in a situation/event.
  </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="requested">
      <xs:annotation>
        <xs:documentation>The emergency service has been requested to attend, but is not yet
in attendance.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="attending">
      <xs:annotation>
        <xs:documentation>The emergency service is in attendance.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="none">
      <xs:annotation>
        <xs:documentation>The service has no involvement in the situation/event.
      </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="EmergencyServiceTypeEnum">
  <xs:annotation>
    <xs:documentation>Types of emergency service that attend a situation/event.
  </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="airAmbulance">
      <xs:annotation>
        <xs:documentation>Air ambulance.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="ambulance">
      <xs:annotation>
        <xs:documentation>Ambulance (ground vehicle).</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="fire">
      <xs:annotation>
        <xs:documentation>Fire service.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="police">
      <xs:annotation>
        <xs:documentation>Police.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>

```

```

        </xs:annotation>
    </xs:enumeration>
</xs:restriction>
</xs:simpleType>

<xs:complexType name="PeopleAndVehiclesInvolved">
    <xs:annotation>
        <xs:documentation>Contains information related to the people and vehicles involved in a
situation/event. The container uses standard DATEXII types only available to Accident
SituationRecords, to enable other types of SituationRecord to access these
items.</xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="totalNumberOfPeopleInvolved" type="D2LogicalModel:NonNegativeInteger"
minOccurs="0" maxOccurs="1">
            <xs:annotation>
                <xs:documentation>The total number of people that are involved.</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="totalNumberOfVehiclesInvolved" type="D2LogicalModel:NonNegativeInteger"
minOccurs="0" maxOccurs="1">
            <xs:annotation>
                <xs:documentation>The total number of vehicles that are involved.</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="groupOfVehiclesInvolved" type="D2LogicalModel:GroupOfVehiclesInvolved"
minOccurs="0" maxOccurs="unbounded">
            <xs:annotation>
                <xs:documentation>Group of vehicles involved in the situation/event.
            </xs:documentation>
        </xs:annotation>
        </xs:element>
        <xs:element name="groupOfPeopleInvolved" type="D2LogicalModel:GroupOfPeopleInvolved"
minOccurs="0" maxOccurs="unbounded">
            <xs:annotation>
                <xs:documentation>Group of people involved in the situation/event.</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="peopleAndVehiclesInvolvedExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
</xs:complexType>

<xs:complexType name="RccInformation">
    <xs:annotation>
        <xs:documentation>Information about the Regional Control Centre (RCC) managing the
situation/event.</xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="allocatedRcc" type="D2LogicalModel:String" minOccurs="0" maxOccurs="1">
            <xs:annotation>
                <xs:documentation>The Regional Control Centre (RCC) to which the situation is
currently allocated to manage.</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="rccSituationId" type="D2LogicalModel:String" minOccurs="0"
maxOccurs="1">
            <xs:annotation>
                <xs:documentation>The situation ID allocated by the governing Regional Control Centre
(RCC).</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="rccInformationExtension" type="D2LogicalModel:_ExtensionType"
minOccurs="0" />
    </xs:sequence>
</xs:complexType>

<xs:complexType name="WeatherConditions">
    <xs:annotation>
        <xs:documentation>The weather conditions affecting the management of a situation/event.
    </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="weatherType" type="D2LogicalModel:WeatherConditionsEnum" minOccurs="0"
maxOccurs="1">
            <xs:annotation>

```

```

        <xs:documentation>Type of weather affecting the situation/event.</xs:documentation>
      </xs:annotation>
    </xs:element>
  <xs:element name="visibility" type="D2LogicalModel:VisibilityStatusEnum" minOccurs="0"
    maxOccurs="1">
    <xs:annotation>
      <xs:documentation>Visibility affecting management of the situation/event.
    </xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="weatherConditionsExtension" type="D2LogicalModel:_ExtensionType"
    minOccurs="0" />
</xs:sequence>
</xs:complexType>

<xs:simpleType name="WeatherConditionsEnum">
  <xs:annotation>
    <xs:documentation>Types of general weather conditions affecting a situation/event.
  </xs:documentation>
</xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="rain">
      <xs:annotation>
        <xs:documentation>Rain.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="snow">
      <xs:annotation>
        <xs:documentation>Snow.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="winds">
      <xs:annotation>
        <xs:documentation>Winds.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="dry">
      <xs:annotation>
        <xs:documentation>Dry.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="VisibilityStatusEnum">
  <xs:annotation>
    <xs:documentation>The status of the visibility affecting the management of a
situation/event.</xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="good">
      <xs:annotation>
        <xs:documentation>Good visibility.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="medium">
      <xs:annotation>
        <xs:documentation>Medium visibility.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="poor">
      <xs:annotation>
        <xs:documentation>Poor visibility.</xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>

```

### 7.1.5.6 Public Event

A new extension type is added to the schema to include the new *PublicEventDetails* type; utilised to add further details to the standard *PublicEvent* type:

```

<xs:complexType name="_PublicEventExtensionType">
  <xs:sequence>
    <xs:element name="publicEventDetails" type="D2LogicalModel:PublicEventDetails"
      minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

The standard DATEXII *PublicEvent* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="PublicEvent">
  <!-- ... -->
  <xs:element name="publicEventExtension"
    type="D2LogicalModel:_PublicEventExtensionType" minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type is added to include the additional information required for *PublicEvent* Events:

```

<xs:complexType name="PublicEventDetails">
  <xs:annotation>
    <xs:documentation>Additional details of a Public Event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="publicEventName" type="D2LogicalModel:String" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>Name of the Public Event.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="situationParent" type="D2LogicalModel:SituationParent" minOccurs="0" />
  </xs:sequence>
</xs:complexType>

```

A common complex type (also used by *MaintenanceWorks* type Events) is added to contain information on the Parent Event:

```

<xs:complexType name="SituationParent">
  <xs:annotation>
    <xs:documentation>Details of the parent situation/event of this situation/event.
  </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="parentId" type="D2LogicalModel:String" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The ID of the parent situation/event.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="situationParentExtension" type="D2LogicalModel:_ExtensionType"
      minOccurs="0" />
  </xs:sequence>
</xs:complexType>

```

### 7.1.5.7 Source

A new extension type is added to the schema to include the new *SourceSituation* type; utilised to provide details of the Event, as supplied by the Source:

```

<xs:complexType name="_SourceExtensionType">
  <xs:sequence>
    <xs:element name="sourceSituation" type="D2LogicalModel:SourceSituation" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

The standard DATEXII *Source* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="Source">
  <!-- ... -->
  <xs:element name="sourceExtension" type="D2LogicalModel:SourceExtensionType"
    minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type is added to include the additional information supplied by the Event Source:

```

<xs:complexType name="SourceSituation">
  <xs:annotation>
    <xs:documentation>Contains information related to the original source of the
situation/event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="sourceSituationId" type="D2LogicalModel:String" minOccurs="0"
      maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The situation ID provided by the reporting source when initially
reporting the situation/event.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="sourceSituationCreationTime" type="D2LogicalModel:DateTime"
      minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>The initial creation/reported time of the situation/event, as
provided by the event source.</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

#### 7.1.5.8 Abnormal Load Vehicle Obstructions

A new extension type is added to the schema to include the new *AbnormalLoadDetails* type in *SituationRecord* elements of type *VehicleObstruction*. The new type is utilised to provide details of an Abnormal Load Event:

```

<xs:complexType name="_VehicleObstructionExtensionType">
  <xs:sequence>
    <xs:element name="abnormalLoadDetails" type="D2LogicalModel:AbnormalLoadDetails"
      minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

The standard DATESXII *VehicleObstruction* type is modified to use the new extension type (modification in grey):

```

<xs:complexType name="VehicleObstruction">
  <!-- ... -->
  <xs:element name="vehicleObstructionExtension"
    type="D2LogicalModel:_VehicleObstructionExtensionType" minOccurs="0" />
  <!-- ... -->
</xs:complexType>

```

A new complex type – *AbnormalLoadDetails* - is added to include the abnormal load details information in the Event:

```

<xs:complexType name="AbnormalLoadDetails">
  <xs:annotation>
    <xs:documentation>Additional details of an Abnormal Load Event.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="isEscorted" type="D2LogicalModel:Boolean" minOccurs="0" maxOccurs="1">
      <xs:annotation>

```

```

        <xs:documentation>Flag indicating whether the abnormal load is being escorted; by the
haulier, police or other organisation.</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="maximumSpeed" type="D2LogicalModel:KilometresPerHour"
    minOccurs="0" maxOccurs="1">
    <xs:annotation>
        <xs:documentation>The maximum speed that the abnormal load vehicle is permitted to
travel.</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="routeDescription" type="D2LogicalModel:String"
    minOccurs="1" maxOccurs="1">
    <xs:annotation>
        <xs:documentation>Textual description of the route taken by the abnormal
load.</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="currentLocation" type="D2LogicalModel:Location" minOccurs="0">
    <xs:annotation>
        <xs:documentation>The current location, on the road network, of the abnormal load
vehicle.</xs:documentation>
    </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

```

## 7.2 Annex B – DATEXII v2.0 Push WSDL

The standard DATEXII v2.0 WSDL [ref 18] is utilised to describe the web service implemented by the interface. The WSDL is listed below:

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions xmlns=http://schemas.xmlsoap.org/wsdl/
  xmlns:soap=http://schemas.xmlsoap.org/wsdl/soap/
  xmlns:soapbind=http://schemas.xmlsoap.org/wsdl/soap/
  xmlns:http=http://schemas.xmlsoap.org/wsdl/http/
  xmlns:xs=http://www.w3.org/2001/XMLSchema
  xmlns:mime=http://schemas.xmlsoap.org/wsdl/mime/
  xmlns:tns=http://datex2.eu/wsdl/supplierPush/2_0
  xmlns:d2ns=http://datex2.eu/schema/2/2_0
  name="supplierPush"
  targetNamespace="http://datex2.eu/wsdl/supplierPush/2_0">
  <documentation>
    Version 2.0 - 21 January 2011
    This document describes the DATEX II Push Service with WSDL 1.1
    This wsdl document is the reference with which each DATEX II Push Web Service has to
    be built
    Refer http://datex2.eu
  </documentation>
  <types>
    <xs:schema targetNamespace="http://datex2.eu/wsdl/supplierPush/2_0">
      <xs:import namespace="http://datex2.eu/schema/2/2_0"
        schemaLocation="[schema location]"/>
    </xs:schema>
  </types>
  <message name="supplierMessage">
    <part name="body" element="d2ns:d2LogicalModel"/>
  </message>
  <message name="outputMessage">
    <part name="body" element="d2ns:d2LogicalModel"/>
  </message>
  <portType name="supplierPushInterface">
    <operation name="putDatex2Data">
      <input message="tns:supplierMessage"/>
      <output message="tns:outputMessage"/>
    </operation>
  </portType>
  <binding name="supplierPushSoapBinding" type="tns:supplierPushInterface">
    <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
    <operation name="putDatex2Data">
      <soap:operation soapAction="http://datex2.eu/wsdl/supplierPush/2_0/putDatex2Data"
        style="document"/>
      <input>
        <soapbind:body parts="body" use="literal"/>
      </input>
      <output>
        <soapbind:body use="literal"/>
      </output>
    </operation>
  </binding>
  <service name="supplierPushService">
    <port name="supplierPushSoapEndPoint" binding="tns:supplierPushSoapBinding">
      <soap:address location="[local endpoint]"/>
    </port>
  </service>
</definitions>
```

### General Notes:

1. The NTIS system uses the input/request message *supplierMessage*, a component of the *putDatex2Data* operation, to publish data to Subscribers.
2. The *outputMessage* is defined as the response to the *supplierMessage*. The interface does not utilise the response message: the message has been retained for compliance with the standard WSDL, for cases where the Subscriber system needs to implement

the response (for instance, if a Subscriber is reusing an existing web service implementation that issues the response). Implementing the response message does not affect the operation of the interface.

Data Item Descriptions:

Data Item	Description
[schema location]	<p>The location of the local DATEXII schema that is used by the web service to validate the content of the data contained in the request/response messages.</p> <p>The NTIS-specific version of the DATEXII schema should be used by Subscribers to fully realise the web service: refer to Section 7.1 for details.</p> <p>Example: <i>..\Schema\DATEXIISchema_2_2_0.xsd</i></p>
[local endpoint]	<p>The URL that defines the endpoint of the web service; used by the Subscriber system only.</p> <p>The port and local path components of the URL must be identical to the URL provided by the Subscriber as part of the Subscription Options applied to the service (refer to Section 7.3).</p> <p>Example: <i>http://localhost:8080/myMIDASTrafficDataFeed/2_0</i></p>



## 7.3 Annex C – Subscription Information

### 7.3.1 Subscriber System

To receive data published on the interface, the Subscriber system is required to adhere to the following criteria:

1. Web service: the system hosts an implementation of the web service endpoint.
2. Internet access: the system has network access to the internet.
3. URL: the system utilises either a static IP address or ISP-registered domain name for the hostname component of the URL used to receive published data. The URL is specified by the Subscriber as part of the service Subscription Options.
4. Firewall: any firewall utilised by the system accepts HTTP requests originating from the NTIS system; either on the standard HTTP port 80, or the port specified as part of the Subscription Options URL. The firewall can be configured to accept HTTP requests from all sources, or specifically from the NTIS system: the IP address(es) used by the NTIS system are detailed in [ref 4].

### 7.3.2 Subscription Options

A number of Subscription Options are utilised by the NTIS system to personalise the data published to each Subscriber on this interface. The Options available are dependent on the Published Data Type.

#### 7.3.2.1 Universal Options

The following options are applicable to all Published Data Types and are specified per Published Data Type.

Option	Values	Description
Receive Data	true/false	Indicates that the Subscriber receives data for the Published Data Type.
URL	Valid URL string	<p>The web service endpoint on the Subscriber system; to which published data is delivered.</p> <p>In addition to a hostname/IP address, the URL can optionally contain a port number and a relative local path on the Subscriber system. The available ports are limited, to protect the security of the NTIS system, to:</p> <ul style="list-style-type: none"><li>• 80 : standard HTTP port. If no port is specified, the system assumes the Subscriber uses this port.</li><li>• 8080 : standard alternate HTTP port.</li><li>• 15500-15520 : a range of ports, not registered with the Internet Assigned Numbers Authority (IANA) and unused by standard applications or services.</li></ul> <p>A separate URL can be specified for each received</p>

Option	Values	Description
		Published Data Type, or the same URL can be specified for more than one Published Data Type.
Geographical Areas of Interest (AoI)	n/a	<p>Multiple AoIs can be specified for a Subscriber, using one or more of the following area definitions:</p> <ul style="list-style-type: none"> <li>• HA Areas</li> <li>• RCC Regions</li> <li>• Counties</li> <li>• User Defined Regions</li> </ul> <p>Data published to a Subscriber is filtered on the AoI(s) specified for the Subscriber. A data item with an associated location that falls partly or wholly within one or more of the specified AoI(s) is published to the Subscriber.</p> <p>A maximum of 10 AoIs can be specified, per Subscriber, per Published Data Type, to filter the data published on this interface.</p> <p>If no AoI is specified, then there is no filtering of published data on geographic location.</p> <p>A User Defined Region is a custom geographical area specified by the Subscriber: refer to Section 7.3.4.</p> <p><i>Note: this option does not apply to NTIS Model Update Notifications publications, as the data is not location-specific.</i></p>

### 7.3.2.2 ANPR Travel Times

Option	Values	Description
Receive Catch-up Data	true/false	<p>Indicates that the Subscriber receives catch-up data (historic data, buffered by source systems/sites if no connection to the NTIS system can be established) in addition to current data.</p> <p>Only applies if the option Receive Data is specified as true for ANPR Travel Times.</p> <p>Note: this option is common, shared with TMU Loop Data and MIDAS Loop Data; the option specifies that catch-up data is received for all TMU, MIDAS and ANPR data.</p>

### 7.3.2.3 Events

Option	Values	Description
Event Types	n/a	Specifies one or more Event Types to be received by the Subscriber.

Option	Values	Description
Include Unconfirmed Events	true/false	Specifies that the Subscriber receives Unconfirmed Events in addition to Confirmed Events (always published).  The default value is false.
Include Restricted Information	true/false	Specifies that the Events published to the Subscriber include restricted/sensitive information. If set to false, the Events are still published to the Subscriber, but with the restricted information omitted.  The default value is false.

#### 7.3.2.4 MIDAS Loop Data

Option	Values	Description
Receive Catch-up Data	true/false	Indicates that the Subscriber receives catch-up data (historic data, buffered by source systems/sites if no connection to the NTIS system can be established) in addition to current data.  Only applies if the option Receive Data is specified as true for MIDAS Loop Data.  Note: this option is common, shared with TMU Loop Data and ANPR Travel Times; the option specifies that catch-up data is received for all TMU, MIDAS and ANPR data.

#### 7.3.2.5 NTIS Model Update Notifications

Only the universal options are employed.

Note that the Geographical Areas of Interest (AoI) option is not used for this published data as it is not location-specific.

#### 7.3.2.6 Processed Traffic Data

There are two types of Processed Traffic data: Fused FVD and Sensor Data and Fused Sensor-only Data:

1. The universal Receive Data option is specified separately for each type of Processed Traffic Data.
2. The universal URL option is specified for both types of Processed Traffic Data. That is, both types are published to the same URL.

#### 7.3.2.7 TMU Loop Data

Option	Values	Description
Receive Catch-up Data	true/false	Indicates that the Subscriber receives catch-up data (historic data, buffered by source systems/sites if no connection to the NTIS system can be established) in addition to current

Option	Values	Description
		<p>data.</p> <p>Only applies if the option Receive Data is specified as true for ANPR Travel Times.</p> <p>Note: this option is common, shared with TMU Loop Data and MIDAS Loop Data; the option specifies that catch-up data is received for all TMU, MIDAS and ANPR data.</p>

#### 7.3.2.8 VMS and Matrix Signal Data

Only the universal options are employed. Note that VMS and Matrix Signal data are published in the same feed.

### 7.3.3 Implementing the Web Service

The resources required to implement the web service endpoint on the Subscriber system are supplied on the github web-based software hosting service, located at:

<https://github.com/ntisservices>

The resources include:

1. WSDL: the standard DATEXII V2.0 Push service WSDL, describing the functionality of the web service.
2. Schema: the standard DATEXII v2.0 schema with NTIS Publish Services-specific extensions, describing the content of the published data.
3. Sample software: an implementation of the server-side web service, containing all required source files and resources. The sample software interprets the raw data and marshals the data into useable objects. The sample software also includes test software and data. A version of the sample software is supplied in the following technologies:
  - a. Java
  - b. C# ASP.NET
4. Documentation for the sample software:
  - a. A guide to building and deploying the web service.
  - b. A wiki providing an overview of the sample code.

There are a number of choices regarding implementation of the web service on a Subscriber system:

1. Modify the sample code to suit the needs of the Subscriber system.
2. Use the sample code as is, as a front end to receiving and marshalling the received data, then extend the code to suit the processing and storage needs of the Subscriber system.

3. Use only the web service descriptors, the supplied WSDL and schema, to implement a fully customised web service.

The sample software is subject to the MIT permissive free license [ref 29].

#### **7.3.4 On-line Resources**

A number of on-line resources are available to Subscribers on the Traffic England website:

<http://www.trafficengland.com/subscribers>

General Information: information regarding the facilities and services provided by the NTIS Publish Services component.

Subscription Requests: a facility is provided to request a new Subscription or a modification to an existing Subscription.

User Defined Regions: User Defined Regions can be created to filter the received published data on geographical Areas of Interest. The User Defined Regions form part of the Subscription Options specified for each Subscriber.

A maximum of 10 User Defined Regions can be created, per Subscriber.

## 7.4 Annex D – Abbreviations and Glossary

Industry-standard and HA terms and abbreviations used within this document are listed in the HA Taxonomy [ref 1].

Terms and abbreviations specific to this document, or not included in the Taxonomy, are listed below.

Term	Description
DATEXII	European-wide 2 <sup>nd</sup> generation Data Exchange specification for traffic information. Official website: <a href="http://www.datex2.eu">http://www.datex2.eu</a>
DG MOVE	European Commission Directorate-General for Mobility and Transport. The body that oversees the DATEXII specification.
EIDD	External Interface Design Document. A Thales document for describing an external system interface.
EIRS	External Interface Requirements Specification. A Thales document for defining the requirements of an external system interface.
FVD	Floating Vehicle Data. Traffic data acquired from the monitoring of vehicle-resident location determination systems.
HTTP	Hyper Text Transfer Protocol
ISP	Internet Service Provider
Published Data Type	Published data is categorised into discrete Published Data Types. The different types of data are published in separate messages and are processed and managed separately by the system.
Subscriber	An individual, organisation or body that has registered to receive published data. The term is also applied to the system utilised by the Subscriber to receive published data.
SOAP	Simple Object Access Protocol
SSDD	System/Subsystem Design Document. A Thales document for describing the function and overall design of a system.
WSDL	Web Services Description Language