

A Specification for Victorian Flood Database (VFD) Dataset Update

1. Purpose

The purpose of this document is to provide information on the format and requirements of the Victorian Flood Database (VFD) spatial data in order to facilitate their orderly update with digital outputs from flood and related studies including flood data survey work, and following Planning Scheme amendments that result in changes to 1% flood (LSIO) and/or floodway (UFZ and FO) extents. The VFD is the consolidated version of the former Flood Data Transfer Project (FDTP) which it supersedes.

It is expected that this document will be of most use to CMAs and Consultants involved in preparing data for upload to the VFD Master datasets.

It is recommended that users of this Specification familiarise themselves with the VFD Dataset Update Protocols prior to commencing work.

2. Overview

The Victorian Flood Data Transfer Project (FDTP) involved the systematic collection, collation, analysis and presentation in GIS and hard copy format of historic, interpreted and other flood related data for major regional urban and rural floodplains in Victoria, excluding the Melbourne metropolitan area. Project outputs included GIS layers under seventeen (17) flood related themes (see below) in Arc export (e00) format. The datasets have been modified and are now consolidated into the Victorian Flood Database (VFD).

Themes	Features	Layer names	Comment
Flood extents - Historic - Interpreted - Statistical	Arcs & Polys Arcs & Polys Arcs & Polys	FLXT_XYZ FLXT_INT_X FLXT_STAT9	These are currently multi-feature class layers but will be converted to single feature class (Polys) during 2004
Flood heights - Historic - Statistical	Points Arc Arcs	FLHITE_POINT FLHITE_XYZ FLHITE_ST9	
Floodways	Polys	FLOODWAY25	
Levees	Points Arcs	FLLEVEE25_P FLLEVEE25_L	
Features	Polys	FLFEAT25	
Structures	Points	FLSTRUCT25	
Running km	Points	FLRUNKM100	
Flood flow direction arrows - historic - generic	Arcs Arcs	FLFD_XY FLFD_GENERIC	
Index layers - topo - mapping extent - soils - satellite - aerial photos	Polys Polys Polys Polys Polys	FLTI_W FLMI_XY FLGI FLSI_XY FLPI_XY	These layers are currently not being maintained. An alternative aerial flood photo index layer has been development and will replace the existing FLPI_XY layer during 2004. Update of the new layer will be undertaken under separate maintenance protocols.

A Specification for Victorian Flood Database (VFD) Dataset Update

The VFD datasets are managed as state-wide coverages from DSE's Traralgon office, through the auspices of the Regional Data Net (RDN).

In order to ensure the long term currency and utility of the VFD datasets, it is critical that established Metadata and data standards are adhered to. This will ensure that all flood related data developed and/or collected by stakeholders will be in the appropriate format and thus be able to be uploaded into the state-wide master datasets. Key requirements are:

- ◆ Adherence to VFD Dataset Update Protocols and guidelines;
- ◆ Adherence to this Specification;
- ◆ Adherence to the VFD Metadata;
- ◆ Correct use of established codes, numbering systems and file names;
- ◆ Supply of cleaned and QA'ed data in required GIS data format and precision;
 - ⇒ Free of digitisation errors (ie. cleaned);
 - ⇒ Free of attribution errors (ie. QA'ed); and
 - ⇒ Topologically and spatially correct (ie. correct topology and coordinates systems used).
- ◆ Supply of logs from a documented, robust and appropriate QA system for VFD datasets.

3. *Storage and Maintenance of the VFD Datasets*

The joint DSE/CMA Regional Data Net project has been selected as the vehicle to facilitate the long term management and dissemination of the VFD datasets. This does not however extend to VFD dataset funding.

The Regional Data Net consists of a central storage hub, a number of regional data servers and connections from these regional servers to a series of satellite sites. It utilises Arc/Info GIS software at the central hub and regional servers for all data maintenance.

Protocols that detail the steps to be followed by stakeholders in updating the VFD Master datasets have been developed and are provided in a simplified form at Attachment 1. The protocols are aimed at ensuring that dataset update activities proceed smoothly and that only the latest datasets are available for use.

4. *GIS Data Format*

All GIS data submitted for updates must be supplied in uncompressed Arc/Info e00 double precision export format or ArcView shapefile format with topology that has been cleaned and is verified as being correct prior to supply.

5. *Metadata and Attribute Values*

All data supplied for upload to the VFD datasets must adhere strictly to the **VFD Metadata**. Failure to observe any of the Metadata requirements will result in the flood data being rejected for upload.

Metadata, developed to NRE standards, exist for each of the 17 VFD data themes. It provides dataset details including the specific items and attribute codes within each layer together with details on Look-Up Table (LUT) items and values. A full description of the VFD Metadata is available as a series of PDF's at www.dse.vic.gov.au – select '*land management*', then '*catchments*' then '*Victorian Flood Data Transfer Project*'

The Metadata includes the appropriate nomenclature for defining and naming coverages. Each cover is made up of a single feature class (ie. points, arcs and polygons are separated into separate covers). While this represents a departure from the original specification, it has been adopted as the VFD standard as it greatly simplifies data transfers.

A Specification for Victorian Flood Database (VFD) Dataset Update

There are a number of fields that utilise lookup codes to list the possible values for that field, or rules for handling unknown attributes. An index of look-up tables (LUTS) or reference tables is available at the same location as the Metadata. These items are essentially 'maintenance fields' together with 'notes' and have been retained in LUTs so as to maximise on-screen readability of features and their attributes. The LUTs are available from the same location as the Metadata.

The nomenclature system established for each item and detailed in the Metadata must be used when attributing an item.

Note that as changes may be made to the Metadata from time to time, users are encouraged to always obtain an up to date version of the Metadata from the web site before commencing work.

The following attribute fields should be incremented sequentially beginning always at 1. Note that the upload script used by the Data Manager will change these values to uniquely fit with existing values within the Master datasets. This will avoid the potential for duplication of attribute values within the Master datasets.

- ◆ FLDEXTID Every polygon within any of the FLXT layers must have a unique FLDEXTID value.
- ◆ FLNOTEID Each FLNOTEID value should have a unique note/description. Identical notes/descriptions should use the same FLNOTEID value.

Dataset changes will always necessitate changes to the following fields as indicated:

- ◆ Version Number This should always be incremented by 1 following changes to attribute values and/or linework. Note that the Version Number may be different within and between layers. A value of 1 indicates original VFD work.
- ◆ MODIFIED This should always be set to the date that the individual feature is modified.
Format is YYYYMMDD where Y is year, M is month and D is day
The initial value is 20000101 and indicates original VFD work.
- ◆ FLMETH It is expected that this attribute field will change with each edit of the dataset.

The following table provides a summary of mandatory attributes and those that must have a valid 'unknown' value if data is not available, listed by cover.

Cover	Mandatory Attributes
FLXT_XYZ FLXT_INT_X	<p>FLEVNTID – Flood event identifier = date of the event. Use yyyy99 if month unknown, 9999mm if year unknown use 9999mm, 999999 if both unknown</p> <p>FLEXTT – Flood extent type. Use standard values</p> <p>FLDEXTID – Flood extent polygon ID. Begin at 1</p> <p>FLEXTSTM – Flood start time. Use -999 if unknown</p> <p>FLEXTFTM – Flood finish time. Use -999 if unknown</p> <p>STATIONNO – Representative gauging station number. Use 99999999 if unknown</p> <p>FLATSCL – Flood information source scale. Use 99999999 if unknown</p> <p>FLDEPT – Organisation source of flood information. Use 'unknown' if no information</p> <p>FLMETH – Method used to determine flood extent. Use codes from LUT</p> <p>FLREL – Reliability of flood extent. Use codes from LUT. If no data use 'unknown'</p> <p>INUNDATED – Indicates wet or dry land. 'Y' if area inside poly is flooded else 'N'</p> <p>FLEXTVER – Version number. Increment existing number by 1</p> <p>MODIFIED – Date the feature was last modified</p>
FLXT_STAT9	<p>FLEXTT – Flood extent type. Use standard values</p> <p>FLDEXTID – Flood extent polygon ID. Begin at 1</p> <p>STATIONNO – Representative gauging station number. Use 99999999 if unknown</p> <p>FLATSCL – Flood information source scale. Use 99999999 if unknown</p>

A Specification for Victorian Flood Database (VFD) Dataset Update

	<p>FLDEPT – Organisation source of flood information. Use 'unknown' if no information</p> <p>FLMETH – Method used to determine flood extent. Use codes from LUT</p> <p>FLREL – Reliability of flood extent. Use standard values. If no data use 'unknown'</p> <p>INUNDATED – 'Y' if area inside poly is flooded else 'N'</p> <p>FLEXTVER – Version number. Increment existing number by 1</p> <p>MODIFIED – Date the feature was last modified</p>
FLHITE_POINT	<p>FLHINFO – Flood information type</p> <p>FLSPHTRL – Spot flood height RL</p> <p>FL_YEAR – Year of data. Use 9999 if unknown</p> <p>FL_MONTH – Month of data. Use 99 if unknown</p> <p>FL_DAY – Day of data. Use 99 if unknown</p> <p>COLL_DATE – Data collection date</p> <p>FLREL – Flood height reliability. Use standard values. If no data use 'unknown'</p> <p>FLMETH – Method used to determine flood height. Use standard values</p> <p>FLHITEVN – Version number. Increment existing number by 1</p> <p>MODIFIED – Date the feature was last modified</p>
FLHITE_XYZ	<p>FLHINFO – Flood information type. Use standard values</p> <p>FLCONTRL – Flood level contour RL</p> <p>FL_YEAR – Year of data. Use 9999 if unknown</p> <p>FL_MONTH – Month of data. Use 99 if unknown</p> <p>FL_DAY – Day of data. Use 99 if unknown</p> <p>COLL_DATE – Data collection date</p> <p>FLREL – Flood height reliability. Use standard values. If no data use 'unknown'</p> <p>FLMETH – Method used to determine flood height. Use standard values</p> <p>FLHITEVN – Version number. Increment existing number by 1</p> <p>MODIFIED – Date the feature was last modified</p>
FLHITE_ST9	<p>FLHINFO – Flood information type. Use standard values</p> <p>FLCONTRL – Flood level contour RL</p> <p>MODL_DATE – Modelling date</p> <p>FLREL – Flood height reliability. Use standard values. If no data use 'unknown'</p> <p>FLMETH – Method used to determine flood height</p> <p>FLHITEVN – Version number. Increment by 1</p> <p>MODIFIED – Date dataset modified</p>
FLOODWAY25	<p>FLWAYTYP – Type of floodway. Use standard values</p> <p>INUNDATED – 'Y' if area inside poly is flooded else 'N'</p> <p>FLWAYVER – Version number. Increment existing number by 1</p> <p>MODIFIED – Date the feature was last modified</p>
FLLEVEE25_P	<p>FLLEVO – Levee ownership type. Use standard values. Use 'unknown' if no information</p> <p>FLDEPT – Organisation source of flood information. Use 'unknown' if no information</p> <p>FLDATSPH – Levee spot height RL</p> <p>FLLEVVER - Version number. Increment existing value by 1</p> <p>MODIFIED – Date the feature was last modified</p>
FLLEVEE25_L	<p>FLLEVO – Levee ownership type. Use standard values. Use 'unknown' if no information</p> <p>FLDEPT – Organisation source of flood information. Use 'unknown' if no information</p> <p>FLLEVVER - Version number. Increment existing number by 1</p> <p>MODIFIED – Date the feature was last modified</p>
FLFEAT25	<p>FLFTYP – Type of flood feature. Use codes from LUT</p> <p>FLFEATVER - Version number. Increment existing number by 1</p> <p>MODIFIED – Date the feature was last modified</p>
FLSTRUCT25	<p>FLSTR – Type of flood structure. Use codes from LUT</p> <p>FLSTRVER - Version number. Increment existing number by 1</p> <p>MODIFIED – Date the feature was last modified</p>

A Specification for Victorian Flood Database (VFD) Dataset Update

FLRUNKM100	FLBMAP_NO – Name/number of source map FLRUNKMS – Running distance from outflow location FLDATSCL – Map scale. Use 9999999 if unknown FLRKMETH – Method used to derive running km. Use standard values FLRKVERS - Version number. Increment existing number by 1 MODIFIED – Date the feature was last modified
FLFD_XY	FLFDHVER - Version number. Increment existing value by 1 MODIFIED – Date the feature was last modified
FLFD_GENERIC	FLFDGVER - Version number. Increment existing number by 1 MODIFIED – Date the feature was last modified

Note - any items not included in the above table may be left blank.

6. *Reliability and Floodway Delineation*

It is suggested that Consultants will find the following two documents of considerable assistance in the determination of what reliability to assign to various linework being captured to the VFD datasets and what should be captured to the FLOODWAY25 layer.

- ◆ “Guidelines for Assessing Reliability”, Floodplain Management Unit, DNRE, April 1998
- ◆ “Advisory Notes for Delineating Floodways”, Floodplain Management Unit, DNRE, July 1998

Note that the reliability attribute for layers FLLEVEE25_L and FLLEVEE25_P refers to the state of repair of the levee along a segment or at a location.

7. *Supply of VFD Data for Update – Defining the Study Area and Clip Box*

It is suggested that as part of the planning for the update or augmentation of the VFD datasets, the Data Manager should be advised of the likely study area and expected timing.

The first task following the collection and collation of new/additional/corrected data to be uploaded to the VFD datasets is to obtain all existing relevant VFD data from the Data Manager. This is achieved by locating a ‘box’ over the study area and specifying the latitude and longitude of two opposing corners. Provided there are no conflicts with other active update projects, the Data Manager will clip this ‘box’ from the Master dataset and supply it electronically (or on CD) to the requesting entity. Further update of data within the clip box area will not be allowed until such time as revised data has been returned and successfully uploaded to the VFD datasets.

8. *Modifying the VFD Data*

Only change those points/lines/polys/attribute values within the clip box that need to be changed. This means that layers within the clip box that are not edited are returned to the Data Manager exactly as they were delivered.

If a layer has not been changed since it was first uploaded (ie. it is still the original VFD work), item MODIFIED will have the initial attribute value of 20000101.

9. *Return of the Updated VFD Data – Upload of the Clip Box and Edge Matching*

Following integrity checking and verification of data within the clip box to the satisfaction of the Data Manager, he will cut the new data into the VFD Master dataset. This will result in the erasure of all existing data within the clip box area in the Master datasets and its replacement by the new data.

The Data Manager will ensure edge matching with existing data by:

A Specification for Victorian Flood Database (VFD) Dataset Update

- ◆ Inserting join lines between new and existing linework along the clip box boundary;
- ◆ Ensuring that polygons are closed, arcs terminated and attributes assigned in line with VFD Metadata; and
- ◆ Removing the clip box outline.

10. Report Addendums

The FDTP delivered a series of reports that detailed the steps followed, assumptions made and data used to build the original FDTP (now VFD) Master datasets. It is expected, unless otherwise specified, that an addendum will be produced for each report covering the study area. As a minimum, the addendum should outline:

- ◆ Any new analyses, studies or field work;
- ◆ Revised assumptions;
- ◆ A reassessment of reliability;
- ◆ The availability of new or corrected data; and
- ◆ Other matters considered relevant by the CMA to the long term appreciation and informed use of the datasets.

11. Precision

The tolerance settings and minimum polygon area information is listed with the Metadata for each layer type. While similar, the tolerances do vary from layer to layer. It is essential that the correct tolerance is used for each layer.

All Consultants are strongly advised to double check that the settings being used are correct for the layer type being digitised.

As an example only, the tolerance settings for historic flood extent layers (FLXT_XYZ) are:

Dangle	0	Weed	3m	Node Snap	10m
Fuzzy	0.001m	Tic Match	0.003	Snap	10m
Grain	10m	Edit	50m		
Polygon Area (ha)		Minimum	1	Suspicious	5

It is expected that all data supplied by the Consultant will have been fully checked and corrected for sliver, dangles and bow-tie errors.

Additional notes regarding precision and tolerances applicable to each theme are listed in the VFD Metadata. Only those tolerances that are appropriate for the data type (Point, Arc or Poly) apply.

12. Data Coordinate System

All data is stored centrally as State-wide layers in Geographic (decimal degrees) coordinates based on Geocentric Datum of Australia 1994 (GDA94).

VFD study area coordinates can be provided as either Map Grid of Australia (MGA) or Latitude and Longitude (decimal degrees).

13. Non-Spatial Data

It is possible that some attribute data will need to be supplied in an additional database due to the character limitations associated with Arc items. The purpose of the non-spatial database is to provide a:

- ◆ Storage location for all relevant information that does not readily fit in the Look Up Tables, including notes greater than 320 characters in length; and

A Specification for Victorian Flood Database (VFD) Dataset Update

- ◆ Means of incorporating notes and annotations on hard copy maps. These will take the form of generic notes to clarify the methodology used, the reliability of data and other relevant information.

All non-spatial databases shall be constructed in *MS-ACCESS*.

14. Quality Assurance

On completion of any VFD GIS layer and prior to delivery to the CMA for validation, it is the responsibility of the Consultant to perform appropriate QA checks on the finished data. This is to include a sign-off and approval process for the completed package of work that explicitly states that the Consultant has conformed to the VFD Metadata and the VFD Dataset Update Specification and has performed appropriate QA checks on the finished data.

The Consultant is also required to provide a summary of dataset changes and/or additions in a form acceptable to the CMA. The CMA will already have discussed requirements with the Data Manager.

The results of all QA checks and processes are expected to be made available to the CMA and/or Data Manager on request.

Before accepting the Consultant's QA certification, the CMA will validate the data to confirm adherence to Metadata and Update Specification requirements. Validation will include a check of the Consultant's summary of dataset changes and additions.

Provided data is acceptable to the CMA, it should be forwarded by the Consultant to the Data Manager for further integrity checking and verification prior to upload to the VFD Master datasets.

15. Flow Diagram

Consultants are referred to the VFD Update Protocol diagrams (**Attachment 1**) for a description of the major steps, interactions and hold points applicable to VFD dataset update activities.

It should be noted that strict timelines apply for all data exchanges with the Data Manager. Consultants are encouraged to observe these rigorously.

16. Useful Notes

16.1 Flood Extent layers (FLXT_XYZ, FLXT_STAT θ , FLXT_INT_X)

The maximum outer envelope of the extent of flooding should be captured to the FLXT_XYZ layer. This extent could be derived by bundling all day/date layers for the event as captured from successive aerial photography. Any closure lines for the maximum outer envelope should be appropriately attributed (see Section 16.7: 'Limit of Study' below).

For areas where there is good coverage of flood photography of an historic flood it should be captured as an historic flood extent and be contained in the FLXT_XYZ layer. Where there is also sufficient ground level information and historic peak flood levels to project the flood extent captured at the time of the flood photography (which may be days before or after the peak) to the extent at the time of the peak, this projected extent should be captured as an interpreted flood extent layer. The extent should be contained in the FLXT_INT_X layer as it is a non statistical interpreted flood extent

In situations where there is sufficient evidence to link this to a 1% extent, the extent should be contained in the FLXT_STAT1 layer rather than the FLXT_INT_X layer.

All flood extents relating to a particular AEP event (ie. historic events that have been analysed as having a particular AEP, flood study/model results, etc) should be contained in the FLXT_STAT θ (where θ is the AEP of the flood event).

When capturing and delineating flood extents from flood photos the visible edge of water should be captured except in cases where an obvious high water mark (flood level line being debris or water mark)

A Specification for Victorian Flood Database (VFD) Dataset Update

is evident. In such cases this line should be digitised and assigned a reliability depending on the time of the photo and the time of the peak (where known).

Polygons and arcs relating to a flood extent should be linked to a gauging station where this can be done in a meaningful way. For example, a flood extent applicable to the Ovens River can be linked to an Ovens River gauging station. However, a flood extent applicable to an ungauged anabranch of the Ovens River should not be linked to a gauging station unless there is evidence that the behaviour of the anabranch is similar to the main river. In cases where a river has more than one gauging station, Consultants must decide which sections of the floodplain relate to each gauging station. Common sense should prevail.

16.2 Flood Height layers (FLHITE_POINT, FLHITE_XYZ, FLHITE_ST9)

Recorded flood levels (ie. historic flood height data and thus FLHINFO = general spot height) should be captured to the FLHITE_POINT layer while modelled flood levels (ie. flood contour isolines and thus FLHINFO = flood height contour) should be captured to the FLHITE_ST9 layer.

All height data is in mAHD.

16.3 Flood Features layer (FLFEAT25)

Floodways should not be included in the FLFEAT25 layer as there is a separate layer (FLOODWAY25) for them: FLFEAT25 has been prepared for features, including those declared under the Water Act.

Start date is the date of declaration or proclamation.

16.4 Levee layer (FLLEVEE25)

Only actual flood levees are to be included in this layer. Other structures that may act in part as a levee (eg. a road embankment) should be stored in the flood structures layer as a point with relevant notes attached.

However, structures (eg. roads) that have been properly and intentionally constructed to act as levees (eg. Kerang, Echuca, etc) should be included in both the FLLEVEE25 and FLSTRUCT25 layers.

All height data is in mAHD. However, a level (FLDATSPH) should only be attached to a levee in cover FLLEVEE25_L if the levee is in very good condition and is maintained to a high standard (for example the levees at Wangaratta).

16.5 Flood Structures layer (FLSTRUCT25)

Only structures with a known link to flooding should be included in this layer. Examples include bridges which significantly obstruct flows, flood regulators and channel outfalls.

However, structures (eg. roads) that have been properly and intentionally constructed to act as levees (eg. Kerang, Echuca, etc) should be included in both the FLLEVEE25 and FLSTRUCT25 layers.

16.6 Running Kilometres layer (FLRUNKM100)

Running distances could be either derived from digital data, digitised directly from source maps or by using some other method. It is however essential that Consultants are consistent in their use of the methodology within a river reach.

In general the following principles should apply in the generation of stream running distances.

- ◆ If running distances exist for a water course (eg. on plans, in reports, etc), record/capture them;
- ◆ Generate running distances for significant (in terms of size, flow volumes, catchment area, flood impact, etc) water courses;
- ◆ Do not generate running distances for water courses where there is no other flood (historic or interpreted) information; and
- ◆ The zero point for running distances should always be the downstream end of the water courses (ie. discharge point, confluence, etc).

16.7 'Limit of Study' lines

These are required at the interface between "new" and "old" work and should be provided to the data manager to be included in a separate layer (should state which layer). These lines may be used to close (flood extent) polygons. If no limit of study lines are submitted, the boundary of the data clip box will be used to close polygons.

Attachment 1

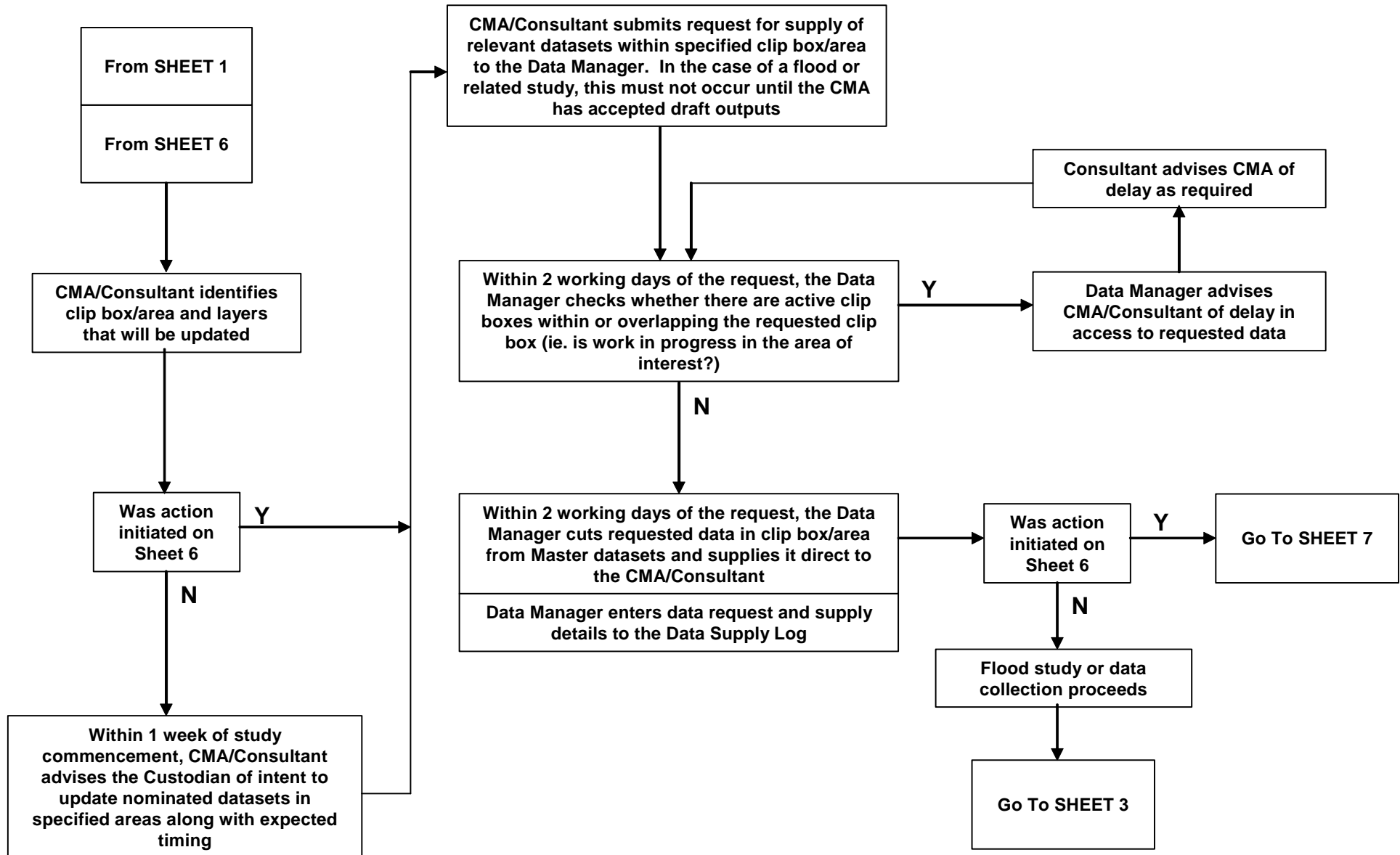
VFD DATASET UPDATE PROTOCOLS

VFD Update Protocol V3.01 – Sheet 1

<p>These protocols have been developed to facilitate a structured and ordered approach to the long term management of the VFD datasets. Specifically, the steps detailed over the following pages are aimed at maintaining the currency of the VFD datasets and assisting maintenance of consistency with corresponding Municipal Planning Schemes.</p>	
<p>A need to change or add to the VFD datasets will result from:</p>	
<ul style="list-style-type: none"> • A (planned) flood or related study 	<p>Go To SHEET 2</p>
<ul style="list-style-type: none"> • Collection of flood related data 	<p>Go To SHEET 2</p>
<ul style="list-style-type: none"> • Identification of errors in the existing VFD datasets 	<p>Go To SHEET2</p>
<ul style="list-style-type: none"> • A mismatch between the relevant Planning Scheme and the VFD FLXT_STAT1 and/or FLOODWAY layers 	<p>If as a result of changes to the VFD datasets: Go To SHEET 5</p>
	<p>If as a result of changes to the Planning Scheme: Go To SHEET 6</p>
<ul style="list-style-type: none"> • A change to the data model. This includes changes to Metadata, database structure, addition of new data formats, etc 	<p>To be managed by the Data Manager and Data Custodian as required</p>

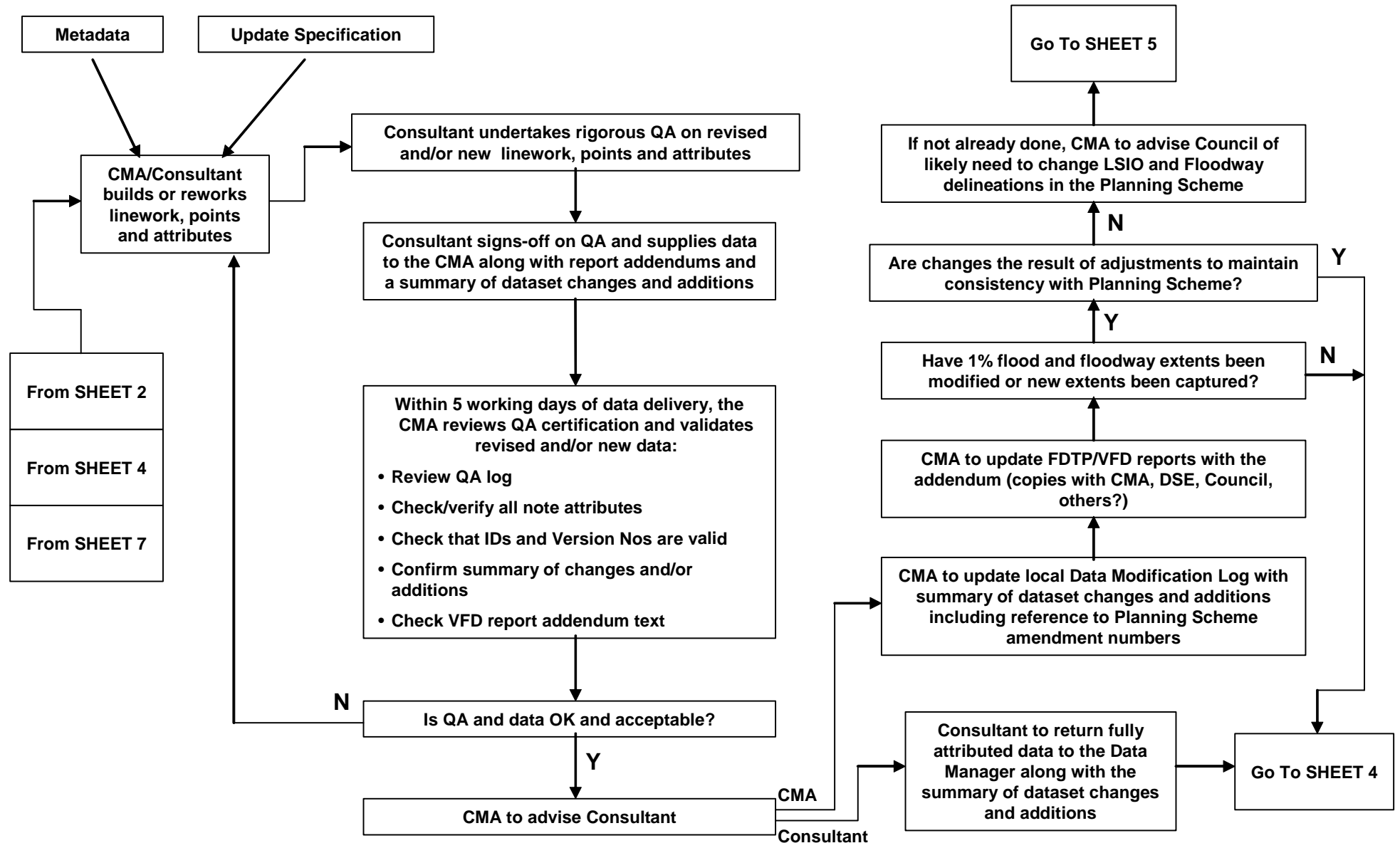
VFD Update Protocol V3.01 – Sheet 2

This is page 1 for upload of new or corrected data to VFD datasets



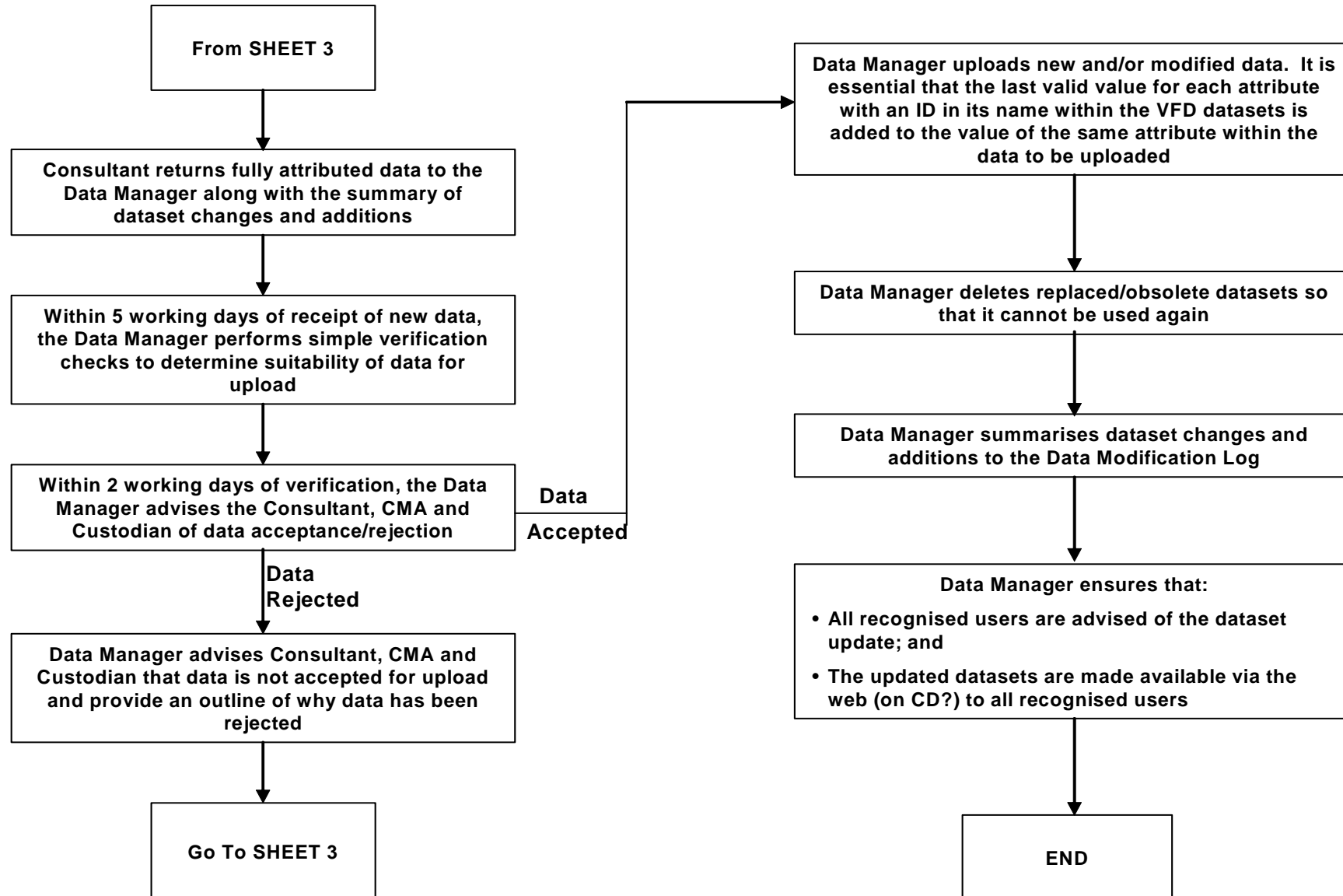
VFD Update Protocol V3.01 – Sheet 3

This is page 2 for upload of new or corrected data to VFD datasets



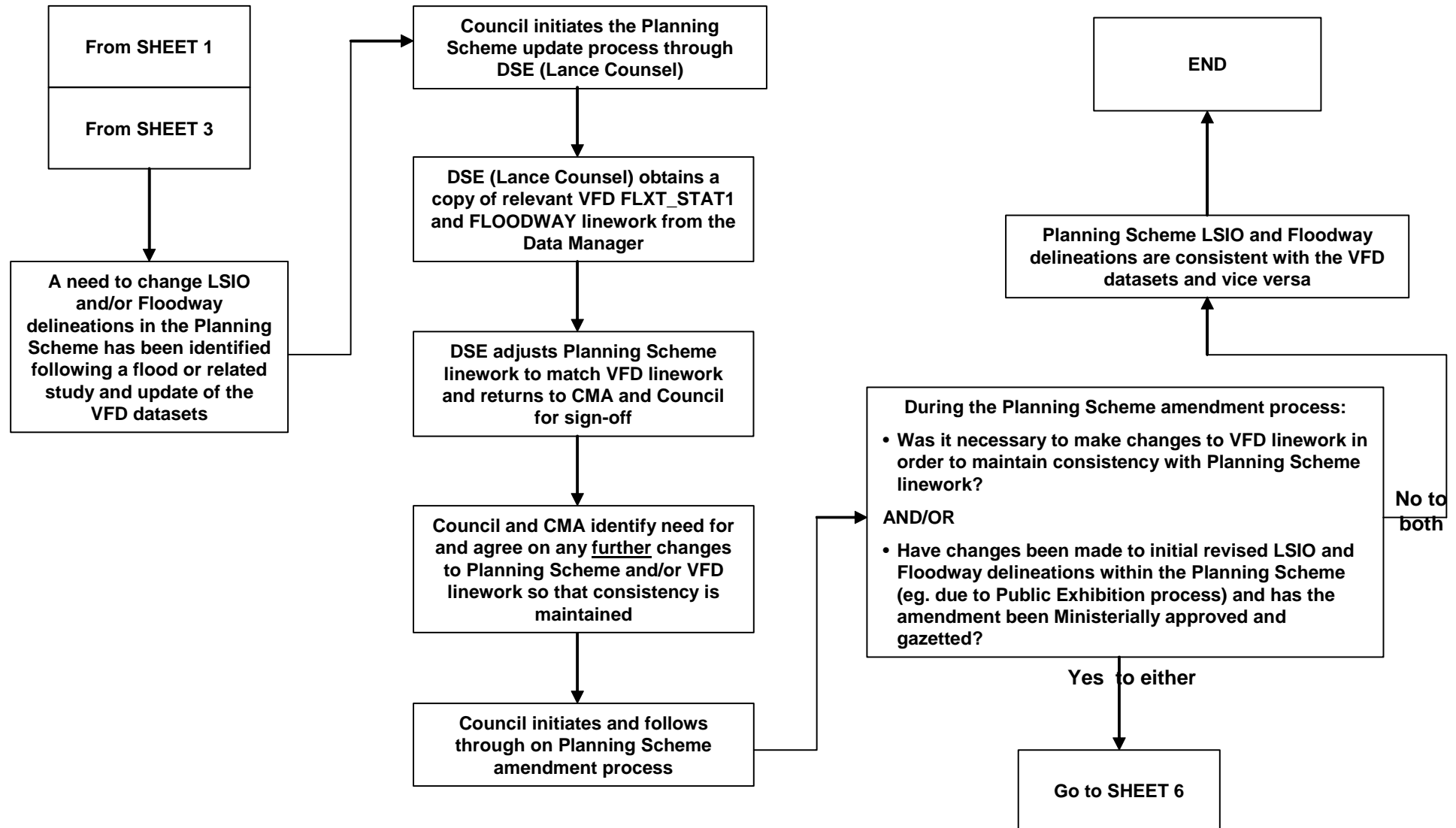
VFD Update Protocol V3.01 – Sheet 4

This is page 3 for upload of new or corrected data to VFD datasets



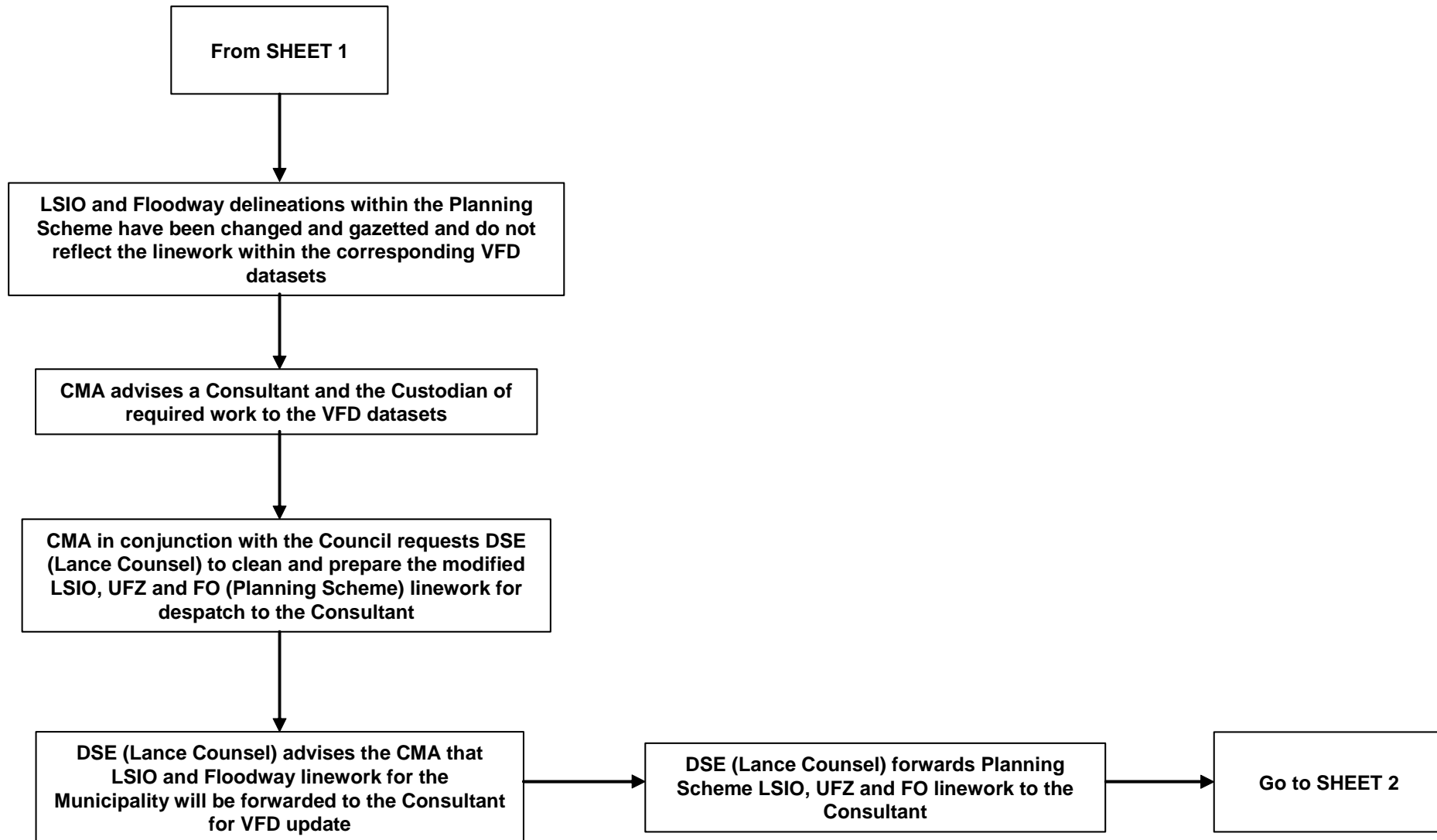
VFD Update Protocol V3.01 – Sheet 5

This is page 1 for Planning Scheme change following VFD dataset update



VFD Update Protocol V3.01 – Sheet 6

This is page 1 for VFD dataset update following change to Planning Scheme



VFD Update Protocol V3.01 – Sheet 7

This is page 2 for VFD dataset update following change to Planning Scheme

