TRANSPORT FOR NSW (TfNSW)

QA SPECIFICATION G75

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		First Issue	EDCS	05.11.20
Ed 1/Rev 1		Clarifications and alignment with Digital Engineering Framework Release 4.1	SS	13.07.23
		Updated all references to Annexure G75/A to also refer to the contract scope		
	1.3	Added definitions for Dataset, Feature and Layer		
	2.1.1	Removed point cloud and BIM deliverable format requirements. Added Digital Engineering specific deliverable format requirements to enable acceptable formats for non-DE projects to be extended		
	2.1.2	Added option for Principal to supply a GIS Schema document customised for the project		
	2.1.3	Added a requirement to populate dataset metadata in the specified XML paths if it is captured against the dataset rather than in the metadata form contained in the GIS schema		
		Clarified feature level metadata requirement		
		Added a reference to the ANZLIC metadata best practice guide		
	2.2.1	Added reference to ICSM website for GDA 2020 logo		
		Added clarifications that web map service definitions are considered Map Documents		
	2.2.3	Provided additional deliverable format options for Map Documents		
		Clarified the cartographic product index requirements		
		Clarification on item (i)		
	2.3.1	Added a clarification that the Principal may choose to accept deliverables that do not comply with some topology in some circumstances		
	2.3.2	Clarified this clause that it applies only to rasters you procure or create		
	2.3.3	Point cloud requirements now references Survey requirements in the DEF		
	2.3.4	Updated document reference		

	2.4	Coordinate Reference System requirement updated to first refer to project customised GIS Schema and then to Annexure G75/A Clarified the requirement for horizontal and vertical coordinate system to be defined Guidance sentence removed for clarity		
	3	Added guidance sentence related to different combinations of contractor and Principal GIS tech stacks to support GIS application requirements Sub-clauses updated to incorporate answers to queriers from supply chain		
	4.1.2	Clarified requirements Clause renumbered to 4.1.3		
	4.2	Principal may now require GISMP as part of DEXP		
	4.5.1	Clarified requirement excludes GIS application reference layers and to include any other datasets included in contract scope		
	4.5.2	Clarified requirements based on supply chain feedback Added requirement for file structure of deliverable to align to TfNSW IP-0048-TL03		
	4.5.3	Clarified requirements relating to WIP submissions		
	Annexure G75/M	Formatting		

GUIDE NOTES

(Not Part of Contract Document)

GN1 Use of TfNSW QA Specification G75

G75 sets out the requirements for undertaking work that includes a Geographic Information System (GIS) deliverable, where the work relies on the output of analysis or visualisation carried out within a GIS including maps, figures or values contained within a report, or a GIS capability such as a web mapping interface or mobile mapping interface.

G75 has been written to be "mode agnostic", and can be used on any contract regardless of transport mode, contract size or type of engagement.

GN2 Relationship to TfNSW Digital Engineering Framework

G75 has been written such that it is consistent with the TfNSW Digital Engineering Framework (DEF) and elements from the DEF must be used as the default requirements. Some sections of G75 may be customised, but such changes should be kept to a minimum to maintain consistency with the DEF within TfNSW.

G75 and GIS Schema (DMS-FT-580) have been developed to be suitable for use on both Digital Engineering and non-Digital Engineering projects.

For non-Digital Engineering projects, there is some flexibility around dataset naming conventions and metadata requirements. However, for overall consistency across TfNSW, it is recommended that the dataset naming conventions and metadata requirements as defined in the DEF be followed.

The Principal may choose to provide a modified DMS-FT-580 customised with project-specific data.

GN3 Enquiries

(a) Technical Advice

Technical advice may be obtained from Digital Engineering Services – Spatial Project Service (spatialprojectservices@transport.nsw.gov.au).

(b) Other Advice

Contractual advice may be obtained from the Contracts Quality Manager, Commercial Services Section.

Transport for NSW

QA SPECIFICATION G75

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

TS 03400:1.0
IC-QA-G75

VERSION FOR: DATE:

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CLAUSE PAGE

FOREWORD

TFNSW COPYRIGHT AND USE OF THIS DOCUMENT

When this document forms part of a contract

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This copy is not a controlled document. Observe the Notice that appears on the first page of the copy controlled by TfNSW. A full copy of the latest version of the document is available on the TfNSW Internet website: https://standards.transport.nsw.gov.au/

Revisions to Previous Version

This is the second version incorporating clarifications and alignment with Digital Engineering Framework Release 4.1.

PROJECT SPECIFIC CHANGES

Any project specific changes are indicated in the following manner:

(a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***;

(b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.

TfNSW QA SPECIFICATION G75

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

1 GENERAL

1.1 SCOPE

This specification sets out the requirements for undertaking Geographic Information System (GIS) Work, including:

- data file formats;
- naming conventions;
- metadata requirements;
- requirements for Cartographic Products;
- topology rules;
- coordinate reference systems.

It also sets out the requirements on quality management and processes for assuring the quality of GIS data deliverables.

This Specification may be used in a construction contract, or other types of contracts during any stage of the asset lifecycle.

1.2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

1.2.1 Project Specific Requirements

Project specific details of work are shown in Annexure G75/A or specified in the contract scope.

1.2.2 Payment

The method of measurement and payment is detailed in Annexure G75/B.

1.2.3 Schedules of HOLD POINTS

The schedules in Annexure G75/C list the **HOLD POINTS** that must be observed. Refer to Specification TfNSW Q for definitions of **HOLD POINTS**.

1.2.4 Referenced Documents

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 1234). For convenience, the full titles are given in Annexure G75/M.

Unless otherwise specified, the applicable issue of a referenced document, other than a TfNSW Specification, is the issue current at the date one week before the closing date for tenders, or where no issue is current at that date, the most recent issue.

Hyperlinks to some TfNSW Digital Engineering documents are also provided in Annexure G75/M. Where no hyperlinks are provided, the document may be obtained from the Principal.

1.3 DEFINITIONS

The terms "you" and "your" mean "the Contractor" and "the Contractor's" respectively.

The definitions and acronyms given in TfNSW DMS-SD-123 apply to this Specification.

In addition to the above, the following definitions also apply to this Specification:

Cartographic Product	All digital and hardcopy maps, plans and diagrams produced by PSC GIS personnel and provided to the Principal or otherwise published under this Contract.
Dataset	A collection of features that is treated as a single unit in the deliverable format. For example, a feature class in an ESRI file geodatabase.
Endpoint (of web service)	A web address (URL) at which clients of a specific service can gain access to the operations provided by that service, by referencing that URL.
Feature	A feature is an individual row in a table which includes geometry as one of its properties or fields.
GIS Application	An application, system or group of systems that enable the user to interact with your GIS either by visualising or interrogating spatial information, or by capturing, editing or analysing spatial information in a controlled way.
GIS Work	Work that includes a GIS deliverable or GIS inputs, the output of some analysis or visualisation carried out within a GIS including maps, figures or values contained within a report, or the provision of a GIS capability such as a web mapping interface or mobile mapping interface for use by the Principal.
Layer	See Dataset. Layer and Dataset are used interchangeably (as in Layer Level Schema) or Layer can refer to a dataset represented in a cartographic product therefore including the data and its representation or symbology.
Map Document	File containing the definition of a Cartographic Product. In the ESRI ArcGIS software suite, this would be a "*.mxd*" or "*.pagex*" file.

1.4 PERSONNEL

1.4.1 Principal's GIS Representative

The Principal must nominate a GIS Representative for the Contract to assist in defining the technical aspects of the project requirements and validating the services and deliverables supplied.

The Principal's GIS Representative must be either a GIS Specialist or GIS Manager, or delegate.

1.4.2 Contractor's GIS Representative

Your GIS Representative must have the appropriate qualifications and experience acceptable to the Principal to undertake the GIS Work.

Liaise closely with Principal's GIS Representative when carrying out the GIS Work.

1.5 THIRD PARTY LICENCES

Where a new licence is required for any software or data required as part of the GIS Work, you must ensure that the licence arrangement enables you to meet the requirements in this specification and in the contract scope. The Principal may require you to take licenses out in the name of the Principal to achieve this.

1.6 DIGITAL ENGINEERING

TfNSW has established the Digital Engineering Framework (DEF) as the means to deliver the objectives set out in CP17005.1, the Transport Data and Information Asset Management Policy.

The DEF sets out the framework and key principles for how TfNSW works in collaboration with its contractors to utilise Digital Engineering to enable time, cost and quality improvements to the way that projects are planned, designed, constructed, operated and maintained throughout their lifecycle.

An overview of the DEF is given in TfNSW DMS-ST-202 and DMS-ST-208, which is available on the TfNSW DEF website (https://www.transport.nsw.gov.au/digital-engineering) or as referenced in Annexure G75/M.

Annexure G75/A or the contract scope states whether the Contract includes a Digital Engineering component. Where this is so, this Specification must be used in conjunction with the relevant Digital Engineering Specification and the work carried out within the DEF. You must satisfy the Principal that the deliverables meet or exceed GIS standards, schemas and definitions outlined in the DEF.

2 TECHNICAL REQUIREMENTS

2.1 DATASET FILE FORMATS, NAMING CONVENTIONS, METADATA AND DATASET LEVEL SCHEMA

2.1.1 Dataset File Formats

Where the Principal is TfNSW, GIS deliverables must be compatible with the ESRI ArcGIS suite of products used by TfNSW. However, you may use products other than ESRI ArcGIS to undertake the work.

You must submit all GIS data deliverables in the formats listed in Table G75.1. For data types which are not listed in Table G75.1, or for variations to the formats listed in Table G75.1, raise them at the GIS Inception Meeting and obtain the concurrence of the Principal before packaging and delivering the data.

Where the work is to be carried out within the DEF (refer to Clause 1.6), you must supply GIS data deliverables in the formats listed under “Digital Engineering Accepted Formats” rather than the list under “Accepted Formats”.

Table G75.1 – Acceptable File Formats for GIS Deliverables

Data Type	Accepted Formats	Digital Engineering Accepted Formats
Vector	• ESRI file geodatabase (GDB, version 10.0 or later) • OGC Geopackage • ESRI Shapefile	• ESRI file geodatabase (GDB, version 10.0 or later)
Raster	• ESRI file geodatabase raster (GDB, version 10.0 or later) • GeoTiff • ECW • JPEG2000	• ESRI file geodatabase raster (GDB, version 10.0 or later) • GeoTiff • ECW • JPEG2000

The Principal may require data types not listed in Table G75.1 to be submitted in an Open Geospatial Consortium (OGC) compliant format.

2.1.2 Dataset Naming Convention

Dataset naming conventions must be consistent with TfNSW DMS-FT-580. The Principal may choose to provide a modified DMS-FT-580 document which must be used to generate project-specific dataset naming conventions from the GIS PDS worksheet.

You may obtain guidance and data field validation from the Principal when populating the form included in TfNSW DMS-FT-580.

2.1.3 Dataset Metadata

Dataset and feature level metadata must be consistent with TfNSW DMS-FT-580. All datasets must have dataset level metadata and feature level metadata fields defined. Feature level metadata fields must be populated where it is possible to do so.

If you choose not to record dataset metadata in the form, then populate the metadata in each dataset using the XML paths listed in the dataset metadata schema in TfNSW DMS-FT-580.

If dataset metadata is included in the form and in the dataset, it must be identical.

Refer to ICSM ISO 19115-1: Metadata Best Practice Guide for guidance on the content of metadata fields listed in TfNSW DMS-FT-580. TfNSW DMS-FT-580 takes precedence if there are conflicts between the guidance in the Metadata Best Practice Guide and the requirements in TfNSW DMS-FT-580.

You may obtain guidance and data field validation from the Principal when populating the form included in TfNSW DMS-FT-580.

2.1.4 Consistency with Cartographic Products

Delivered datasets must be consistent with the Cartographic Products that are derived from them.

If inconsistencies are identified during validation and testing, both the Cartographic Products and the GIS datasets will not be accepted by the Principal until the inconsistencies have been rectified.

2.1.5 Layer Level Schema

You must extend the minimum GIS Layer Level Schema included in TfNSW DMS-FT-580 in order to comply with Clause 4.1, and provide any additional layer definitions to the Principal for approval.

Alternatively, the Principal may provide you with a template geodatabase that complies with the layer level schema defined in TfNSW DMS-FT-580, to be extended and populated.

GIS layers derived from other TfNSW DE Framework structured data deliverables must be defined as per published DE Framework Schema requirements (Utility Schema DMS-FT-493 and/or BIM Schema DMS-FT-516). GIS layer fields must be populated with the TfNSW structured attribute data defined in the relevant BIM and/or Utility Schema.

2.2 CARTOGRAPHIC PRODUCTS

2.2.1 Content and Styling

All Cartographic Products produced under this Contract must contain the following:

(a) title;

(b) coordinate system details, including the GDA2020 logo for products that are in GDA2020 (refer to https://www.icsm.gov.au/gda2020/using-gda2020-logo for requirements related to the GDA2020 logo);

(c) author;

(d) applicable organisation logo(s);

(e) publication date;

(f) scale bar;

(g) all applicable disclaimers, intellectual property statements, warnings and limitations.

Cartographic Products must be consistent with the NSW Government Brand Framework and relevant agency brand (refer to https://www.nsw.gov.au/branding, agency brand contacts can be found on the landing page), unless specified otherwise by the Principal.

Cartographic Products must be legible, and be of a resolution that is fit for its intended purpose while keeping the file size to a minimum.

2.2.2 Cartographic Product Output File Formats

Use the file formats specified in Annexure G75/A and in the contract scope for all Cartographic Products.

2.2.3 Submission of Map Documents and Cartographic Products Index

You must submit any Map Documents used to create Cartographic Products or define map services either in their native format or exported to a packaged format. You may exclude background data layers from submitted Map Documents to reduce transmittal of redundant data, but obtain confirmation from the Principal that excluding those data layers is acceptable.

Acceptable formats are shown in Table G75.2. For data types which are not listed in Table G75.1 or for variations to the formats listed in Table G75.2, you must obtain the concurrence of the Principal before packaging and submitting the Map Documents.

Table G75.2 – Example File Formats for Handover of Map Documents

Authoring Software	Accepted Format
ESRI ArcMap	MXD
ESRI ArcGIS Pro	PAGX (map layout exported from project file)
ESRI ArcGIS Pro	MAPX (i.e. defining a map service)
ESRI ArcGIS Pro	MPKX (map package)
ESRI ArcGIS Pro	PPKX (defining a number of map services or map layouts)
MapInfo	TAB (as a workspace)
QGIS	QGS
AutoCAD	DWG
MicroStation	DGN

Together with the Map Documents submitted, you must provide an index of Cartographic Products that illustrates the relationship between report figures or map services (if relevant) and Map Documents. Use the index form included within TfNSW DMS-FT-580 to facilitate this.

Datasets that are shown for context, or form the base for the Cartographic Product, do not need to be included in the index.

2.2.4 Web Service Map Documents

Web services are considered to be a Cartographic Product and must be submitted in accordance with Clause 2.2.3.

2.3 DATA TYPE SPECIFIC REQUIREMENTS

2.3.1 Vector Topology Rules

You must comply with the following general topology rules, in order to spatially represent phenomena accurately and clearly:

(a) No geometry can contain duplicate vertices in sequence;

(b) Polygon geometries must be correctly closed;

(c) Datasets with line geometries must not contain pseudo-nodes;

(d) Datasets with line geometries must be free from overshoots and undershoots;

(e) All geometries must be free of self-overlaps;

(f) All geometries must be free of “z” double backs;

(g) No line or polygon dataset can contain overlapping features unless the phenomenon the dataset represents also overlaps (i.e. spatial representation of vegetation communities must not overlap);

(h) Area phenomena must be represented as closed polygons, not as bounding lines;

(i) For z-enabled datasets, all z-values or m-values (representing vertical coordinates or measures respectively) must be populated for all features and all vertices must not contain z-values or m-values (representing vertical coordinates or measures respectively) unless these are populated for all features and all vertices.

The Principal may, as a minimum, choose to validate all submitted vector data against these rules. However, the Principal may choose to accept data that fails some of these rules (for example, where derived from CAD), you must notify the Principal at delivery if you expect a dataset may fail any of the requirements listed in this clause.

Topological relationships between datasets or additional topology rules may be specified in Annexure G75/A, in the contract scope, or advised by the Principal at the GIS Inception Meeting.

2.3.2 Raster Requirements

Where you create or procure raster datatypes, you must comply with the following general requirements:

(a) Rasters must contain square cells (i.e. Ground Sampling Distance is equal in X and Y);

(b) Rasters must be orientated to a whole number of the coordinate reference system (i.e. for a projected coordinate system, the upper left corner of each raster must align to a whole metre);

(b) Raster datatype must be appropriate for the level of precision and dynamic range in the data.

2.3.3 Point Cloud Requirements

Refer to the DEF, DMS-ST-207, for requirements relating to point cloud deliverables.

2.3.4 3D Model Requirements

You must refer to the DEF and DMS-ST-207 for requirements relating to Building Information Models (BIM) or 3D models.

2.4 COORDINATE REFERENCE SYSTEM (DATUM AND PROJECTION)

The GIS submitted must be relative to the datum and projection specified in the Coordinate System EPSG table in the project customised DMS-FT-580. However, if a customised version of DMS-FT-580 is not available for your project, then refer to Annexure G75/A.

Each GIS dataset must have horizontal coordinate system defined, if the dataset is 3D it must also have a vertical coordinate system defined. The defined coordinate system must correctly reflect the data and must be identical to any coordinate system content in the dataset metadata.

3 GIS APPLICATION

The clauses in this section apply only if a GIS Application is specified in Annexure G75/A and in the contract scope as required.

There are a number of ways a GIS Application can be delivered and may include your technology stack, the Principals technology stack, or a mix of both. Ensure that the solution you propose is consistent with the Principals requirements and the key project outcomes that they are seeking.

3.1 KEY PROJECT OUTCOMES

The GIS Application must deliver on the key project outcomes stated in Annexure G75/A and in the contract scope.

3.2 GIS APPLICATION GENERAL REQUIREMENTS

3.2.1 Third Party Software Licenses

You must have the necessary licences required to provide the Principal access to the GIS Application.

If existing software licences held by you are used to deliver the GIS Application, they must be sufficient to provide the Principal, or other parties nominated by the Principal, access to the GIS Application.

3.2.2 Timeframe

This GIS Application must be established within the timeframe specified in the contract scope or as agreed at the inception meeting.

3.3 GIS APPLICATION TECHNICAL REQUIREMENTS

3.3.1 Coordinate Reference System

The GIS Application must present spatial information in a coordinate reference system that enables the system to deliver the outcomes specified. The coordinate reference system must be consistent with Clause 2.4, unless agreed otherwise at the GIS Inception Meeting.

3.3.2 Data Themes

The GIS Application may manage data layers or themes from a range of sources. As a minimum, the GIS Application must present the themes required to deliver the outcomes specified. Additional requirements may also be specified in Annexure G75/A and in the contract scope.

3.3.3 Spatial Dimensions

The GIS Application must have the ability to consume and visualise 2D spatial data. If a 3D view is required to deliver the outcomes specified then the GIS Application must be able to consume and visualise 3D spatial data to support those specific outcomes as a minimum.

3.3.4 Scalability

Spatial data housed in the GIS Application must allow new spatial layers and categories of layers to be created.

3.3.5 Geometry Types

The GIS Application must be capable of storing simple geometry types such as points, lines and polygons. The Principal may require the system to support complex geometry types such as networks, surfaces and measures in order to deliver the outcomes specified.

Additionally, the repository must be capable of storing raster information such as aerial photography.

3.3.6 Security

The GIS Application must be secured on a user and layer basis.

The system must restrict editing, loading and viewing of datasets to users with credentials to perform these operations, i.e. appropriate user access and privilege levels must be created and managed.

You must maintain separation between this GIS Application and any other systems running in the same technology stack such that the security, reliability or responsiveness of the GIS Application will not be affected by others.

3.3.7 Metadata

The GIS Application must store or link to metadata information associated with each spatial layer. This metadata must comply with Clause 2.1.3.

3.3.8 Logical Organisation

Refer to Clause 3.3.13.

3.3.9 Recoverability

Spatial datasets must be held in a GIS Application that can be recovered if needed, in the event of a system failure.

3.3.10 Integration and "Single Source of Truth"

The GIS Application must have the ability to store spatial, CAD derived, survey derived and other datasets. You must ensure that it remains consistent with the "single source of truth" for each dataset.

3.3.11 Interoperability

Web services hosted on the GIS Application must be Open Geospatial Consortium (OGC) compliant or ESRI compatible.

The Principal may require access to the endpoints of some web services (refer Clause 1.3 for definition of "endpoints") as defined in the project scope or agreed during project inception. The Principal may accept alternatives to OGC compliant or ESRI compatible web services if you can demonstrate a clear benefit.

3.3.12 Links To Reports or Documents

The GIS Application must integrate with reports and documents that can be linked to spatial features. The links must be retained in the data when it is handed over, the Principal may choose to use this as the basis for re-linking to their own systems.

3.3.13 Web Service Naming Conventions

The Principal may provide project specific requirements relating to layer naming and/or layer grouping within web services, map document naming conventions, or map package file naming conventions. If the Principal chooses not to provide project specific requirements you may follow your standard naming conventions and layer groupings.

4 DELIVERY

4.1 GIS MANAGEMENT PLAN

4.1.1 General

Where specified as required in Annexure G75/A and in the contract scope, you must provide a GIS Management Plan that describes:

(a) your approach and procedures to be adopted to ensure compliance with the requirements outlined in this Specification;

(b) how the GIS Management Plan delivers the outcomes listed under the Technical Requirements (Clause 2);

(c) how the GIS Management Plan will be integrated and managed with your other project management plans (if applicable).

4.1.2 Required Inclusions

The GIS Management Plan must include the following details:

(a) Methodology for developing deliverables including Cartographic Products and GIS datasets;

(b) Sources for initial input GIS datasets;

(c) Process by which new datasets are created, and their source datasets;

(d) Process for updating each dataset as the work progress, and how these processes are triggered;

(e) Process for quality assurance;

(f) Work program, and risks to the program;

(g) How the work will comply with the technical requirements in Clause 2;

(h) How the deliverables will comply with the minimum layer level schema included in TfNSW DMS-FT-580, what additional layers will be delivered in addition to the layer level schema. Provide field definitions for any additional layers in the GIS Management Plan;

(i) If a GIS Application is required, how the GIS Application will meet all of the requirements under Clause 3, including any project specific requirements.

4.1.3 Additional Requirements Specific to Digital Engineering

4.1.3.1 General

Where the work is to be carried out within the DEF, the TfNSW GIS Management Plan template (DMS-FT-581) should be used when a GIS Management Plan is required. Alternatively, the GIS Management Plan may be included as a sub-plan to the Digital Engineering Execution Plan (DEXP) as authorised by the Principals GIS representative. In this case, refer to TfNSW DMS-FT-532.

In addition to the requirements under Clause 4.1.1, the GIS Management Plan must also describe how the GIS Management Plan is consistent with TfNSW DMS-ST-207 and fulfil the technical requirements in that document as well as in this Specification.

4.1.3.2 Required Inclusions

In addition to the requirements under Clause 4.1.2, the GIS Management Plan must also include the following details:

(a) How the "Single Source" principle will be maintained (refer to DMS-ST-202);

(b) List of systems and processes used to ensure that the information presented in the GIS Application remains consistent with each discipline within your project team;

(c) How the electronic content management (ECM) system will be used to manage GIS datasets;

(d) How the datasets in the GIS Application will be submitted at each information exchange (or data drop), with the exception of reference layers.

(e) The principal may require you to provide Work in Progress(WIP) GIS data in the contract scope. In this case, cover how WIP GIS data be provided to the Principal.

4.2 NOT USED

4.3 GIS INCEPTION MEETING

Prior to commencement of the GIS Work, you must conduct a GIS Inception Meeting between the Principal and your GIS Representative.

The GIS Inception Meeting must cover the following items:

(a) GIS Management Plan, if required;

(b) Timeframe for submission of deliverables;

(c) If a GIS Management Plan is not required, the GIS Inception Meeting must also cover the points listed in Clause 4.1.1.

Where the GIS requirements are unclear in the DEF, or where this specification conflicts with the DEF, obtain clarification from the Principal at the GIS Inception Meeting.

4.4 ACCEPTANCE OF GIS MANAGEMENT PLAN

The GIS Management Plan (or list of agreed actions if a GIS Management Plan is not required) must be accepted by the Principal before the Hold Point under this clause can be released and GIS Work can commence.

HOLD POINT	
Process Held:	Acceptance of GIS Management Plan/list of agreed actions and commencement of GIS Work.
Submission Details:	**If GIS Management Plan is required**: GIS Management Plan or DEXP containing GIS Management Plan, or **If GIS Management Plan is not required**: list of agreed actions arising from GIS Inception Meeting.
Release of Hold Point:	The Principal will consider the documents prior to authorising the release of the Hold Point. The Principal may request additional information for inclusion in the GIS Management Plan before authorising the release of the Hold Point.

4.5 DELIVERABLES

4.5.1 GIS Data Deliverables

On completion of the GIS work, you must submit the following:

(a) GIS vector and raster datasets created, and which are considered to be current;

(b) Remotely sensed data captured by drone, aerial survey, satellite, point cloud, etc;

(c) If you have provided the Principal with access to a project web-based GIS, all layers represented by that web-based GIS with the exception of reference layers;

(d) Any other datasets agreed at GIS Inception Meeting or included in the GIS Management Plan;

(e) Any other datasets identified in the contract scope.

Where the Contract includes a requirement to deliver a report containing a Cartographic Product, you must submit the Cartographic Product in accordance with Clause 2.2.

4.5.2 Additional Requirements Specific to GIS Application

Where a GIS Application is required, you must submit all the documents and data that underpins the GIS Application. The Principal may require you to deliver the application or components of the application if they were developed as part of the project scope or were specified in the contract scope, GISMP, or agreed at the inception meeting. You must submit all Map Documents and symbology that were used to publish hosted web services in their native formats, so that the Principal can redeploy those web services if required.

Web services are considered to be Cartographic Products, as stated in Clause 2.2.4. Submit the source data referenced by the Map Documents which must comply with Clause 4.5.1, as well as the specific data requirements specified in Clause 2.

4.5.3 Additional Requirements Specific to Digital Engineering

Where the work is to be carried out within the DEF, you must comply also TfNSW DMS-ST-207 management requirements for submission of DE deliverables.

You must Submit the GIS package as part of the federated model for each milestone delivery unless otherwise specified by the Principal. This GIS package must include the GIS Application deliverables specified in Clause 4.5.2. However, with the exception of Map Documents and symbology that were used to publish hosted web services you may exclude the cartographic product register and map documents from all but the last two milestone deliveries specified in the contract.

These Digital Engineering standard requirements for information submissions are in addition to the GIS submission requirements under Clause 4.5.

You must submit the GIS package file structure and geodatabase structure consistent with the template provided in TfNSW IP-0048-TL03.

The principal may require you to provide work in progress (WIP) GIS data at regular intervals between milestone deliveries in the contract scope. In this case, the WIP GIS data must be fit for purpose but will not be tested for compliance with G75.

4.5.4 Timeframe for Submission

You must submit the GIS datasets, Cartographic Products, metadata, and indexes on completion of the GIS work, within the timeframes agreed to by the Principal at the GIS Inception Meeting.

If required, the Principal will provide electronic file transfer mechanisms for large files, prior to submission of deliverables.

4.5.5 Rectification

Following submission of the final deliverables, allow 10 working days for the Principal to review the deliverables submitted, including validating and testing for compliance with this Specification.

The Principal will refer any ambiguities, errors, inconsistencies or other deficiencies detected to your GIS Representative for clarification or rectification.

The Principal will determine the level of priority against any issues identified and agree to timeframes for resolution of issues with your GIS Representative. Resolve all issues raised to the satisfaction of the Principal within the agreed timeframes.

The GIS Work will be considered to be completed when all ambiguities, errors, inconsistencies and other deficiencies have been resolved to the satisfaction of the Principal.

4.5.6 Hold Point

HOLD POINT	
Process Held:	Processing of final payment claim.
Submission Details:	Deliverables and other submissions specified in Clause 4.5 which have been verified to be of a level of quality that is acceptable to the Principal.
Release of Hold Point:	The Principal will consider the submission prior to the release of Hold Point.

4.6 REPORTING

Where specified as required in Annexure G75/A and in the contract scope, you must provide to the Principal a monthly report on the progress of the GIS Work. The report must include, as a minimum, the following:

(a) Progress to date;

(b) Milestones reached;

(c) Issues identified and their solutions;

(d) Risks to the program.

This monthly report may be consolidated with other reports required under the Contract.

4.7 LIQUIDATED DAMAGES AND VARIATIONS

If included as part of the Contract terms, liquidated damages will apply if you fail to meet milestones or agreed timeframes.

All time and cost variations must be approved before payment for the work can be claimed.

ANNEXURE G75/A – PROJECT SPECIFIC REQUIREMENTS

A1 PROJECT SPECIFIC REQUIREMENTS

NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure G75/A)

Complete the table below by filling in the required details. Where "Yes / No" or other options are shown below, delete whichever is not applicable.

If the Contract includes a Digital Engineering component (Clause 1.6), then a GIS Management Plan is always required (Clause 4.1).

Specify the horizontal datum / projection (Clause 2.4) by the name shown on the Geoscience Australia website; e.g. Geocentric Datum of Australia 2020 (GDA2020) / Map Grid of Australia 2020 zone 56 (MGA56). It may also be relevant to list the name and EPSG code as it appears on www.epsg.io; e.g. GDA2020 / MGA zone 56 (EPSG:7856).

Include a GIS Application (Clause 3) as a requirement only if the Principal requires access to it.

Clause	Details		Requirements
1.6	Contract includes a Digital Engineering component		Yes / No
2.2.2	Cartographic Product file format		Geospatial PDF / JPEG / Included within a report document
2.4	Coordinate Reference System	…….	
	Horizontal Datum / Projection	…….	
	Vertical Datum	…….	
3	GIS Application required		Yes / No
4.1	GIS Management Plan required		Yes / No
4.6	Monthly report required		Yes / No

A2 VECTOR TOPOLOGY RULES

Refer Clause 2.3.1.

The GIS Data Deliverables must comply with the following topology rules in addition to those topology rules listed in Clause 2.3.1.

NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure G75/A)

Insert here any topology rules additional to those listed in Clause 2.3.1. Consider the relationship between datasets or if a specific dataset must conform to additional rules; e.g. vegetation map dataset to completely cover the project footprint.

A3 KEY PROJECT OUTCOMES

Refer Clause 3.1.

NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure G75/A)

Insert here the key outcomes that the GIS Application must deliver or project risks that it must address.

Specify exactly the outcomes required but do not stifle innovation by specifying a particular vendor or being overly specific in terms of how the system is expected to work.

As a guide, the following are some examples that could be used:

- *"The Principal is able to access a visualisation enabling them to view the current design in relation to the Three-toed Snake-tooth Skink (TTST) habitat as identified in the Review of Environmental Factors (REF) and any subsequent investigations."*
- *"Geotechnical investigation points are shown in relation to the current design. The points can be used to access the borehole logs, site photographs, and other geotechnical reports."*
- *"The GIS Application can be used as an index to help the Principal find design drawings and BIM models."*
- *"The Principal is able to access the system on their standard mobile devices (iPhones) while in the field. The system uses the location services on the mobile device to orient and locate the user."*
- *"Provide an OGC compliant WFS endpoint to a web service representing the current alignment design that is updated at least weekly with the GIS Application."*

Consult your GIS technical representative(s) for their input to ensure that the requirements listed here will deliver the outcomes required.

ANNEXURE G75/B – MEASUREMENT AND PAYMENT

Refer to Clause 1.2.2.

Payment will be made for all costs associated with completing the work detailed in this Specification in accordance with the following Pay Item.

Where no specific pay items are provided for a particular item of work, then the costs associated with that item of work are deemed to be included in the rates and prices generally for the Work Under the Contract.

Pay Item G75P1 – GIS Work

This is a Lump Sum item.

Payment will be made on a pro-rata basis of the work done under this pay item, having due regard to the duration of the Contract.

ANNEXURE G75/C – SCHEDULES OF HOLD POINTS AND MEETINGS

Refer to Clause 1.2.3.

C1 SCHEDULE OF HOLD POINTS

Clause	Description
4.4	Submission of GIS Management Plan, or list of agreed actions arising from GIS Inception Meeting
4.5.5	Submission of GIS deliverables which have been verified to be of a level of quality acceptable to the Principal

ANNEXURES G75/D TO L – (NOT USED)

ANNEXURE G75/M – REFERENCED DOCUMENTS

Refer to Clause 1.2.4.

ICSM ISO 19115-1	ICSM ISO 19115-1: Metadata Best Practice Guide https://www.anzlic.gov.au/resources/asnzs-iso-1911512015-metadata

TfNSW Documents

CP17005.1	Transport Data and Information Asset Management Policy https://www.transport.nsw.gov.au/system/files/media/documents/2019/data-and-information-asset-management-policy.pdf
DMS-ST-202	Digital Engineering Standard – Part 1, Concepts and Principles https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/digital-engineering-standard-part-1-concepts-and
DMS-ST-207	Digital Engineering Standard – Part 2, Requirements https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/digital-engineering-standard-part-2-requirements
DMS-ST-208	Digital Engineering Framework https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/digital-engineering-framework
DMS-SD-123	Terms and Definitions https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/terms-and-definitions
DMS-FT-532	Digital Engineering Execution Plan (DEXP) Template https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/digital-engineering-execution-plan-dexp-template
DMS-FT-580	GIS Schema https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/gis-schema
DMS-FT-581	GIS Management Plan Template https://www.transport.nsw.gov.au/system/files/media/documents/2022/GISMP-template-DMS-FT-581.docx
IP-0048-TL03	Template file structure for GIS https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/template-file-structure-for-gis