Digital Engineering Execution Plan (DEXP) Template

IP Integrated Management System

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**Instructional note:** This title page and the guidance sections that follow are for the template only, to assist in the creation of the DEXP. The DEXP to be created from this template begins at page 7. Before submitting the DEXP, please delete this template title page and the guidance sections up to and including page 6.

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If you want to use the advisory text in your document, simply apply the equivalent non-Guidance style to remove the green background.

Template revision history

| Issue | Date | Revision description |
| --- | --- | --- |
| 1.0 | September 2018 | Interim Approach Issue |
| 2.0 |  | Updated to incorporate developments for Release 2 of the DE Standard |
| 3.0 |  | Updated to incorporate developments for Release 3 of the DE Standard |
| 4.0 | April 2021 | Updated to incorporate developments for Release 4 of the DE Standard |
| 4.1 | December 2022 | Updated for DE Standard 4.1 |
| 4.2 | August 2023 | Updated formatting issue on instructional page and other minor error |

Important message

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Instructions for use

**Instructional note:** This section is for use while the DEXP is being created. Please delete this section before submitting the DEXP.

DEXP context

This Digital Engineering Execution Plan (DEXP) Template sets out the standard requirements for the contents of a DEXP and provides a standard format. The Transport for NSW (TfNSW) project team is expected to make modifications to this template before it is provided to contractors as a Project DEXP Template.

Unless explicitly agreed with TfNSW, where any items in the DEXP do not comply with the project contractual requirements, the project contract requirements take precedence over the DEXP.

The elements to be included in each Project DEXP Template are dependent on:

* the project’s contract, including deed, requirements and works/services brief.
* the ways of working to be adopted by the project team, appropriate to the required deliverables, project structure, available resources and tools.
* appropriate industry best practices.

The DEXP is to be influenced by and compatible with the documents shown in Figure 1 (or equivalent project contract documents).



Figure 1 – Documents influencing the DEXP

Using the template

Text with green background colour is guidance text for the TfNSW project team. Text with orange or green background colour is guidance text for the contractor.

The TfNSW project team should update the template as instructed by the green guidance text, remove highlights and delete unnecessary text prior to issuing to the contractor as a Project DEXP Template. In certain instances, it may be appropriate to convert green shading to orange shading.

Similarly, the contractor should then populate the template as instructed by the orange shaded guidance text and submit back to TfNSW as a project plan.

All sections of the DEXP template may not be relevant to the project and will be dependent on DE scope and project details. These sections will have green shading for TfNSW to confirm applicability and where they are not applicable, should include the words ‘not applicable’ under that section.

All section number and headings should be preserved in the order they are specified in this DEXP template.

The contractor may provide additional subsections if applicable and consolidate responses to multiple sections under one heading if it is referenced accordingly.

Figure 2 illustrates the process of the TfNSW project team preparing the Project DEXP Template to suit the project needs, and the contractor taking action to create an active Project DEXP along with other related deliverables. Each component of Figure 2 is discussed within the DEXP.

The structure of the deliverables and work packages may necessitate that a Project DEXP is supported by sub-plans, which may include specialist execution or implementation sub-plans. All supporting sub-plans must align with and enable the delivery of the governing DEXP.

Where content required in this DEXP template is covered in a separate management plan or document, the contractor may make a cross reference to that plan/document and the content does not need to be repeated in the DEXP.

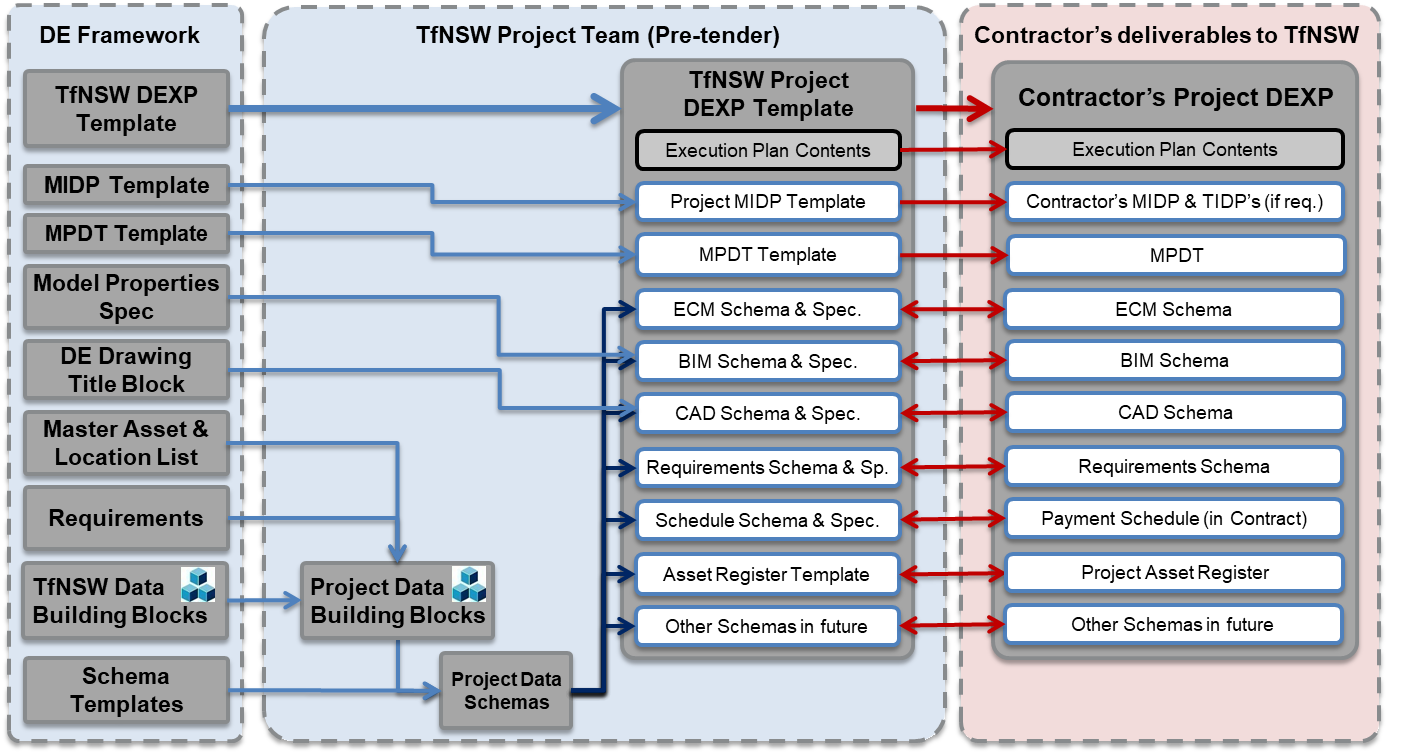


Figure 2 – Assembling the DEXP and its components.

**Instructional note:** This page and all proceeding pages, including the title page for the template, are for use while the DEXP is being created. Please delete these pages before submitting the DEXP.

Digital Engineering Execution Plan

Project name: Click here to enter text.

Contract name: Click here to enter text.

Document ref/no.: Click here to enter text.

Project ref: Click here to enter text.

Document owner: Click here to enter text.

Authoring company: Click here to enter text.

Issue date: 10 May 2023

Document control

| Revision | Date | Description (Including Status and Milestone???) |
| --- | --- | --- |
| XX | DD/MM/YYYY | <Enter your text> |
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Preface

Transport for New South Wales (TfNSW) is developing and implementing the Digital Engineering (DE) Framework to support projects as they adopt new digital ways of working. The way assets are planned, designed, constructed, operated and maintained are becoming faster and more accurate as a result of emerging technologies. The DE Framework connects these technologies across various project disciplines together with reliable, structured data.

Consistent DE processes provide TfNSW with an approach that enables digital information to become a key enabler of better project outcomes. This includes, but is not limited to, stakeholder engagement, informed decision-making, improved asset knowledge, capability and capacity planning.

Applying this unified vision will accelerate the value of DE and simplify these new ways of working for both our project teams and industry, providing valuable insights, creating efficiencies and delivering cost savings throughout the project life cycle.

This document should be read in conjunction with all related DE Framework documentation. Any application of the DE Framework or any of its parts must be considered in a project specific context. Adoption of the DE Framework should be undertaken in consultation with the DE Team to ensure best appropriate practice.

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# Introduction

## Purpose of this DEXP

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1.

The purpose of this Digital Engineering Execution Plan (DEXP) is:

* to demonstrate to TfNSW the contractor’s interpretation of the Digital Engineering (DE) requirements
* to provide assurance to TfNSW that the DE requirements will be met, by setting out how DE will be executed.
* for clarification between TfNSW and the contractor on how to proceed
* to define for the contractor’s team how project information will be produced, coordinated and delivered in accordance with the TfNSW requirements.

## Statement of intent to comply

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Section 3.

As required by the DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, the contractor will adopt the following principles (as stated in the CP17005 – *TfNSW Data and Information Asset Management Policy*) to support TfNSW’s commitment to implementing best practice data and information management enabled in a digital environment:

* Single Source – Ensuring service and asset data is accurate, current, reliable and not duplicated.
* Collaboration – Increasing access and sharing, reducing latency for improved decision making
* Automation – Reducing or eliminating manual work associated with creating or sharing data
* Interoperability – Reducing or eliminating double handling of data between systems
* Mobility – Enabling access to and input of data from multiple locations including the field
* Visualisation – Incorporating methods to develop, coordinate and check service and asset data spatially
* Data Governance – Comply with information management policies, including open data, data information custodianship and information security.

## Updating and developing this DEXP

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 5.3.

The DEXP will be maintained by the contractor throughout the course of the project and kept consistent with the Contract Management Plan and other project management plans. Once approved an updated version will be submitted for TfNSW review at appropriate intermediate instances as changes occur. The contractor must keep the DEXP current with appropriate changes to scope of project requirements, phase, workflows, technology and project team structures.

## Terms and definitions

**DE references**:

* DMS-SD-123 – *DE Terms and Definitions*.

DE Framework terms and definitions are provided in DMS-SD-123 – *DE Terms and Definitions*. Project specific terms and definitions are listed in Appendix A.

# Project details

## Summary

A summary of key project information is provided in Table 1.

Table 1 – Project summary

| Project | Details |
| --- | --- |
| Project name | <insert project name> |
| Project address/location | <insert project name> |
| TfNSW project number | <insert project number> |
| Procurement type | <Design Services or D&C or other> |

Amend below table to show only the relevant project phases and milestones based on project scope as per the contract.

Project phases and milestones are provided in Table 2.

Table 2 – Project phases and milestones

| Project phase | Main project milestone |
| --- | --- |
| Need | Service Outcome Baseline |
| Feasibility | Strategic Baseline |
| Concepts | Concept Baseline |
| Design | Preliminary Baseline |
| Design | Approved design baseline |
| Implement | Handover Baseline |
| Implement | Operational Integrated Baseline |
| Close Out |  |

Refer to insert reference document for durations and submission dates.

## General scope

Insert a brief project scope based on the Contract.

## Project DE objectives and scope

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Section 3.

Use this section to provide any additional details for DE objective and scope clarity.

Table 3 lists the planned Digital Engineering deliverables and submissions to TfNSW.

Only list deliverables specific to DE and required by the DE Standards DMS-ST-202 and DMS-ST-207.

Table 3 – Digital Engineering deliverables summary

|  | Deliverable | Description | TfNSW submissions |
| --- | --- | --- | --- |
| Project Management | DE Execution Plan | XXX | XXX |
| BIM | TfNSW Submissions | XXX | Refer to Table 11: Agreed information exchange frequencies |
| BIM | Clash Detection Report | XXX | XXX |
| GIS | GIS Management Plan | XXX | XXX |
| Time | 4D simulation | XXX | XXX |
| Visualisation | Visualisation | XXX | XXX |
| Asset Data | DE Asset Register | XXX | XXX |
|  | XXX | XXX | XXX |

## Digital Engineering risks

Insert here any key project risks the contractor identifies with potential to impact on DE delivery for this project.

## Innovation and value adding opportunities

It is recommended that each project demonstrates innovation or opportunities to add value to improve the delivery and overall outcomes of the project.

The contractor is encouraged to highlight any additional opportunities for innovation or value adding here.

## Roles and responsibilities

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 7.

### Project team

Table 4 lists project team role and contact details.

Table 4 – Project team

| DE role | Contact name | Company | Contact details |
| --- | --- | --- | --- |
| TfNSW Project Manager | XXXX | TfNSW | XXXX |
| TfNSW Technical Manager | XXXX | TfNSW | XXXX |
| TfNSW DE Manager | XXXX | TfNSW | XXXX |
| TfNSW GIS Manager | XXXX | TfNSW | XXXX |
| Project Manager | XXXX | XXXX | XXXX |
| Engineering Manager | XXXX | XXXX | XXXX |
| DE Lead | XXXX | XXXX | XXXX |
| GIS Manager | XXXX | XXXX | XXXX |
| Document Controller | XXXX | XXXX | XXXX |
| Insert additional key DE roles as required | XXXX | XXXX | XXXX |

## Project standards

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Appendix A.

Appendix B lists the applicable Digital Engineering standards and guides for this contract.

The contractor must confirm the specific standards and guidelines to be followed by all project participants. Adoption of any other standards related to DE may be proposed and any deviation from the listed DE standards must be agreed with the TfNSW DE Manager.

# Project data management

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Sections 5
* DMS-ST-207 – *Digital Engineering Standard Part 2: Requirements*, Version 4.1, Sections 4 and 5.3
* DMS-SD-124 – *TfNSW Application of Uniclass*

## Project data schemas (PDSs)

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Section 5.2
* DMS-ST-207 – *Digital Engineering Standard Part 2: Requirements*, Version 4.1, Section 5.3

Project Data Schemas (PDSs) for specific applications are shown in Table 5.

Use the below table to cross reference to all schemas used on the project and remove any schemas which are not applicable.

Table 5 – DE project data schemas

| DE deliverable | PDS title | TfNSW template | Version | Project reference | DEXP section reference | Responsible team member/ primary contact |
| --- | --- | --- | --- | --- | --- | --- |
| Documents and correspondence | ECM Schema and Specification | DMS-FT-533 |  | Appendix D | Section 5.5.1 ECM file metadata requirements | xxxx |
| Systems engineering | Requirements Schema and Specification | DMS-FT-563 |  | Appendix E | Section 5.4 Systems engineering deliverables | xxxx |
| Surveys | Use BIM PDS where appropriate  Utility Schema  Survey Schema and Specification | DMS-FT-493 |  | Appendix F Appendix L | Section 5.3 Digital survey deliverables including as-built information | xxxx |
| CAD | CAD Schema and Specification | DMS-FT-562 |  | Appendix G | Section 5.6 CAD deliverables | xxxx |
| BIM | BIM Schema and Specification  Utility Schema | DMS-FT-516 |  | Appendix F Appendix I | Section 5.7 BIM deliverables | xxxx |
| Visualisation | Use BIM PDS where appropriate | N/A |  | N/A | Section 5.9 Visualisation | xxxx |
| GIS | GIS Schema | DMS-FT-580 |  | Appendix J | Section 5.10 GIS deliverables | xxxx |
| Scheduling | Scheduling Schema and Specification | DMS-FT-520 |  | Appendix K | Section 5.11 Time deliverables | xxxx |
| Cost estimating | Use Scheduling PDS where appropriate | NA |  |  | Section 5.12 Cost deliverables | xxxx |
| Asset data | DE Asset Register Template | DMS-FT-537 |  | Appendix M | Section 5.13 Asset data deliverables | xxxx |

## Location classification and referencing

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Section 6.3
* DMS-ST-207 – *Digital Engineering Standard Part 2: Requirements*, Version 4.1, Section 4.2.2
* DMS-SD-124 – *TfNSW Application of Uniclass*

### Location classification

Use this section to describe the contractor’s application of location classification (‘location type’) across different deliverables. Use diagrams as appropriate.

Use the asset location hierarchy in the Asset register Template in Appendix Mas a starting point to demonstrate how locations will be grouped and classified, including how this will increase in granularity throughout the life of the project if applicable.

Note: This does not need to be an exhaustive location hierarchy for the entire project down to all sub-sub locations but should adequately demonstrate the approach to grouping of locations and how these should be classified.

Consider providing illustrations such as asset location maps and hierarchical tree views at a high level across the project with additional granularity shown only as typical examples only. A list of pre-approved Uniclass codes for the project may also be provided.

Refer to the references above at Section 3.2 for further guidance.

[Contractor to replace diagrams]

### Work zones

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Section 6.3
* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 4.2.2.

Use this section to describe or illustrate any Work Zones being utilised for project delivery. If appropriate, provide a table with the Asset Location to Work Zone mapping.

## Asset classification and referencing

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Section 6.4
* DMS-ST-207 – *Digital Engineering Standard Part 2: Requirements*, Version 4.1, Section 4.2.2
* DMS-SD-124 – *TfNSW Application of Uniclass*

### Asset classification

Use this section to describe the contractor’s application of asset classification. Consider providing reference to MPDT.

Use the DE Asset Register Template in Appendix M as a starting point to demonstrate how assets will be grouped and classified, including how this will increase in granularity throughout the life of the project if applicable.

Note: This does not need to be an exhaustive asset hierarchy for the entire project down to product level but should adequately demonstrate the approach to grouping of assets and how these should be classified.

Consider providing illustrations such as a hierarchical asset tree views capturing all the key systems with additional granularity shown only as typical examples only. A list of pre-approved Uniclass codes for the project may also be provided.

Refer to the references above at Section 3.2 for further guidance.

## Work packages

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Section 6.6
* DMS-ST-207 – *Digital Engineering Standard Part 2: Requirements*, Version 4.1, Section 4.2.5.

Adjustments to work packages arising as a result of schedule or scope changes must be agreed with the TfNSW project team in the same way as other changes to project data (Section 3).

Summarise how work packages are used by the contractor. Illustrate the work packaging structure and its alignment with the project data schemas such as location, asset and discipline classification.

## Contractor requests for codes or schemas

If an appropriate classification or reference code or schema cannot be determined, the contractor will request a new code from TfNSW.

# Collaboration

## Contractor’s internal collaboration environment

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Section 7
* DMS-ST-207 – *Digital Engineering Standard Part 2: Requirements*, Version 4.1, Section 2.

### Common data environment configuration

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Sections 3.2 and 3.3.

Describe the contractor-CDE configuration:

* list the platforms/software which comprise the CDE and how project information is synchronised while maintaining a single source of information
* workflows, permissions and governance of information within the contractor-CDE
* systematic use of project data schemas for consistent tagging of information
* any other project specific aspects of the contractor-CDE.



Figure 3 – Project system architecture [Contractor to replace diagram]

### Data security

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 3.8.

Demonstrate how the contractor-CDE and management of information within it will comply with T MU AM 02004 ST – *Management of Asset Information* and other applicable legislation/transport standards.

Data security risks and protection measures are shown in Table 6.

Table 6 – Data security risks and protection measures

| Risk | Applied protection measures |
| --- | --- |
| Non-approved applications (including malicious code) may be executed | Application control to prevent execution of unapproved/malicious programs including .exe, DLL, scripts (for example, Windows Script Host, PowerShell, and HTA) and installers |
| Security vulnerabilities in applications can be used to execute malicious code on systems | Patch Applications, for example, Flash, web browsers, Microsoft Office, Java, and PDF viewers. Patch/mitigate computers with ‘extreme risk’ vulnerabilities within 48 hours. Use the latest version of applications. |
| Microsoft Office macros can be used to deliver and execute malicious code on systems | Configure Microsoft Office macro settings to block macros either in ‘trusted locations’ with limited write access or digitally signed with a trusted certificate. |
| Flash, ads and Java are popular ways to deliver and execute malicious code on systems | User application hardening. Configure web browsers to block Flash (ideally uninstall it), ads and Java on the internet. Disable unneeded features in Microsoft Office (for example, OLE), web browsers and PDF viewers. |
| Admin accounts are the ‘keys to the kingdom’. Adversaries use these accounts to gain full access to information and systems | Restrict administrative access to operating systems and applications based on user duties. Regularly revalidate the need for privileges. Do not use privileged accounts for reading email and web browsing. |
| Security vulnerabilities in operating systems can be used to further the compromise of systems | Patch operating systems Patch/mitigate computers (including network devices) with ‘extreme risk’ vulnerabilities within 48 hours. Use the latest operating system version. Do not use unsupported versions. |
| Stronger user authentication makes it harder for adversaries to access sensitive information and systems | Multi-factor authentication including for VPNs, RDP, SSH, and other remote access, for all users when they perform a privileged action or access a critical (sensitive/high-availability) data repository. |
| Access to data could be lost either through deliberate attack such as a ransomware incident or due to accidental damage to system infrastructure | Daily backups of important new/changed data, software and configuration settings, stored disconnected, retained for at least three months. Test restoration initially, annually and when IT infrastructure changes. |
| Add additional risks where relevant |  |

### Information management governance

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 3.

Table 7 demonstrates that information management processes are appropriately governed to protect security of project information.

Table 7 – Governance of information management processes

| Action | Process and governance measures |
| --- | --- |
| Granting new team member access to project information | XXXXX |
| Ensuring access to project information is withdrawn when a team member leaves the project | XXXXX |
| Archiving and backing up project information | XXXXX |
| XXXXX | XXXXX |

Contractor is to specify here how asset data will be managed in accordance with T MU AM 02004 ST – *Management of Asset Information*.

Table 8 details how access to project information is managed for each of the project user roles or permission groups.

Table 8 – Access to project information by staff and sub-contractors

| User role or permission group | Access and authority level |
| --- | --- |
| Company member not approved for this project | No access to project information. |
| Standard approved project team member | Access to background information from TfNSW, design information, and incoming documents approved for use. |
| Document controller | Access to all information received by the project apart from executive folders. |
| Executive access | Access to all information received by the project.  Authority to commission user profiles for new approved project team members. |
| System administrator | Access to all information received by the project.  Authority to create user profiles following approval by the project executive. |

A contractor response (orange-shaded text) to this section can be removed for smaller projects at DE Managers discretion.

Consider providing an example of the revision history box including a full log of sample revisions of the expected submissions for a typical drawing.

## Contractor collaboration activities

**DE references**:

* DMS-ST-202 – *Digital Engineering Standard, Part 1: Concepts and Principles*, Version 4.1, Sections 7 and 8
* DMS-ST-207 – *Digital Engineering Standard Part 2: Requirements*, Version 4.1, Section 2.

This section is for the contractor to define and communicate collaboration processes. Detailed coordination workflows which are specific to the type of deliverable are to be later presented in Sections 5 and 6. Simply make reference to these sections here where relevant, for example the model coordination process in Section 5.8.

Summarise the contractors’ approach to collaboration with TfNSW, internal team and other stakeholders with an emphasis on Digital Engineering principles listed within the following sub-sections.

### Exchanging information with TfNSW

Enter here the procedures for exchanging information with TfNSW on items such as:

* process for information exchange (uploading to the TfNSW-CDE)
* any constraints on information exchange identified.

### TfNSW comments and contractor responses

Outline the process for receiving TfNSW review comments and providing responses.

### Model review procedures

Define model review procedures and criteria to be followed when undertaking model review or facilitating a model review workshop. Capture the full range of review types expected.

### Model Issues tracking and commenting

Define how issues and comments identified in the clash detection and model review processes will be managed.

### Exchanging information with other parties

This section can be ‘not used’ when external parties are not used on the project.

Enter here the strategy and procedures for exchanging information with:

* contractors internal team including subcontractors
* other contractors
* external stakeholders.

Include items such as:

* processes for information exchange
* proposals to manage the sharing of information in line with TfNSW’s security requirements
* how comments will be captured and considered.

### Software platforms and versions

Table 9 lists the key software applications used for producing and managing DE deliverables, and the exchange formats to be used including formats required by TfNSW for delivery.

In the table below summarise the nominated software solutions for the creation, collaboration, quality assurance and delivery of all digital artefacts. Review project contract requirements, the TfNSW DE Standard, and standards from applicable owners such as TfNSW, Council, and so on. Remove rows which do not apply.

Outline software interfaces for each phase of the project or any other key considerations.

TfNSW’s expectation for delivery as follows is open to discussion with the contractor’s DE Lead:

* Native model submissions as relative links in a single zip file.
* Industry Foundation Class (IFC) model submissions separated by technical discipline and, where reasonably practicable, additionally as a single bound federated model.
* Navisworks model submissions as a single bound federated NWD and, where reasonably practicable, additionally as NWCs for each technical discipline.

If other formats are being submitted, consider DWFx with drawings wrapped into the federated model.

Table 9 – Agreed software versions and exchange formats

| Party | Purpose | Software | Version | Native format | Exchange format and version | Comments |
| --- | --- | --- | --- | --- | --- | --- |
| TfNSW | Document management | XXX | XXX | N/A | XXX | XXX |
| TfNSW | Model review | XXX | XXX | XXX | XXX | XXX |
| TfNSW | Geographic information system application | XXX | XXX | XXX | XXX | For more detail refer GIS Management Plan |
| XXX | Documents | XXX | XXX | XXX | PDF |  |
| XXX | Drawings | XXX | XXX | XXX | PDF,  DWG 2010 | XXX |
| XXX | Federated models | XXX | XXX | XXX | NWC, NWF, NWD | XXX |
| XXX | Architecture models | XXX | XXX | XXX | IFC 4, XXX | XXX |
| XXX | Rail models | XXX | XXX | XXX | IFC 4, XXX | XXX |
| XXX | Roadworks models | XXX | XXX | XXX | IFC 4, XXX | XXX |
| XXX | Structural models | XXX | XXX | XXX | IFC 4, XXX | XXX |
| XXX | Point clouds | XXX | XXX | XXX | XXX | XXX |
| XXX | GIS data | XXX | XXX | XXX | XXX | For more detail refer GIS Management Plan |
| XXX | XXX | XXX | XXX | XXX | XXX | XXX |

Refer to Section 4.1.1 for the project’s CDE system architecture.

### Project team meetings

In the below table add regular meetings which use digital engineering information to achieve project goals. This may include coordination, design review, constructability reviews, health and safety walkthroughs. This should include all meetings with TfNSW, external project stakeholders and key internal meetings.

Table 10 lists the meetings on projects which are fundamental to ensure success of DE. This includes DE meetings focused on implementing and managing the DE processes and the meetings which will use DE to enable various non-DE project outcomes.

Table 10 – Meetings utilising DE

| Meeting type | Frequency | Facilitator | Key attendees | How will DE be used/what aspects of DE will be discussed |
| --- | --- | --- | --- | --- |
| Client Brief |  | TfNSW Project Manager |  | XXX |
| DE Initiation Meeting |  | TfNSW DE Manager |  | XXX |
| DE Execution Plan Review |  | TfNSW DE Manager |  | XXX |
| Clash Detection and Design Issue close out Workshops | Formal workshops before AFC Submission’s. | TfNSW DE Manager |  | XXX |
| Client and contractor design working group(s) | XXX | XXX |  | XXX |
| Multiple contractor DE workshops | XXX | XXX |  | XXX |
| Safety in design workshops | XXX | XXX |  | XXX |
| XXX | XXX | XXX |  | XXX |

# DE deliverables

## Delivery strategy

**DE references**:

* DMS-SD-555 – *Master Information Delivery Plan Template*

### Master Information Delivery Plan (MIDP)

The MIDP template is provided in Appendix C. The MIDP is a separate deliverable insert document reference and should be updated and submitted more frequently than the DEXP.

Outline the strategy for managing delivery of the contract’s information deliverables using the MIDP:

* planning deliverables (MIDP)
* monitoring delivery (MIDP).

The MIDP includes information on each deliverable to assist with good management, including the responsible owner, due date and design/works package. It may connect with the contractor-CDE to monitor deliverables’ status for assistance with project completeness assessment and earned value analysis.

A MIDP template is provided in Appendix C. The contractor is expected to issue the MIDP as a separate deliverable since it may be updated more frequently than the DEXP. Appendix C in the contractor’s DEXP may refer to the MIDP published separately or, at the contractor’s discretion, provide a template Task Information Delivery Plan for the contractor’s task teams to use.

## Project coordinates

### Assurance of project coordinates

**DE references**:

* DMS-SD-142 – *Digital Engineering Survey Requirements Guide*

Project coordinates are provided in Table 11.

Table 11 – Project coordinates

| Description | Project use |
| --- | --- |
| Geodetic datum | GDA94/2020 |
| Map projection | MGA 54/55/56 ISG |
| Height datum | Australian Height Datum |

* Define how consistent and correct MGA coordinates will be ensured across all digital information delivered.
* Outline the procedure for the transformation between co-ordinate systems if applicable.
* Outline how alignment of coordinates with other stakeholders will be confirmed.
* Provide relevant information on model origins, positioning, and orientation.

Information for model positioning and orientation is provided in Table 12.

Table 12 – Record of information for model positioning and orientation

| Point | Location description | Easting (m) | Northing (m) | Elevation or site datum |
| --- | --- | --- | --- | --- |
| [Site local benchmark origin] | XXX | XXX | XXX | XXX |
| [Grid intersection (A and 1)] | XXX | XXX | XXX | XXX |
| [Project angle to true north] | XXX | XXX | XXX | XXX |
| [Drone calibration points] | XXX | XXX | XXX | XXX |

## Digital survey deliverables including as-built information

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.3

Enter here the details of what survey deliverables are to be provided to support the requirements of the contract, including the level of accuracy.

### Survey strategy

Insert here the survey strategy (or cross-reference to Survey Management Plan) and relevant survey information to be used for the project.

Table 13 demonstrates the survey strategy including survey method, delivery format and survey origin.

Table 13 – Survey strategy

| Survey method | Delivery format | Survey origin | Details/notes |
| --- | --- | --- | --- |
| Feature Survey | XXX | XXX | XXX |
| Point Cloud | XXX | XXX | XXX |
| Light Detecting and Ranging (LIDAR) | XXX | XXX | XXX |
| Aerial / Drone Imagery | XXX | XXX | XXX (include frequency details) |
| Global Navigation Satellite Systems (GNSS) | XXX | XXX | XXX |
| Utility Mapping | XXX | XXX | XXX |

### Existing site and legacy data integration

Enter here details of how the project is to use existing site survey information and legacy survey data to inform future works. The approach should also reference other relevant sections of the DEXP. Any procedures for updating existing relevant information to comply with the requirements of the contract and/or DE Standard (DMS-ST-202/DMS-ST-207) must be specified.

### As-built survey strategy

Provide here the strategy for the collection, management, validation and delivery. Include the progressive capture of as-built information throughout the construction stage, to avoid loss of capture opportunity as aspects of the construction become hidden. Detail the systems and processes put in place to ensure the accuracy and completeness of the final as-built model.

### Deliverables metadata

Outline the process and technology that will be utilised to populate the metadata in accordance with the schemas provided in Appendix F and Appendix L.

### Metadata validation

Outline the process and technology that the project will be implementing to ensure metadata is validated.

## Systems engineering deliverables

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.2.

The TfNSW project team should, where possible, provide any existing project BRS, SRS and/or DOORS data to the contractor for re-use/development.

Enter details here about the procedure and system that are to be utilised to demonstrate traceability of the Business Requirements Specification (BRS) and/or System Requirements Specification (SRS), in compliance with the data specification included in DMS-FT-563 – *Requirements Schema and Specification*.

### Deliverables metadata

Outline the process and technology that will be utilised to populate the metadata in accordance with the schemas provided in Appendix E.

### Metadata validation

Outline the process and technology that the project will be implementing to ensure metadata is validated.

## ECM deliverables

### ECM file metadata requirements

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 3.4.

#### Deliverables metadata

Contractor to describe how ECM will be configured to meet:

* ECM Schema requirements
* document numbering
* revision and versioning control
* state and suitability control
* metadata fields and values are defined in Appendix D.

#### ECM deliverables validation

Contractor to describe validation process of metadata on assets transferred to TfNSW ECM.

## CAD deliverables

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.4.

### Existing CAD review

Enter here the process for validating or checking any CAD information which is inherited or provided to the contractor from TfNSW or another agency.

### Rail submission requirements [remove for road projects]

At Approval For Construction (AFC) stage and following changes thereafter, CAD deliverables must be submitted to the TfNSW Virtual Plan Room (VPR). TfNSW places requirements on all drawings submitted to the virtual plan room. For some projects a concession from TfNSW requirements has been granted, outlined in Technical Note TN 022: 2020, *Change of CAD and drafting requirements for digital engineering approved projects*, T MU MD 00006 ST – *Engineering Drawings and CAD Requirements*. This concession affects the contractor’s responsibilities for:

* smart tags
* drawing title blocks
* CAD layer naming
* composite models.

If the contractor’s scope includes AFC or beyond, this section should define how the contractor will operate in response to the TfNSW CAD concession (Technical Note TN 022: 2020, T MU MD 00006 ST).

### Smart tags and metadata spreadsheet [remove for road projects]

For any submission to the TfNSW VPR, summarise how a metadata spreadsheet will be generated and provided in lieu of smart tags. Refer to the TfNSW Standards website for the latest metadata spreadsheet.

### Drawing title block

Confirm the use of and define how the contractor team will implement the project title block in Appendix G.

Changes to the project title block must be agreed with the DE Manager. Special case disciplines will be granted exceptions to the requirements of this title block.

### CAD layer naming

**DE references**:

DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.4.3.

DE Manager to review if section is applicable to project scope.

Define how CAD layers will be named in accordance with the DE Standard.

### Connecting models and drawings

The contractor is to describe their approach for creating drawings from models and how the data remains connected and referenced appropriately.

TfNSW requires that drawings reference the model(s) they are derived from, by including the applicable model file name at the right side of the drawing frame.

For special cases in which other models have a critical influence on the drawing (for example if it is important to know which revision of a track alignment is showing), these models should be referenced in a separate text field.

## BIM deliverables

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.5.

### Modelling requirements

#### General principles

Contractor to outline how the model generated will be structured to cater for construction and maintenance. Enter here the contractor’s high-level principles for modelling by all disciplines. For example, model elements as they are intended to be built and maintained.

#### Subcontractor and external providers modelling guidelines

Contractor to outline how they will ensure that subcontractors produce models that will be compliant to TfNSW data and geometric requirements.

### Model production and delivery table (MPDT)

TfNSW project team may populate the MPDT in Appendix H with the high-level systems expected to form part of the contractor’s scope. The DE standard specifies minimum LOD which can be used as a guide and LOD requirements may be increased where deemed necessary to support project objectives.

A MPDT template is provided in Appendix H. The contractor is expected to expand the template to include all model element types used by the contractor and allocate responsibility to individual task teams.

Include and clearly note any relevant model elements which the contractor deems out of the contract scope or delivered by others. The contractor must submit the populated MPDT as in Appendix H to this DEXP and update at each milestone as a minimum. It is expected that the model elements will become more granular throughout the project phases.

The model production delivery table (MPDT) shown in Appendix H.

Describe how the Model Production and Delivery Table (MPDT) is used to manage the development of model element types throughout all contracted phases.

### Level of definition

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.5.3.2

Contractor to outline how they will comply to the Level of Definition requirements including how they will meet the minimum requirements outlined in the Specification/DERS.

### Model property requirements

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.5.3.4

#### Deliverables Metadata

Contractor to outline how they will comply to the Model Property requirements including the process of how they will populate the metadata to meet the minimum requirements outlined in the Specification/DERS and DE Standard.

#### Metadata validation

Outline the process and technology that the project will be implementing to ensure metadata is validated, accurate and fit for purpose.

#### Model verification

The contractor is to describe their technical and approval processes for model validation. The contractor may augment the assurance process by providing the results of automated model audits or additional manual checking, in which case the criteria and reports should also be outlined here. Reference other sections of the DEXP where required.

### Open data format models

Describe the IFC export processes to address the following points:

* IFC version to be adopted
* ensure all modelled objects have been assigned to relevant IFC Class and enumeration, with no Ifc Building Element Proxy objects
* ensure Properties are included in Industry Foundation Class (IFC) exports
* ensure TfNSW required properties are located in appropriate TfNSW Property Sets
* ensure data integrity and no loss of data
* file size efficiency.

### Review of existing models

Enter here the strategy for checking and validating any existing models prior to using on the project. This includes level of accuracy, context, non-geometric data and relevance.

## Model coordination procedures

### Model structuring and federation

Enter here how project BIM models are to be divided to suit the needs of the project. For example: spatial segregation into volumes, zones, spaces or technical disciplines. Consider alignment with asset locations and work packaging and ensuring files sizes don’t exceed the 500MB limit.

Define the process for federation and sharing.

Consider providing a diagram or table of how the models are combined to form the federated model. Document the owners for each model.

### Clash detection and reporting

Define the clash detection and reporting processes

* frequency and procedure
* ensuring a focus on design resolution and managing which clashes to ignore
* automation, where appropriate
* results format and availability
* responsibilities of key staff
* performance indicators and tracking clash statistics throughout the project.

#### Level of accuracy and construction tolerance

Enter here the tolerances to be applied during the clash detection process, for clearances and interfaces between different disciplines. Consider for example clash/proximity detection to verify offset requirements between high voltage cables, or structural construction tolerances in areas of restricted space.

## Visualisation

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.6.

TfNSW requires the contractor to deliver the visualisation output and all the files and content used to develop the final deliverable.

TfNSW to refer to DMS-SD-130 – *Visualisation Requirements Guide* for assistance in determining project specific requirements to be included in this section or the corresponding Works Brief.

Contractor to summarise contracted visualisation deliverables and activities, including how the deliverables will be derived from the federated model, the software and plug ins being used and the digital workflow.

## GIS deliverables

**DE references**:

* DMS-ST-207 – Digital Engineering Standard, Part 2: Requirements, Version 4.1, Section 6.7.

#### Overview

Refer to contract scope documents to determine if a stand-alone project GIS Management Plan (GISMP) is required. If it is required, refer to DMS-FT-581 GISMP template and summarise here the strategy for Geographic Information Systems (GIS) deliverables, including the scope of GIS for the project, access to the system and security, coordinates, GIS dataset integration with Project Data Schemas and interoperability workflows for integration with CAD and BIM information.

If a stand-alone project GISMP is not required, include sufficient information to support TfNSW QA Specification G75 GISMP requirements as a sub-plan to this document. GISMP content may be provided in this section or as an appendix.

### Deliverable metadata

Outline the process and technology that will be utilised to populate the metadata in accordance with the schemas provided in Appendix J.

### Metadata validation

Outline the process and technology that the project will be implementing to ensure metadata is validated.

## Time deliverables

**DE references**:

* DMS-ST-207 – Digital Engineering Standard, Part 2: Requirements, Version 4.1, Section 6.8.

Where appropriate outline the strategy and details for scheduling, construction sequencing and simulation in alignment with the project requirements. Where elements are detailed in other management plans, provide a cross reference. Include:

* compatibility with the Project Data Schemas (for example disciplines, locations, milestones)
* compatibility with TfNSW systems
* construction simulation scope, tools and procedures.

## Cost deliverables

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirement*s, Version 4.1, Section 6.9.

Describe how the contractor’s cost information (including payment schedules, earned value and/or cost estimates) will be integrated with relevant datasets across the project. Include:

* Compatibility with the Project Data Schemas (for example disciplines, locations, milestones)
* Integration between cost deliverables and the schedule.

## Asset data deliverables

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 6.10.

### DE Asset Register

Outline each DE Asset Register submission for applicable milestones. Include:

* How will Asset Registers be federated if applicable? Confirm submissions frequency of a Master Asset Register and if applicable Asset Registers for packages.
* What asset data is to be populated?
* Which fields will be generated from the digital models?
* Process for creation of the asset register, including where the asset data is generated and how (for both model and non-model data)
* How is the data verified and synchronised between the model, asset register and other data sources?
* Who is responsible for creation and checking of the Asset Register?

The contractor is expected to issue the asset data register as a separate deliverable. Appendix M should be retained containing the template as a record of requirements, unless agreed otherwise with the TfNSW DE Manager.

### Asset handover strategy

Where applicable to the contract scope, outline the plan for handover of the Asset Information Model, including the Asset Handover Register, to the owner and/or operator. This could be a cross-reference to the Handover Management Plan as required by T MU AM 01005 ST – *Asset Handover Requirements*. Where applicable document any compatibility requirements for information being delivered to the asset management system.

# Quality and assurance management

## Quality control strategy

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 8.2.

Provide an overview of the contractor’s internal compliance procedures, refer to the relevant quality management plan or other sections of the DEXP as necessary.

Summarise applicable quality control procedures, including:

* validation and verification prior to submission to TfNSW
* audits of CAD, BIM, GIS and other DE processes, including tracking of issues
* demonstrating compliance with Project Data Schemas.

## Quality control checks and processes

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 8.2.

Provide a diagram illustrating the flow of project information through the contractor’s checking and approval processes from creation to delivery. Include reference to the contractual quality assurance requirements (for example, Q6 for road projects), types of checks throughout the DEXP, and add to Table 14 if necessary. Where appropriate, illustrate differences between checking processes for documents, drawings, models (including exchange file-types) and other deliverables such as the Asset Register.

Table 14 contains general quality control check information.

Table 14 – General quality control checks

| Checks | Definition | Responsible party | Software programs | Frequency |
| --- | --- | --- | --- | --- |
| Rendition check | Assessment of renditions from the native file to ensure they accurately and completely represent the native. For example, PDFs generated from Word | Person responsible for the deliverable | XXXX | Each delivery |
| TfNSW Audits | Check against contract and TfNSW requirements | TfNSW DE Manager and Technical Managers |  | Each milestone |

## Performance indicators

**DE references**:

* DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*, Version 4.1, Section 8.3.

DE Manager to review if KPI section is applicable to project scope and technology solution.

Table 15 contains the key performance indicators and methods of measuring the success of DE which will be applied on the project and provided to TfNSW.

Table 15 – Performance indicators

| KPI area | Benefit | KPI |
| --- | --- | --- |
| Communication | Improved design clarity  Minimise administration overhead associated with responding to RFIs, through improved design clarity using BIM | No. RFIs  No. business days to respond to RFIs |
| Design | Reduced re-work  Minimise rework during construction, by improving the quality of the design through clash detection and construction sequencing | No. design changes (during construction)  No. resubmitted design packages |
| Design Review | Improved design review  Issues with designs identified and resolved faster, using BIM to review design and ECM to optimise collaboration and communication | No. business days to review design submissions  No. business days to close-out comments |
| Cost | Reduced commercial risk  Minimise unexpected cost of variations during construction, by improving quality of design | No. variations  % Cost variance – Actual vs Baseline cost |
| Time | Improved construction durations  Minimise construction times and public disruption, by optimising the schedule | % Activities completed on time  % Time variance – Actual vs Baseline duration |
| Quality | Improved data accuracy  Ensure handover information for O&M is appropriate, complete and accurate, by more effective assurance of project deliverables. | Number of asset data errors at configuration management gates |
| Safety | Improve safety  Improve site inductions and safety training, using 4D BIM to support virtual construction and work simulation | Number of site inductions using visualisation tools  Number of incidents on site (lost time injury frequency rate) \* |
| The contractor may add any additional KPIs required |  |  |

###### Terms and definitions

Refer to DMS-SD-123 – *DE Terms and Definitions* for standard terms and definitions.

Contractor to define any additional terms used which are not defined in the DE Standard.

Table 16 – DEXP terms and definitions

| Term | Definition | Reference |
| --- | --- | --- |
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###### Applicable standards and guides

The TfNSW project team is to review Table 17 and update before passing to the contractor.

In the table: **M** = Mandatory, **C** = Mandatory with concessions, **R** = Recommended

Table 17 – Applicable standards and guides

| Category | Number | Title | Guidance | Engineering/Design | Information Management/CDE | Asset Information | Costing | Scheduling |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Project specific | Enter here | Enter here |  |  |  |  |  |  |
| Project specific | Enter here | Enter here |  |  |  |  |  |  |
| Project specific | Enter here | Enter here |  |  |  |  |  |  |
| Project specific | Enter here | Enter here |  |  |  |  |  |  |
| Infrastructure and Place (IP) | DMS-ST-202 | Digital Engineering Standard, Part 1: Concepts and Principles |  | M | M | M | R | R |
| IP | DMS-ST-207 | Digital Engineering Standard, Part 2: Requirements |  | M | M | M | R | R |
| IP | G73 | Detail Survey |  | M |  |  |  |  |
| IP | G75 | Geographic Information Systems (GIS) |  | M |  | M |  |  |
| IP | DMS-ST-173 | Cost Estimating for Infrastructure and Place Projects |  |  |  | M | M |  |
| IP | Enter here | Enter here |  |  |  |  |  |  |
| TfNSW | - | TfNSW Asset Management Framework | M | M | M | M | M | M |
| TfNSW | - | TfNSW Configuration Management Framework | M | M | M | M | M | M |
| TfNSW | T MU AM 01001 ST | Life Cycle Costing | R |  |  |  | R |  |
| TfNSW | T MU AM 01005 ST | Asset Handover Requirements |  |  |  | M |  |  |
| TfNSW | T MU AM 01006 ST | Asset Reference Codes |  |  |  | M |  |  |
| TfNSW | T MU AM 01006 F1 | Asset Location Classification Code Form |  |  |  | M |  |  |
| TfNSW | T MU AM 01007 TI | Asset Reference Codes Register |  |  |  | M |  |  |
| TfNSW | T MU AM 01012 ST | Engineering Document Requirements |  | M |  | M |  |  |
| TfNSW | T MU AM 01012 F1 | Metadata Spreadsheet for Engineering Documents |  |  |  | M |  |  |
| TfNSW | T MU AM 02001 ST | Asset Information and Register Requirements |  |  |  | M |  |  |
| TfNSW | T MU AM 02002 TI | Asset Classification System |  |  |  | M |  |  |
| TfNSW | T MU AM 02004 ST | Management of Asset Information |  |  |  | M |  |  |
| TfNSW | TS 01455:1.0 | Configuration Management |  | M |  |  |  |  |
| TfNSW | T MU AM 06006 ST | Systems Engineering Standard |  | M |  |  |  |  |
| TfNSW | T MU AM 06006 GU | Systems Engineering Guide | M |  |  |  |  |  |
| TfNSW | T MU MD 00006 ST | Engineering Drawings and CAD Requirements |  | C |  |  |  |  |
| TfNSW | T MU MD 00006 F1 | Metadata Spreadsheet for Engineering Drawings |  | C |  |  |  |  |
| TfNSW | T MU MD 00006 TI | Technical Information for CAD and Engineering Drawings |  | C |  |  |  |  |
| TfNSW |  | TfNSW Schedule of Classified Roads and Unclassified Regional Roads |  |  |  | M |  |  |
| TfNSW | ILC-GEN-TP0-901 | Asset Acceptance Technical Procedure |  |  |  | M |  |  |
| TfNSW | - | Bridge Inspection Procedure Manual |  |  |  | M |  |  |
| TfNSW | - | Sydney Trains Asset Information Delivery Plan |  |  | M | M |  |  |
| TfNSW | Enter Here | Enter Here |  |  |  |  |  |  |
| Industry | Uniclass | Universal Classification System for the Construction Industry |  | M |  | M |  |  |
| Industry | Enter Here | Enter Here |  |  |  |  |  |  |
| Industry | Enter Here | Enter Here |  |  |  |  |  |  |

The contractor may augment this table.

###### Master Information Delivery Plan (MIDP)

The contractor is expected to issue the MIDP as a separate deliverable. This appendix is to be retained containing either cross-reference to the MIDP or, at the contractor’s discretion, a template Task Information Delivery Plan for the contractor’s teams.

Another MIDP template may be used if it serves the needs of the project.

###### Enterprise Content Management (ECM) Schema and Specification

The TfNSW project team is to develop the Project Data Building Blocks (PDBB) with project-specific data including codes for projects, contracts, originators and locations, then export the DMS-FT-533 – *ECM Schema and Specification* and provide it here for the contractor.

The contractor is expected to include in this appendix either the TfNSW ECM schema without any changes or a contractor view of the data for easier use by the contractor team. Where the ECM Schema and Specification is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

###### Requirements Schema and Specification

TfNSW project team to provide DMS-FT-563 – *Requirements Schema and Specification*, populated with appropriate PDBB and with project-specific adjustments if appropriate.

The contractor is expected to include the Requirements Schema and Specification as an appendix without any changes, unless agreed otherwise with the TfNSW DE Manager. Where the Requirements Schema and Specification is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

###### Utility Schema

TfNSW project team to provide DMS-FT-493 – *Utility Schema*, populated with appropriate PDBB and with project-specific adjustments if appropriate.

The contractor is expected to include the Utility Schema as an appendix without any changes, unless agreed otherwise with the TfNSW DE Manager. Where the Utility Schema is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

###### CAD Schema and Specification

CAD layer naming table

TfNSW project team to provide DMS-FT-562 – *CAD Schema and Specification*, populated with appropriate PDBB and with project-specific adjustments if appropriate.

The contractor is expected to include the CAD schema and specification as an appendix without any changes, unless agreed otherwise with the TfNSW DE Manager. Where the CAD Schema and Specification is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

Project title block

TfNSW project team to provide the configured title block (DMS-FT-549) for use on the project, including any specific rules for aspects such as file name and sheet size. All title blocks allocated for use on the project should comply with T MU MD00006 ST Engineering Drawings and CAD requirements.

The contractor is expected to include the project title block as an appendix without any changes, unless agreed otherwise with the TfNSW DE Manager. Where the CAD title block is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

###### Model Production and Delivery Table (MPDT)

TfNSW project team to provide DMS-FT-534 – *Model Production and Delivery Table (MPDT) Template* with any project specific modifications and including the systems expected to be designed and/or implemented by the contractor.

Contractor to populate for all model element types across the full scope of work contracted and submit in this appendix.

Another template may be used if it serves the needs of the project. Where the MPDT is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

###### BIM Schema and Specification

BIM Schema and Specification

The TfNSW project team is to update the DMS-FT-516 – *BIM Schema and Specification* with the PDBB and make any project specific amendments to the TfNSW template before providing this appendix to the contractor.

Where the BIM Schema and Specification is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

Model Validation Certificate Template

TfNSW project team to provide with any project specific modifications.

Where the Model Validation Certificate Template is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

###### GIS Schema

TfNSW project team to pre-populate the DMS-FT-580 – *GIS Schema Template* with relevant GIS information relevant to the contractor’s scope of work. Where previous work has been done, the GIS Schema from a previous phase may be used as the template for the latter.

Contractor to populate for the full scope of work contracted for relevant submissions as defined in the QA Specification G75 – *Geographic Information Systems (GIS)* and DMS-ST-207 – *Digital Engineering Standard, Part 2: Requirements*. Where previous work has been done, the schema and GIS deliverables from a previous phase may be used as the basis for the next phase.

The contractor is expected to submit the populated GIS Schema as a separate deliverable, cross-referenced from the GISMP (and/or DEXP). This appendix is to be retained, containing the GIS Schema template used by the contractor.

###### Scheduling Schema and Specification

The TfNSW project team is to update the DMS-FT-520 – *Scheduling Schema and Specification* with the PDBB and make any project specific amendments to the TfNSW template before providing this appendix to the contractor.

The contractor is expected to include the Scheduling Schema and Specification as an appendix without any changes, unless agreed otherwise with the TfNSW DE Manager. Where the Scheduling Schema and Specification is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

###### Survey Schema and Specification

If appropriate, the TfNSW project team is to supply a IP-0043-GD01 - *Survey Schema and Specification* and Specification with the PDBB and make any project specific amendments to the TfNSW template before providing this appendix to the contractor.

The contractor is expected to include the IP-0043-GD01 - *Survey Schema and Specification* as an appendix without any changes, unless agreed otherwise with the TfNSW DE Manager. Where the Requirements Schema and Specification is managed as a separate document, a cross-reference to that document may be provided without duplication of the document.

###### DE Asset Register

TfNSW project team to pre-populate the DMS-FT-537 – *DE Asset Register Template* with all assets and systems expected to form part of the contractor’s scope of work. Where previous work has been done, the asset register from a previous phase may be used as the template for the latter.

Contractor to populate for the full scope of work contracted for relevant submissions as defined in the Digital Engineering Standard. Where previous work has been done, the asset register from a previous phase may be used as the template for the latter.

The contractor is expected to submit the asset register as a separate deliverable, cross-referenced from the DEXP. This appendix is to be retained, containing the asset register template used by the contractor.