Table of Contents

Purpose 3

Scope 3

Risk Considerations 3

Background 3

Procedure 4

1. Viewing drawing in EPMS 4

2. Reservation of drawing in EPMS 4

2.1. Reserving new EPMS drawing numbers or drainage sections 4

2.2. Reserving an existing EPMS drawing 5

2.3. Reserving an EPMS drawing that is already reserved 5

3. Submission of drawings and other documents 5

3.1. Transmittal documentation 6

4. Drawing Standards 6

4.1. General requirements for drawing 7

4.2. Decommissioned Asset 12

4.2.1. *Drawing depicting single Asset* 12

4.2.2. *Drawing depicting multiple Assets* 12

4.3. Addendum drawing 13

4.4. Vendor drawing 13

4.5. Electrical drawings 13

4.6. Electrical drawing numbering 14

4.7. P&ID drawing 14

4.8. Licenced Surveyor certified drawing 17

4.9. Standard drawing 17

4.10. Spatial information required 18

5. Rejection or Approval of drawings 22

6. Other Documentation 22

6.1. O&M manual 22

6.2. Geotechnical report 22

Definitions 22

References 24

Stakeholder Consultation 24

Document History 25

Appendix A: Drawing Requirements Checklist 28

Appendix B: Water Supply drawing numbers 30

Appendix C: Drawing Type / Discipline 32

Appendix D: Drawing Title examples 33

Appendix E: Reserving drawings already reserved – process diagram 34

Purpose

This procedure is to be used by Melbourne Water Representatives, Project Managers, Alliance Teams and external Consultants to manage the retrieval, creation, registration and change control of Melbourne Water drawing documents.

CORP AM P006 relates to Melbourne Water project managed works, and should be used in conjunction with the Planning & Building Requirements (guideline relating to works undertaken by the Land Development industry – http://www.melbournewater.com.au/Planning-and-building/Pages/planning-and-building.aspx)

Scope

The scope of this procedure covers:

- Reservation of new and existing drawings in EPMS;
- Submission of drawings to be uploaded into EPMS;
- Auditing of drawings (deliverable formats and requirements);
- Rejection and Approval of Drawings.

Risk Considerations

To correctly maintain and operate a MWC asset, it is important to know what type of asset it is, where it is, what it looks like and how it is connected into the integrated system. There are significant risks associated from not having up-to-date and reliable drawings providing information about Melbourne Water's assets. These risks may result in:

- Inadvertent shutdown of equipment and/or system;
- Safety issues, especially with respect to electrical wiring;
- Inappropriate business decisions being made;
- Maintenance on assets which are no longer the responsibility of Melbourne Water;
- Costly Land Development decisions based on incorrect information on drawings.

Background

CORP AM P006 was created to give direction on the creation, maintenance and storage of drawing documents relating to Melbourne Water assets. This procedure provides guidance so that drawings are provided in a standard format with appropriate subject content. This facilitates ease of locating and use of drawings as required.

Procedure

1. Viewing drawing in EPMS

Drawings can be viewed in EPMS and accessed via the Melbourne Water Intranet, Home > Systems > IT Systems > Inflo or using the Intranet Quicklinks. The two following formats are available for viewing: TIFF images (scanned hardcopies) and PDF files (output from CAD file). Both TIFF and PDF files can be downloaded directly from the EPMS. Plans or drawings in EPMS can also be accessed through the GIS by clicking the on the asset with the Inflo hotlink

CAD files (where available) are also stored within the EPMS environment. For security reasons, these are not directly accessible to users via EPMS. To obtain CAD files for the purpose of updating drawings, requests can be made to the Plan Room Team via the Plan Reservation Form (link). CAD files of standard drawings can also be requested to support the creation of new drawings.

In the case where drawings (Pre 2001) are illegible, the original drawing may be retrieved from the Public Records Office Victoria by the Plan Room Team.

For any technical questions regarding how to use EPMS or issues with drawing content, please contact the Asset Management Systems Team. For any system related questions (e.g. access to EPMS), please contact the Melbourne Water IT Support on 9235 7000.

2. Reservation of drawing in EPMS

Each drawing produced for a project and submitted to Melbourne Water shall have a number reserved in EPMS.

Requests for reservation of existing drawings and/or creation of new drawing numbers are made using the Plan Reservation Form (located under the EPMS folder in Inflo). The Plan Room Team shall respond to all reservation requests within 3 working days.

2.1. Reserving new EPMS drawing numbers or drainage sections

The Client Representative/Project Manager shall ensure that an adequate number of new drawing numbers and/or drainage sections are reserved in the EPMS for the project. The Plan Reservation Form should include the following information:

- Product service (Water, Sewerage, Waterways & Drainage, other);
- Project title;
- Project number (the CMS project number is required for all capital works);
- For Drainage scheme works (This will allow cross-reference information to be entered into EPMS):
- New section description (include DSCM scheme number and stage number);
- Melway reference and;
- Drainage scheme nodes.
- For non-Drainage projects:

- The number of drawings to be reserved by discipline (i.e. civil, mechanical etc.);
- The project/section folder to be reserved under.

In response, the Plan Room Team will reserve the new drawing/section numbers in EPMS and will notify the Client Representative/Project Manager via email.

The drawing numbers used must not exceed those reserved. Additional drawing numbers can be requested through Plan Reservation Form.

2.2. Reserving an existing EPMS drawing

The Client Representative/Project Manager shall ensure that all existing drawing(s) affected by works undertaken as part of a project, are reserved in EPMS and updated accordingly.

The Plan Reservation Form should include a list of the required drawings in the 'Additional Notes' section of the form.

In response, the Plan Room Team will 'Reserve' the drawing(s) in EPMS allowing plan updates to be undertaken. They will download the drawings (PDF & any available CAD) and forward them to the Client Representative/ Project Manager via email.

2.3. Reserving an EPMS drawing that is already reserved

While existing drawings in EPMS are reserved out for updating, they cannot be modified by any others without approval from the reservation owner. It is important therefore that revised drawings are promptly updated in EPMS or the Plan Room Team is notified if the drawings are no longer required.

When modifications to existing reserved drawings are required by another project, the process described on Appendix E must be followed (*See*

Appendix E: Reserving drawings already reserved – process diagram).

3. Submission of drawings and other documents

All "As Constructed" drawings must be submitted to Melbourne Water.

All electronic information can be delivered using the Plan Room Team's Drop Box folder - M:\MEL\Info Systems\Drop Box. Hardcopies can be delivered at Plan Room Team's office.

An email communicating the delivery must be sent to Melbourne Water representatives, the respective Asset Manager and the Plan Room Team. If the file sizes of the As Constructed submission are small enough to be attached to an email, the files may be submitted directly to the Plan Room Team email address without having to utilise the Drop Box network folder.

The Plan Room Team will process the submission and send back the Transmittal Note signed acknowledging the receipt of the documents within 3 working days.

Plan Room Team signs the Transmittal Note to acknowledge document receipt, NOT as document approval (*See Rejection or Approval of drawings*).

We prefer to receive the full submission at once. Partial submission must be clearly indicated on the transmittal note.

List of Deliverables (For templates, see item References):

- Transmittal Note;
- Drawing List (MS Excel);
- CAD files;
- PDF files;
- P&ID files (AutoPlant database – contact Plan Room Team for a template);
- Drawing Requirements Checklist (See

- Appendix A: Drawing Requirements Checklist, page 28);

3.1. Transmittal documentation

3.1.1. Transmittal Note

The Transmittal Note shall include a complete list of all drawings submitted as part of the project completion stage. This must include reserved drawing numbers not used for the project. It must also list any superseded drawings, drawings for abandoned assets and removed assets. The Transmittal Note template can be provided by Melbourne Water, which includes the Drawing Requirements Checklist.

3.1.2. Drawing List

A copy of the Drawing List must be provided in MS Excel format as specified on the Drawing Register template (See item References).

3.1.3. Drawing Requirements Checklist

Drawing Requirements Checklist must be provided with all submissions to verify an understanding of Melbourne Water's requirements (See item

Appendix A: Drawing Requirements Checklist, page 28).

4. Drawing Standards

Melbourne Water drawings and specific documents (e.g. Transmittals) shall be based on the guidelines detailed below.

The Team Plan Room will not evaluate the drawing content. Drawing content approval shall be determined by Melbourne Water Asset Managers (*See item* ***Rejection or Approval of drawings***).

The Plan Room Team shall accept or reject "As Constructed" drawings based on adherence to drafting standards within 5 working days of receipt.

4.1. General requirements for drawing

4.1.1. Title Block

Drawing titles shall comprise the minimum number of words required to clearly describe area, the relevance and content of the drawing.

Title panel shall be placed in bottom right hand corner next to the drawing number (See

Appendix D: Drawing Title examples).

The title shall clearly describe and include the following features:

- Relevant area - e.g. Silvan Chlorination plant
- Description - clearly describe the content of the drawing
- Identification - incorporate main equipment ID (if applicable)
- Describe the process (if applicable)
- Discipline (See Appendix C: Drawing Type / Discipline)
- Organisation name

Consultant details must be shown in the drawing table as per drawing template (See References).

Any plant specific drawing should be easily identified from a library of drawings by searching through the titles on the index. Generic titles shall not be accepted (i.e. SCHEMATIC DIAGRAM)

4.1.2. Revision Box

A revision on an As Constructed plan should be identified alphabetically except for I, O & X. The appropriate reference letter corresponding to the letter in the revision box should accompany each alteration or addition to a drawing. If an existing drawing is reserved for modification as part of the project and its revision is "B", the modified drawing delivered to Melbourne Water will be revision "C". Where drawings have used numeric order revisions in the past, any future revisions to these drawings should now be indicated alphabetically using the next available letter (Rev 3 will be followed by Rev D).

As Constructed revision entries are in addition to any existing Design revision entries. Design revisions should not be removed unless there is a lack of space in which to add the As Constructed revision, in which case only the minimum number of Design revisions should be removed to accommodate the As Constructed revision.

The revision box shall be placed in the bottom left hand corner of the title block. See example below:

B	FLOW METER F1966 ADDED	Company2	554433	P.M.	J.G.	F.J.	26.07.10
A	AS CONSTRUCTED	Company1	Q65491	J.C.	P.T.	P.L.	23.04.98
Rev.	Revision Description	Company	Project or WO Number	Drawn	Eng. check	Pr. Man. App'd	Date

Descriptions in the revision box shall be updated with:

- What has been changed or added and how it has changed;

- Company name;
- Project number or work order number;
- Initials for drawn by, checked by and approved by (project manager);
- Date when changes were made.

4.1.3. Drawing Status & Labels

All Drawings shall have a label representing its status:

- AS DESIGNED;
- FOR CONSTRUCTION;
- AS CONSTRUCTED;
- SUPERSEDED.

"OBSOLETE" or "DELETED" are not accepted by Melbourne Water as drawing status/labels as they reflect the asset status not the drawing status (*See Decommissioned Asset)*.

Therefore if one or more drawings need to be removed from EPMS, the Plan Room Team needs to be informed via email.

Any drawing replaced by a new drawing must have the revision box updated and a note placed in a banner spanning from the top left corner to the bottom right corner of the page passing through the title block (*See References*), stating:

"THIS DRAWING IS SUPERSEDED BY DRAWING No. ####"

If a plan is assigned a Melbourne Water drawing number in the design process but ultimately not constructed then the drawing must still be submitted to the Plan Room Team marked clearly with the status NOT CONSTRUCTED.

4.1.4. Melbourne Water Drawing Numbers

Drawing numbers are slightly different for each of the Sewerage, Water and Waterway assets. Examples for each group are given below:

Sewerage (General):

Discipline Code,

MELBOURNE WATER CORPORATION	
C5527/20/001	A
MWC DRAWING NUMBER	REV

Sewerage (ETP):

Discipline Code,

MELBOURNE WATER CORPORATION

E15/02/013	D
MWC DRAWING NUMBER	REV

Water:

MELBOURNE WATER CORPORATION	
WR043/E/345	B
MWC DRAWING NUMBER	REV

Asset ID,

Discipline

For further information regarding Water Supply Drawing Numbers, see Appendix B - page 24.

Waterways:

MELBOURNE WATER CORPORATION	
4721/04/001	A
MWC DRAWING NUMBER	REV

Asset ID,

Section,

Code letters are adopted for Sewerage Projects & Water Treatment Plants from following list:

- A Architectural
- C Civil
- E Electrical (including loop & instrumentation drawings)
- G General
- J –Piping & Intrumentation Diagram (P&ID)
- M Mechanical
- S Structural

4.1.5. CAD files and PDF files

CAD file shall be delivered in a single package such as a zip file (MicroStation's Packager or AutoCAD's eTransmit) and contain all reference and system files: X-refs, fonts, cell libraries, raster, etc.

Adobe PDF files are to be produced as an output of the CAD files, using the source software. They shall be created by the provider preparing the drawings and must be submitted with the correct orientation (Landscape or Portrait). Each Drawing shall be in a separate PDF file.

When editing existing drawings, make changes to existing CAD files if available, otherwise produce a Hybrid CAD file by incorporating the current TIFF file available and make annotations in CAD environment. This will minimise degradation of existing TIFF file. If the existing drawing is illegible or the modifications result in more than 50% of the drawing being modified, then a new CAD file shall be produced.

CAD files must be readable when printed in colour and the file projection must be MGA94 (z55).

A CAD template is available on request from the MW Plan Room Team.

MicroStation Requirements (*.dgn):

- Format (Version 8);
- Global origin set at 214748.3648, 214748.3648;
- Working area set at (These working units allow for one millimetre precision):
- Master Units = m (metres);
- Sub Units = mm (millimetres);
- Resolution = 1000 sub units to a master unit;
- One Position Unit = 1 mm.

AutoCAD Requirements (*.dwg/*.dxf):

- Format (Pre 2015);
- Metre units precision to be set to 3 decimal places to achieve mm accuracy.

4.1.6. File name

Each drawing file must be named exactly as per its drawing number with the exception of slashes; these shall be replaced with underscores. For example; drawing number WQ206/E/015 was issued. The corresponding files to be returned to MWC must be:

- WQ206_E_015.pdf
- WQ206_E_015.zip (CAD file)

Example CAD and PDF file names for each asset type:

Sewerage

Drawing No.	Rev	CAD File Name	PDF File Name
E7282/46/003	A	E7282_46_003.zip	E7282_46_003.pdf

Water

Drawing No.	Rev	CAD File Name	PDF File Name
WQ210/E/001	C	WQ210_E_001.zip	WQ210_E_001.pdf

Waterways

Drawing No.	Rev	CAD File Name	PDF File Name
4400/03/001	B	4400_03_001.zip	4400_03_001.pdf

4.1.7. Drawing referencing

Drawing referencing between existing and new drawings must be comprehensive.

All supplies, feeds, boundaries, borders, piping, circuits, schematics and layouts between existing plant and new plant shall be referenced or commented accordingly, across all drawings.

There shall be no open ended circuits.

4.1.8. Digital survey information

Digital Survey Information allows the capture of "As Constructed" works into the Melbourne Water GIS.

This is required for civil assets, such as pipelines, channels, associated fittings (e.g. valves), underground cabling and structures (e.g. manholes).

Provision of digital survey data is an addition, not an alternative, to the submission of annotated design plans in CAD and PDF format.

Drawings shall make use of standard scales, i.e. 1:10, 1:100, 1:250, 1:500, etc.

4.1.9. Revision clouds

First release As Constructed drawings (version A) must not contain any revision clouds.

Subsequent revisions may use clouds to identify changes made to the current revision however they, along with revision symbols, must be in "paperspace" and removed or placed on a frozen layer when drawings are release As Constructed.

4.1.10. *Sheet size*

Sheet sizes should conform to the international standard, ISO in the A series. Generally the preferred sheet size is A1 (841mm x 594mm), as this allows for more content and reduces the final number of plans.

However, if the same information can be placed on smaller sheet, then that is acceptable so long as text can be legible at A3.

4.1.11. *Source control information*

To enable Melbourne Water to undertake field audits during or after the construction period and to verify submitted information, we require notation of Permanent Survey Marks (PSMs) used to establish source control for MGA coordinates and AHD elevations.

4.2. Decommissioned Asset

For details of Asset Decommissioning process, please refer to CORP AM P031 Decommissioning Assets (See item References).

4.2.1. *Drawing depicting single Asset*

Where the latest version of a drawing shows a decommissioned asset, this drawing must be labelled with:

"ASSET REMOVED" when all assets shown in the drawing are effectively removed from site; or

"ASSET ABANDONED" when all assets shown in the drawing are effectively abandoned; or

"ASSET INACTIVE" when all assets shown in the drawing are effectively inactive.

The note must be placed in a banner spanning from the top left corner to the bottom right corner of the page passing through the title block.

4.2.2. *Drawing depicting multiple Assets*

Where the latest version of a drawing shows a decommissioned asset(s) and also shows an asset(s) in service, the decommissioned asset(s) must be enclosed by a revision cloud and the asset(s) must be removed. The revision box must be updated accordingly.

4.3. Addendum drawing

Where As Constructed works differ significantly from Design, or it is not possible to annotate the original Design drawings, addendum As Constructed drawings (i.e. feature survey plans) should be created.

4.4. Vendor drawing

Vendor Drawings as any "As Constructed" drawings must have MW numbers reserved prior to their submission.

All equipment that has become an integral part of any Melbourne Water installation shall have the "As Constructed" drawing supplied with a MW number.

Stand-alone equipment (off the shelf) not part of Melbourne Water installation can be supplied as part of the vendor manual.

4.5. Electrical drawings

Melbourne Water has a created a set of Typical Electrical and Controls Drawings to be used by electrical engineering consultants and contractors. The purpose of these drawings is to set out Melbourne Water's expectation for drawing layout and the minimum information to be shown. The Typical Electrical and Controls Drawings produced are not detailed design drawings. It is the responsibility of the electrical designer to ensure that the electrical design produced is fit for purpose and complies with Melbourne Water standards and AS/NZS standards. As part of each new project with elements of electrical and/or controls, Melbourne Water will provide the electrical consultant or contractor with the PDF and CAD files of the Typical Electrical and Controls Drawings.

All existing electrical equipment shall retain the existing asset number or P&ID tag. If the electrical equipment is new, the tag of the instrument or motor will be taken from the P&ID or Maximo Location ID. Each electrical and controls project shall have at least one associated P&ID.

All electrical and control drawings for an installation shall be saved within a single drawing Project file. Subfolders with a Project file can be created to group separate parts of the installation. Project and subfolder naming shall follow the MW Maximo Location ID.

The electrical consultant or contractor shall not change the line type or the font sizes on the CAD files. All symbols on the electrical drawings must be taken from Melbourne Water standard drawing symbols S38/240 and S38/241. These symbols have been sourced from AS 1102 and IEC 60617. The use of other symbols or symbol qualifiers from this suite of standards may be considered and approved for use by Melbourne Water. The use of JIS or IEEE symbols is not permitted.

General diagram structure and presentation shall follow the concept provided in the Typical Electrical Drawings and in IEC 61082-1.

Electrical component nomenclature shall follow the method outlined in IEC 81346. Electrical components within a motor starter cell which is physically and functionally separated from all functional units and is identified as a unique physical or functional unit may reset their item numerical suffix.

Instrument nomenclature shall be taken from the source P&ID and will generally follow ISA 5.1.

Coil to contact cross-references shall be provided to all electrical schematic diagrams. The cross reference shall be taken from a vertical grid which is marked on the left of the schematic. The drawing or sheet number shall not be in the cross reference but as a separate field. Cross references within the schematic diagram are to be provided in square brackets.

Wire and cable numbers are defined in CORP Am S006.

4.6. Electrical drawing numbering

The electrical drawing numbering shall be broken down into the following series:

- E0 series is allocated for drawing lists
- E1 series is allocated for single line drawings
- E2 series is allocated for distribution drawings, i.e. three line diagrams, 24V DC distribution, 110V DC distribution drawings
- E3 series is allocated for controls drawings including control architecture, rack layout, PLC drawings
- E4 series is allocated for motor schematic drawings.
- E5 series is allocated loop drawings and termination drawings
- E6 series is allocated for switchboard and control cubicle drawings
- E7 series is allocated for cable route, cable schedules and cable block diagrams

4.7. P&ID drawing

For any new or modified Piping and Instrumentation Diagram (P&ID) the Melbourne Water Standard P&ID Symbols shall be utilised, please refer to the latest revision standard drawings GS/PID/001 to 007.

For any existing numbered assets i.e. the P&ID tag number or asset number are to be retained.

Equipment Identification tag (P&ID Tag) and descriptor on P&ID drawings must be represented in all related drawings and in the field.

4.7.1. P&ID Production

MW has standardised Bentley AutoPlant series for production of Smart P&IDs. This shall be used where there are revisions to existing P&ID drawings developed on AutoPlant or where a new drawing is required at a facility where AutoPlant P&IDs are already in use (currently Eastern Treatment Plant). AutoPlant P&IDs may be required at other facilities as defined by the responsible Asset Manager.

Updates to existing P&ID drawings that were not created on AutoPlant (i.e. using another CAD package) may be updated from its original program either AutoCAD or MicroStation. A spreadsheet of plant P&ID tag details must be provided with the drawing submission in the agreed MW format.

4.7.1.1. P&ID Tag Numbering

The three elements for creating all P&ID tags are

1. Complex/facility
    a. blank for ETP P&IDs
    b. visible in the Autoplant Database, but not on the drawing
    c. In accordance with CORP AM P005
2. Area/Function Number

3. Equipment Information (that can be found on the Melbourne Water Standard P&ID Symbol drawings)

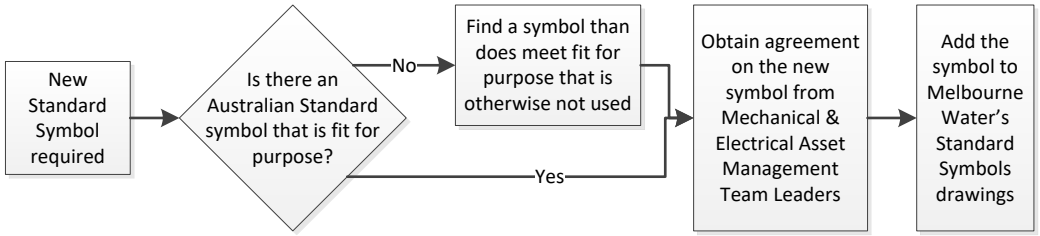
Tag Elements			Full Tag	Partial Tag	Site
Complex/facility In accordance with Corp AM P005	Area number / Function Number	Equipment Information	(as visible in AutoPlant Database)	(as visible on Drawing, Hansen/Maximo and Tag)	
(blank for ETP)	72	RWVA001	72RWVA001	72RWVA001	ETP Main Plant
41	79	VA117	4179VA117	79VA117	ETP Tertiary
WP010	2	RWVA001	WP0102RWVA001	2RWVA001	Silvan
WQ1	573	RWVA001	WQ1573RWVA001	573RWVA001	Winneke Lime Plant
WQ524		RWVA001	WQ524RWVA001	RWVA001	Yarra Glen Filtration
WQ224		RWVA002	WQ224RWVA002	RWVA002	Yarra Glen Chlorination
STB	0	APVA001	STB0APVA001	0APVA001	Brooklyn PS new air damper valve
WP091		RWVA001	WP091RWVA001	RWVA001	Pump Station
WR032		RWVA001	WR032RWVA001	RWVA001	Service Reservoir
WQ72	46	V09	WQ7246V09	46V09	Tarago (existing filtered water valve)
WQ72	46	FWVM010	WQ7246FWVM010	46FWVM010	Tarago (new filtered water valve)
SW25	40	V96	SW2540V96	40V96	Western Treatment Plant 25W Lagoon (Existing Tag)

FIGURE: Examples of P&ID Tags:

On non-Autoplant P&ID drawings (dumb CAD) the new P&ID tag should be verified in AMIS to avoid duplication. Any new P&ID Tags must be added to the corresponding record in AMIS via the appropriate field the AMIS upload template or direct association.

4.7.2. Creating new Melbourne Water P&ID Standard Symbols

If none of the current Melbourne Water P&ID Standard Symbols (including fluid codes) are fit for purpose then a new symbol may be added by Melbourne Water Mechanical & Electrical Asset Management following this process:



Once agreed upon, update the Melbourne Water P&ID Standard Symbols drawings with this new symbol in accordance with this procedure.

4.8. Licenced Surveyor certified drawing

A licenced surveyor must duly endorse (sign) drawings that show "As-Constructed" assets related to title on or near privately owned land (e.g. normally within an easement in favour of Melbourne Water). Alignments of works related to title should be shown by offsets and/or coordinates MGA94 (z55)

This can be done in two ways:

- Digital Certification: Melbourne Water will accept Gatekeeper compliant digital certificates that have been authorised by VeriSign (each Drawing shall be in a separate PDF file in accordance with 4.1.5); or
- Signing of Hardcopy Drawings: A licensed surveyor may certify a hardcopy drawing if digital certification is not available. Note: the certified hardcopy is in addition to related CAD and PDF files and must be printed at the original design scale.

4.9. Standard drawing

The Standard Drawings Title shall include the following features:

Standard Drawing Title: STANDARD ARRANGEMENT

Organisation Name: MELBOURNE WATER CORPORATION

Drawing Description: PIPE ANCHOR BASES

Title block will contain the Melbourne Water logo and next to the Melbourne Water logo will be space for the "Asset Manager" to have their name placed. The space set aside shall

include the words "Asset Manager" followed by the Asset Manager's name after acceptance of the drawing.

The Asset Manager's name will not be noted on the plan until after they have given their acceptance of the newly created standard drawing(s) via e-mail or similar. Format of the person's name will be the initials (e.g. J. C.). Once the Asset Manager has given their acceptance, the company preparing the drawing(s) will add the name of the Asset Manager to each CAD drawing and generate PDF(s) for final submission.

It is the responsibility of the Asset Owner to ensure that all relevant parties (e.g. operations, capital delivery) have been duly consulted before endorsement of the drawing(s).

4.10. Spatial information required

To enable Melbourne Water to easily consolidate the provided digital survey data into its Geographical Information System, the following information shall be provided in MGA94 (z55).

4.10.1. For Water Supply Assets:

Long Section and Pipe Detail Drawings with "As Constructed" Information including:

MGA94 (z55) Coordinates for:

- Change in direction;
- Start/end points;
- Pipe junctions and;
- Fittings (including manholes).

Chainage for:

- Change of grade;
- Start/end points and;
- Fittings (including manholes).
  - A/C Invert Levels (AHD values) of works shown;
  - Pipe's material, size and grade details amended;
  - Materials list shown for all pipes, valves and fittings and;
  - A condensed Long Section is provided where required, depicting:
- Major roads;
- Major obstacles;
- Major topographical features;
- River/Creek crossings.

4.10.2. For Sewerage system Assets:

Long Section and Pipe Detail Drawings with "As Constructed" Information including:

MGA94 (z55) Coordinates for:

- Change in direction;
- Start/end points;
- Pipe junctions;
- Fittings (including manholes);
- Pump well;
- Sewer vent;
- Inlet/outlet and;
- Any other sewer feature.

Chainage for:

- Change of grade;
- Start/end points and;
- Fittings (including manholes).
  - A/C Invert Levels (AHD values) of works shown;
  - Pipe's material, size and grade details amended;
  - Materials list shown for all pipes, valves and fittings;
  - A condensed Long Section is provided where required, depicting:
- Major roads;
- Major obstacles;
- Major topographical features;
- River/Creek crossings.

4.10.3. For Waterways and Drainage Assets:

As Constructed annotation is in addition to, and does not replace, Design values on Drainage drawings. As Constructed values can be shown either in designated As Constructed sections, or can be differentiated from Design values by unique text colour or by preceding the values with the letters 'AC'.

Long Section "As Constructed" Information including:

MGA94 (z55) Coordinates for:

- Change in direction;
- Start/end points;
- Inlet/outlet points;
- Pipe junctions;
- Fittings (including manholes);
- Tangent points and;
- Appropriate title corners.

Chainage for:

- Change of pipe attributes;
- Inlets/outlets;
- Start/end points and;

- Fittings (including manholes and structures).
  - A/C Invert Levels (AHD values) of works shown;
  - A/C Info prefixed with A/C where not in designated A/C sections
  - Pipe's material, size and grade details amended;
  - Structural schedule updated with A/C details:
- Levels;
- Dimensions;
- Diameter and;
- Depth
  - Detailed insets updated where relationship to title is shown;
  - Internal dimensions of structures amended where required;
  - The centreline of all linear constructed works should be shown (i.e. pipe centreline, channel centreline and levee bank centreline);
  - For open channels:
- Offsets and level details noted on cross-sections
- A/C cross section superimposed when not in accordance to design
- Relationship to title shown where appropriate
- Cross-section has been identified with running chainage
- Relationship to title shown where appropriate

For channels and levee banks:

- The toes;
- Top of cuts
- Any ramps or beams;
- 1 in 100 year ARI level

For lakes, retarding basins and wetlands:

- Water bodies;
- Embankments;
- Spot levels and generated contours where appropriate (i.e. spot levels may be more appropriate than cross sections) and;
- "As Constructed" Normal Top Water Level (NTWL) must be labelled and delineated;
- A 350 mm or 400 mm contour (below NTWL);
- Reduce Level (RL) for A/C NTWL and Extended Detention Depth (EDD);
- Planting 'zones' – typically these would be 'ephemeral marsh', 'shallow marsh', 'deep marsh' and 'submerged marsh' (or some similar nomenclature), open water;
- Pit details (including oriface control, removable plate, debris guard, riser pipe etc.);
- Link to MUSIC model/functional design report;
- Catchment size and shape (may be linked to MUSIC model);
- +- high flow bypass
- +- drawdown valve/penstock .

For sediment ponds

- "As Constructed" Normal Top Water Level (NTWL) must be labelled and delineated;

- A 500 mm contour (below NTWL);
- Base of pond (BOP);
- If BOP is 'hard' (rock);
- The designated sediment drying area;
- Catchment size.

For feature plans:

- spot level annotated on the design plan
- where feature plans have been prepared from scratch, they contain spot levels and generated cross-sections
- features such as edges of water bodies, weirs and spillways have been delineated
  - A condensed Long Section is provided where required, depicting:
- Major roads;
- Major obstacles;
- Major topographical features;
- River/Creek crossings.
  - A limited amount of text is required to assist with interpretation, such as manhole numbers, descriptions of unusual features, or road names
  - Line strings may be used to identify the location of 'as constructed' cross sections

4.10.4. For Underground Electrical cabling:

Long Section with "As Constructed" Information including:

- MGA94 (z55) Coordinates for:
- Change in direction;
- Start/end points;
- Connections and;
- Fittings (including manholes).
  - Chainage for:
- Change of grade;
- Start/end points and;
- Fittings (including manholes).
  - A/C Invert Levels (AHD values) of works shown;
  - Cable's material, size and grade details amended;
  - Materials list shown for all cables and fittings and;
  - A condensed Long Section is provided where required, depicting:
- Major roads;
- Major obstacles;
- Major topographical features;
- River/Creek crossings.

5. Rejection or Approval of drawings

Drawings can be approved or rejected by Asset Managers and the Plan Room Team. Asset Managers evaluate drawing content while the Plan Room Team evaluates the drawing requirements and standards as described in this document.

When a drawing is rejected the Plan Room Team sends a report to Client Representatives and Asset Managers listing the issues found.

The Plan Room Team signature on the transmittal note does not indicate the drawings were approved by Melbourne Water.

Approved drawings are uploaded into EPMS and become available for consultation. An email would be sent notifying interested parties that the drawings were uploaded into EPMS.

6. Other Documentation

6.1. O&M manual

If new or existing O&M Manuals are to be submitted, then the procedure to be used is *CORP AM P007 Documenting Operation and Maintenance Manuals.* It outlines the process to incorporate these manuals into the current Melbourne Water manuals system and details standard format with appropriate subject content.

6.2. Geotechnical report

If geotechnical reports are to be submitted, then the procedure to be used is *CORP AM P019 Melbourne Water Geotechnical Information Requirements.* It outlines the method for reserving new borehole numbers, report content requirements and the attribute structure of MS Excel file.

Definitions

Reference	Definition
A/C	As constructed
Autoplant	CAD software tool connected to a database for Smart P&ID drafting
CAD	Computer Aided Design
CMS	Capital Management System
Consultant	The external consultant or maintenance contractor engaged by MWC to prepare drawings.

Client Representative	Melbourne Water representative responsible for the project.
Discipline Code	The letter code referring to the engineering discipline of the drawing i.e.: electrical, civil etc. Refer to Appendix D for examples.
Dumb CAD	CAD that is not backed by a referential database (not Smart CAD/ non Autoplant CAD)
EPMS	Electronic Plan Management System: EPMS is a module of the Inflo system.
Gatekeeper	Gatekeeper is the Australian Federal Government's initiative for the use of PKI (Public Key Infrastructure) with Federal and State government agencies. Gatekeeper certificates are digital certificates which allow individuals and organisations to securely conduct business across the Internet.
GIS	Geographic Information System
Inflo	Document Management System used by Melbourne Water
MGA94 (z55)	Standard Universal Transverse Mercator (UTM) map projection of cartesian coordinates (Easting and Northings) based on the nationally adopted Geographic Datum of Australia (GDA) within UTM zone 55.
MWC	Melbourne Water Corporation
O&M Manual	Operation and Maintenance Manual reference documents
P&ID	Process & Instrumentation Drawings
Planning and Building Requirements	Melbourne Water requirements and guidelines for land development undertaken project. Available on the Melbourne Water website under Planning and Building. Formerly known as the Land Development Manual
Plan Room Team	Any member in the Data Maintenance Team - Asset Management Systems. Email address: epms.planroom@melbournewater.com.au

Projection	A map projection is any method of representing the surface of a sphere or other three-dimensional body on a plane.

References

Standards and Related Documents

Plan Documents are located on EPMS (Electronic Plan Management System):
http://livelink/inflo/cs.exe/open/9669632

CORP AM Waterway Plan Auditing Standard
http://livelink/inflo/cs.exe/Properties/41565721

Planning and Building Requirements are available on the Melbourne Water website:
http://www.melbournewater.com.au/Planning-and-building/Pages/planning-and-building.aspx

Plan Reservation Form
http://livelink/inflo/cs.exe/open/10209239

Drawing Title Block - Official MWC A1 Drawing Sheet
http://livelink/inflo/cs.exe/Open/9677536

Melbourne Water Standard P&ID Symbols:
http://livelink/livelink/livelink.exe/Open/9669460CORP AM P005 Asset Numbering,

Labelling & Data Capture Procedure
http://livelink/livelink/livelink.exe/open/3513531

CORP AM P007 Documenting Operation and Maintenance Manuals
http://livelink/livelink/livelink.exe/open/3513582

CORP AM P031 Procedure for Decommissioning an Asset.docx
http://livelink/livelink/livelink.exe/open/16300999

CORR-09 (2007) Insp & T.P Install'n Ver.3 (10Apr07).pdf – Corrosion Specs
http://livelink/inflo/cs.exe/open/properties/5737366

Stakeholder Consultation

This document will be circulated amongst Asset Planning Managers and Team Leaders prior to approval.

Document History

A summary of previous versions of this document:

Date	Reviewed/ Actioned By	Version	Action
Jan 2001	Charmaine Quick, Manager Asset Management, Western Sewerage	1	All
Jul 2002	Grant Wilson, Group Manager, Infrastructure	2	All - incorporating new EPMS
Jan 2002	Grant Wilson, Group Manager, Infrastructure	3	Change in AMS ref. no. (Formerly AMS1209) and incorporation of EMS audit recommendation.
Apr 2004	Grant Wilson, General Manager Infrastructure	4	Incorporated Audit findings
Apr 2008	Team Leader, Asset Management Improvement	5	All (re-written to incorporate current requirements of project deliverables)
Aug 2008	Team Leader, Asset Management Improvement	6	Minor changes based on feedback to Amendment No.5
Jul 2010	Team Leader, Asset Information	7	Minor updates incl. P&IDs
Jul 2012	Team Leader, Asset Management Systems	8	All - incorporating new EPMS
Nov 2012	Team Leader, Asset Management Systems	9	Remove Appendix E from version 9a (Plant Wide Drawings)
May 2013	Keith Wesley - Team Leader, Asset Management	10	All (re-written to incorporate current requirements of project deliverables)

	Systems		
March 2014	Cameron Cossart – Data Maintenance Coordinator / Keith Wesley - Team Leader, Asset Management Systems	11	Revisions to Sections 3.1 Transmittal Documents, 4.1.2 Revision box, 4.1.9 Revision Clouds, and 4.5 P&IDs
September 2014	Cameron Cossart – Data Maintenance Coordinator / Keith Wesley - Team Leader, Asset Management Systems	12	Minor correction: Added clarification of P&ID tags creation and reference: 4.5.1.1, clarification of pdf requirements: 4.1.5, additional entries added to Definitions Table, 4.8.3 Wetland and Sediment Pond requirements.
August 2015	Cameron Cossart – Asset Data Leader/Keith Wesley – Asset Management Systems Team Leader	13	4.1.3 clarification of superseded drawings
December 2015	Cameron Cossart – Asset Data Leader	14	Clarification for P&ID tag numbering in section 4.5
January 2016	Cameron Cossart – Asset Data Leader/Andrew Buchanan – Team Leader, Asset Management Systems	15	4.5 change to P&ID Autoplant requirements
October 2016	Cameron Cossart – Asset Data Leader	16	4.5.1 addition of P&ID tag spreadsheet requirement
February 2018	Cameron Cossart – Asset Data Leader	17	Updates to References and 4.1.5
February 2018	Cameron Cossart – Asset Data Leader	18	Updates to 4.5.1.1 & References - removal of reference to retired documents.

September 2018	Geospatial, Asset Data and Survey Team Leader	19	Correction of P&ID references throughout document. Clarification to requirements within sections 3, 4.2 & 4.8.3.
December 2018	Geospatial, Asset Data and Survey Team Leader	20	Inclusion if items 4.5 – Electrical drawings & 4.6 Electrical drawing numbering

Appendix A: Drawing Requirements Checklist

To be completed and delivered with each drawing submission.

Requirement	Section	
Each drawing submitted has a number reserved	2	☐
Delivered Documents include:	3	
Transmittal Note		☐
Drawing List Spreadsheet		☐
CAD Files		☐
PDF Files		☐
P&ID Files (AutoPlant dB)		☐
Drawing Requirements Checklist		☐
Title Block:	4.1.1	
Standard Drawing Title		☐
Organisation Name		☐
Drawing Description		☐
Relevant Area (Asset Name, Complex Name)		☐
Identification (MWC Asset ID)		☐
Type of drawing (Discipline)		☐
Consultant details are shown in the drawings		☐
Revision Box:	4.1.2	
Updated with "as constructed details added" where A/C mark-ups have been added		☐
Includes revision date		☐
Relevant Initials		☐
Date of issue - A/C		☐
Drawing status & labels requirements are met	4.1.3	☐
Superseded drawing requirements are met	4.1.3	☐
Melbourne Water drawing numbers used	4.1.4	☐
CAD Drawings are:	4.1.5	
Zipped/Packaged into a single file with relevant font libraries, plot dependency files and reference files (i.e. TIFF) for each drawing.		☐
DWG (Pre 2010) or DXF (Pre 2010) or DGN		☐
PDF Drawings are:	4.1.5	
An output of the CAD files		☐
Orientated correctly		☐
Named correctly	4.1.6	☐

Drawing referencing between existing and new drawings must be comprehensive	4.1.7	☐
Digital Survey Information requirements are met	4.1.8	☐
Revision clouds requirements are met	4.1.9	☐
Fonts are legible when drawings are printed	4.1.10	☐
Source Control Information requirements are met	4.1.11	☐
Decommissioned Assets - Drawing requirements are met	4.2	☐
Addendum drawing requirements are met	4.3	☐
Vendor Drawing requirements are met	4.4	☐
Piping and Instrumentation Diagram (P&ID) requirements are met	4.5	☐
Licence Surveyor Certified Drawing requirements are met	4.6	☐
Standard Drawings requirements are met	4.7	☐
Spatial Information Required:		
For Water Supply Assets - requirements are met	4.8.1	☐
For Sewerage - requirements are met	4.8.2	☐
For Waterways & Drainage - requirements are met	4.8.3	☐
For Underground Electrical Cabling - requirements are met	4.8.4	☐

Appendix B: Water Supply drawing numbers

Example of a treatment plant drawing number is WQ201/E/001

Where the first two characters stands for type of asset; **WQ** – Water Quality

Third character represents type of treatment;

2 - Chlorination, **3 -** Fluoridation, **4 -** PH Correction / Lime, **5 -** Filtration

Following two characters representing asset number;

01 – Asset Number for Winneke Treatment Plant.

/ - followed by forward slash

Next character represents discipline;

E – Electrical **M** – Mechanical **C** – Civil

J – Process Control **G** – General **A** – Architectural

/ - followed by forward slash

Last three characters are the drawing number (Consecutive three-digit number); **001**, **002**, etc.

Example of the other water supply drawing number is WR167/E/001

Where the first two characters represent type of asset;

WR – Water Service Reservoir **WP** – Water Pumping Station

WB – Water Pressure Reducing Station **WT** – Water Surge Tank

WH – Water Storage Reservoir **WZ** - Water Hydro Power Stations

Following characters represent Asset Number;

167 – Asset No. for Cranbourne Service Reservoir.

/ - followed by forward slash

Next the character representing discipline;

E – Electrical **M** – Mechanical **C** – Civil

J – Process Control **G** – General **A** – Architectural

/ - followed by forward slash

Last three characters are the drawing number (Consecutive three-digit number); **001**, **002**, etc.

Example of the water main and aqueduct drawing number is M102/001 & A5/001

Where the first character represents type of asset, i.e.; **M** - Water Main, **A** - Aqueduct

Following characters represent asset number, i.e.

102 – North Essendon Inlet Water Main, **5** – Maroondah Aqueduct.

/ - followed by forward slash

Last three characters are the drawing number (Consecutive three-digit number); **001**, **002**, etc.

Appendix C: Drawing Type / Discipline

Architectural: Layouts / General Arrangement	
	Views
	Details
Civil	Elevations
	Longitudinal Sections
	Layouts / General Arrangement
Electrical/ Instrumentation	General Arrangement
	Single Line Diagram
	Schematic Diagram
	Wiring Diagram / Loop Diagram
	Cable Schedule
	Equipment Schedule
Mechanical	General Assembly / General Arrangement
	Component Detail
	Isometric / Piping Layout
	Schematic Layout
	Sectional View
	Pipe Schedules
Process	Piping & Instrumentation Diagram (P&ID)
Structural	Plan and Elevation Views
	Detail Fabrication / Section Drawing
	Tables
Schedules	

Appendix D: Drawing Title examples

MELBOURNE WATER CORPORATION - WESTERN TREATMENT PLANT - WTP AERATOR MOORINGS – LAGOON 115 E POND 2 AERATOR ANCHOR DETAILS	
MELBOURNE WATER CORPORATION	
C5527/07/042	B
MWC DRAWING NUMBER	REV

MELBOURNE WATER CORPORATION - EASTERN TREATMENT PLANT - ETP EGEP- POWER STATION – TYPICAL ENGINE – JACKET WATER PUMP SCHEMATIC DIAGRAM	
MELBOURNE WATER CORPORATION	
E62/02/133	B
MWC DRAWING NUMBER	REV

MELBOURNE WATER CORPORATION - CARDINIA CHLORINATION PLANT – WQ206 INJECTOR ISOLATING VALVE ACTUATOR DRIVE SPIGOT COMPONENT DETAIL DRAWING	
MELBOURNE WATER CORPORATION	
WQ206/M/042	A
MWC DRAWING NUMBER	REV

Appendix E: Reserving drawings already reserved – process diagram