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1 INTRODUCTION

Main Roads WA requires the collection of underground utility data for the purposes of planning, detail design, maintenance and construction. Each process requires differing levels of detail and accuracy with regard to the collection of this data.

1.1 PURPOSE

The purpose of this standard is to establish the requirements of all work related to the collection and presentation of underground utilities and utilities data for Main Roads.

All work must be performed and presented in accordance with the following standard to ensure that Main Roads has certainty in delivery quality and procedure.

This Underground Utilities Standard should be read in conjunction with the Underground Utilities Survey Guideline.

1.2 SCOPE

This Standard must apply to all work related to the supply of utility data. Advice and further information on this standard can be obtained by contacting the Senior Engineering Surveyor, Asset & Geospatial Information Branch Main Roads.

surveying@mainroads.wa.gov.au or call 138 138

1.3 DEFINITIONS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Verified Utility Model</td>
<td>Utilities that have been surveyed in the field by a method to define its position and level. For example, a verified utilities model of a water pipe would result from the water pipe being located via ground penetrating radar or if the pipe had been uncovered and measured by survey instrumentation.</td>
</tr>
<tr>
<td>Unverified Utility Model</td>
<td>Utility locations that have been derived from plans (as built) or digital data from the service provider but have not been checked in the field to confirm the service position. It is an indication that utilities are possibly in the general location.</td>
</tr>
<tr>
<td>Digital Ground Survey</td>
<td>Features that have been surveyed in accordance with the main roads standard- 67-08-43 Digital Ground Survey Standard to define its position and level. These features can be used to indicate the presence of services and identify logical end points.</td>
</tr>
<tr>
<td>UUS Search Area</td>
<td>The extents of the area that all locatable services are to be or have been identified by the underground utilities survey.</td>
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<tr>
<td>MRWA</td>
<td>Main Roads Western Australia.</td>
</tr>
<tr>
<td>Contractor</td>
<td>The party named in the contract to collect and present underground utility data.</td>
</tr>
<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System.</td>
</tr>
<tr>
<td>RTK</td>
<td>Real Time Kinematic. A GNSS survey technique utilising GNSS.</td>
</tr>
<tr>
<td>Project Manager</td>
<td>The Main Roads officer responsible for the overall project.</td>
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### Term Definition

<table>
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<th>Term</th>
<th>Definition</th>
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<tr>
<td>Contract Manager</td>
<td>The Main Roads officer responsible to deliver the specific utilities data to the Main Roads project manager.</td>
</tr>
<tr>
<td>Genio</td>
<td>An ASCII file format used by MRWA to input data into MX road design software</td>
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#### 1.4 REFERENCES AND RELATED DOCUMENTS

<table>
<thead>
<tr>
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<tr>
<td>67-08-43</td>
<td>Digital Ground Survey Standard</td>
</tr>
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<td>67-08-36</td>
<td>Road Reference Mark Standard</td>
</tr>
<tr>
<td>67-08-37</td>
<td>Minor Control Points Standard</td>
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<tr>
<td>D15#321963</td>
<td>Survey Metadata Standard</td>
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<td>Underground Utilities Survey Guideline</td>
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<td>Data Lodgement Guideline</td>
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<tr>
<td>D15#329521</td>
<td>Metadata Statement Form – Underground Utilities</td>
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<tr>
<td></td>
<td>“Traffic Management Requirements for Works on Roads” Code of Practice</td>
</tr>
<tr>
<td></td>
<td>Specification 106 Utilities and Services</td>
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</table>

#### 2 ENTRY ONTO LAND

It is the contractor’s responsibility to seek and obtain permission from landowners, occupiers or management authorities before entering any property to undertake survey work. Property includes Crown land which may consist of Reserves, National Parks or State Forests. Work may include, but is not limited to, traversing, investigation, surveying and uncovering utilities.

The contractor shall maintain a written report of all contacts. Details about each contact are to be outlined in the Underground Utilities Survey Metadata statement.

Any queries made by land owners with respect to the project are to be referred to the Main Roads Project Manager.

If access onto land is refused by the land owners, the contractor will be required to immediately contact the Main Roads Project Manager to discuss the need for entry onto the land. If entry is required for the completion of the contract and there are no other alternatives, then Main Roads will arrange formal notification using delegated powers under the Land Administration Act.

A formal notice of entry requires Main Roads to provide 7 days’ notice to the owners. The process to arrange the formal notice of entry may take some time and the contractor must liaise with the Project Manager to ensure disruption to the contract schedule is minimised.
3 WORKING WITHIN THE ROAD RESERVE

Anyone carrying out operations on a road open to traffic has a duty of care under common law to take all reasonable measures to prevent accident or injury to construction workers & road users, damage to assets owned by Main Roads & other utility providers and to maintain existing environment.

The Contractor shall be responsible for Traffic Management in accordance with the Main Roads “Traffic Management Requirements for Works on Roads” Code of Practice.

4 ENVIRONMENTAL IMPACT

All work is to be performed such that environmental impact is minimised. Any breach of environmental and heritage legislation during the execution of works is the sole responsibility of the contractor.

The contractor shall ensure any disturbances are kept to an absolute minimum. The contractor shall reinstate, clean-up and leave the site as close to its pre-disturbed condition as possible on completion of any work or investigation.

New tracks shall not be formed, existing tracks altered, fencing cut, clearing carried out, or damage or disturbance made of any kind unless approved by the Main Roads Project Manager.

The contractor shall be responsible for the cost of reinstating any damage to property resulting from their work.

5 SPECIFICATION FOR SURVEY CONTROL

All data capture and submitted information for Underground Utility Surveys must conform to the following MRWA specifications.

5.1 SURVEY DATUM

All Underground Utility Surveys are to be captured and supplied in the requested Main Roads project zone.

All project zone parameters are available online at


Or from the Senior Geodetic Surveyor (Ph: 9323 4152).

All utilities data must be 3D and relate to the Australian Height Datum (AHD). If the utility provider supplies 2D data, then the data must be converted to 3D and have -999 nominated as the height component.

5.2 SURVEY CONTROL

Suitable and sufficient geodetic control is required for all Underground Utility Surveys to enable specified accuracies to be met. Existing control located within the survey extents must be checked.
All survey control for Underground Utility Surveys shall meet or exceed positional standards (horizontal and vertical) specified in Main Roads Standard 67/08/36 Road Reference Marks (RRM) or 67/08/37 Minor Control Points (MCP).

A summary of survey control used and / or established is to be included in the lodgement of data (refer Data Lodgement Guideline, RRM/MCP Standards)

Any new Road Reference Marks required shall be established according to Main Roads Standard 67/08/36 Road Reference Marks.

5.3 SURVEY ACCURACY AND QUALITY

Survey procedures and equipment used must relate to the attainment of the spatial tolerance nominated for each data quality class.

Survey checks should identify the following types of errors:

- Systematic errors.
- Instrument errors or equipment calibration.
- Errors in information such as control marks, or design information.
- Human error.

Preferably the checks should be independent of the surveying process being checked. Redoing the same survey process as a check is discouraged and should only be used as a last resort (too often the same mistake is made again).

Examples of independent checks include:

- Closed traverse loops;
- Checking distances between points radiated;
- Check shots to survey control marks in electronic tachometry surveys;
- Checking distances to other features whose position has been verified;

The objective is to assure that the survey is correct when completed. In this regard an honest effort must be made to identify parts of the survey process that could produce errors and make every effort to assure against this happening.

6 CONDUCTING AN UNDERGROUND UTILITIES SURVEY

6.1 IDENTIFYING THE PROJECT SCOPE

Before commencing the utilities search the contractor must clearly understand the project requirements. The minimum requirements on requesting an underground utilities survey are outlined in part 3 of the Guideline for Underground Utility Surveys.

Underground Utilities Survey Guideline

All aspects of the project scope should be clarified with the project manager before submitting a quote for service. Price variations may not be considered if the contractor failed to properly understand the level of service required.

An underground utilities survey will be requested by the Main Roads project manager to meet one of, or a combination of the following quality classes to allow data to be customised to Main Roads requirements.
6.1.1 **CLASS D (DATA QUALITY)**

The contractor will be required to perform the following tasks to complete a quality Class D utilities search.

- Collect utilities data from DBYD or the service providers / custodians. This can include property owners, mine sites, Local Government authorities, MRWA etc.
- Supply all utility information in digital format adopting Main Roads codes and file formats.
- Supply all raw data obtained from the service providers; include evidence of no services in area responses.
- Provide an underground utilities survey metadata statement.
- Provide UUS search area extents file.

6.1.2 **CLASS C (PLANNING QUALITY)**

The contractor will be required to perform the following tasks to conform to quality Class C.

- Perform all tasks for a Data Quality class D utilities search as above (see 6.1.1).
- Survey all surface utility features in accordance with the Main Roads survey standard 67-08-43 Detail Ground Survey standard using the appropriate MRWA codes.
- Alter all subsurface utilities locations obtained from supplied plans to align with surveyed surface features to depict their location. These lines are to be clearly noted in the underground utilities survey metadata statement or on plots as “probable location only”.
- Liaise with the Main Roads project manager for requirements. Contractor may be required to lift service manhole lids to confirm pipe directions and measure pipe diameters. Sub surface man holes and areas are not to be entered for safety reasons. All observations and measurement are to be performed from outside the manhole.
- Supply all utility information in digital format adopting Main Roads codes and file formats.
- Provide an underground utilities survey metadata statement.
- Provide UUS search area extents file.

6.1.3 **CLASS B (DESIGN QUALITY)**

The contractor will be required to perform the following tasks to complete a quality Class B underground utilities survey.

- Perform all tasks for a Data Quality class C utilities search (see 6.1.2).
- All utilities shall be surveyed by an indirect survey method. This can involve locating gas, electric, phone, water, sewer and cables with methods such as ground penetrating radar, active and passive frequency detectors, electromagnetic detectors, acoustic detection systems.
- The accuracy of the utilities shall be located to (+ or -) 150 mm at a depth less than 1.2 meters and an accuracy of (+ or -) 300 mm for depths greater than 1.2 meters.
- Leave markings on the earth’s surface to denote the position of the service underground.
- Supply all utility information in digital format adopting Main Roads codes and file formats.
- Provide an underground utilities survey metadata statement.
- Provide UUS search area extents file.

**Note on providing depths to services on traced features.**

*Electronic detection is not an accurate measure of depth information due to the potential for interference from adjacent services and other geological conditions. This information is however useful in the early planning stages as a guide to potential clashes and must be supplied. All electronic...*
depths are coded PZS and the use of these points is at the designers own risk. The expected vertical accuracy is ±500mm unless otherwise stated. If the electronic depth is unreliable or the locator is not confident with its accuracy the depth is still required but depth should be labelled as estimated depth +/- X metres. This text is to be included in the sketches and the Genio file.

6.1.4 CLASS A (CONSTRUCTION QUALITY)

Quality Class A is the highest accuracy order for an underground utilities survey. The contractor will be required to perform the following tasks to complete a quality class A underground utilities survey.

- Perform all tasks for a Data Quality class C utilities search (see 6.1.12) to search, identify and measure all utilities in critical areas that have an impact on the “scope of works”.
- Liaise with the Main Roads Project Manager to identify required pothole locations.
- Expose / pot hole the utility and measure directly to it using adequate survey methods.
- Survey methods must achieve accuracies of (+ or -) 50mm horizontally and (+ or -) 50mm vertically.
- The contractor must be licensed to expose the requested utilities or use a subcontractor who is. All necessary approvals must be in place to undertake the work.
- The contractor must ensure the integrity of the service and the safety of the workers and public are maintained at all times.
- Supply all utility information in digital format adopting Main Roads codes and file formats.
- Provide an underground utilities survey metadata statement.
- Provide UUS search area extents file.

Measuring Pipe Depths

Existing services are surveyed primarily for clash detection, therefore it is essential errors are not made in the clash modelling process. All pipes must be located to the Pipe Crown or to the highest central pipe in a bank of cables.

It is important to keep this in mind when using multiple locating techniques and apply suitable offsets to ensure the best possible accuracy. Pipe diameters should normally be recorded as external diameter though there will often be occasions when internal diameter is requested for drainage assessments.
A bank of services that follow one alignment should be located to the centre top of the bank. The pipe configuration must be shown on the field sketch and text added to the Genio eg. Telstra bank 10 x P50
6.2 COLLATING DATA

Although the http://www.1100.com.au Dial Before You Dig website is an excellent source of information, not all utility asset owners are members and therefore this is not a complete list of the assets in the area. Upon site inspection any indication of assets such as MRWA or local government street lighting, PTA cables or unexpected service pits must be investigated further with the asset owner and a record of communication added to the utilities search metadata statement.

The Electrical Design Manager from road network services directorate can assist with MRWA electrical communication and lighting services - Phone: 138 138

MRWA stormwater drainage should be investigated on site.

All original utilities search data provided from the utility provider must be supplied to Main Roads in addition to the final utilities data that has been altered to comply with Main Roads coordinate system, string codes and file format.

All Asset Owner’s plans and digital files in the original data format and coordinate system must be supplied to Main Roads. A non-comprehensive list of asset owners and contact details is displayed below for reference only.

Telstra: Telstra.Plans@team.telstra.com
Optus: sue.devenyns@optus.com.au
Western Power: dgit@westernpower.com.au
Water Corp: spatial.reporting@watercorporation.com.au
Atco Gas: drawing.office@atcogas.com.au
Vocus: onecalls@vocus.com.au

6.3 VERIFYING SERVICES ON-SITE

A site visit is necessary to identify any assets not identified in preliminary data searches and if required survey the assets to improve data accuracy.

6.3.1 PERSONNEL

All personnel who attend site, must hold a Construction Safety Awareness Blue/White card.

All Survey work must be undertaken by Survey professional with a relevant Bachelor Degree or Diploma of Surveying, adopting survey methods which meet the required accuracies outlined in the code lists (Appendix A).

The lead location technician must be a suitably trained professional with minimum 2 years’ experience locating services in Western Australia and a competency in - RIICCM202D– Identify, Locate and Protect Underground Services.

Also the following inductions are essential when working around the relevant services:

- ATCO GAS HP accreditation
- Western Power – network authority card and RIC accreditation
- Water Corp induction card
- Optic fibre location accreditation
- Telstra’s plant location accreditation
Location personnel must be prepared to identify the indicated depth to all services as measured by their equipment. Failure to meet this requirement will be considered a breach of contract; it is up to the surveyor to indicate the accuracy of these measurements with appropriate coding and in the metadata statement.

### 6.3.2 EQUIPMENT

All survey and location equipment used must be maintained to the manufacturer’s recommendation with regular calibration to ensure data integrity. Locating methods must be reported in the metadata statement.

### 6.3.3 IDENTIFYING FEATURES

Services located are to be marked on site with crayon, paint, pegs or PVC pipe markers with colours that match the site sketch and any files lodged in the final submission. Erroneous marks should be removed if possible or covered over.

- Paint markings shall be at less than 15m intervals on linear runs and at all changes in direction for all services.
- Indicative depths shall be painted at less than 30m intervals and at all changes in depth for all services.
- Services information shall be marked at start and finish of the service run and less than 50m intervals and include:
  - Services ownership e.g. Telstra, Optus, Amcom, Water Corp, Western Power.
  - Cable type and size e.g. Optic fibre, High Voltage, Main Cable, SSI cable, Communication cable or Signal Feed cable.
  - Pipe construction type and size shall be provided where information is available (i.e. RCP 450mm) at start of run.
  - Additional information regarding assets (i.e. HPGM high pressure gas main)
- Service marking and abbreviations:
  - Services shall be colour marked, refer to 7. - STANDARD COLOURS
  - Ensure all markings are discrete and not oversized.
  - Ensure buildings and properties are not damaged by paint markings.
- Markers used to identify Pot holing locations should include the following information.
  - Date
  - Location company
  - Service type / size
  - Depth to service (mark at ground Level)
  - Ribbon or paint colour to match service type.

### 6.3.4 TRACING SERVICES

Services should always be traced to a logical end point or far enough past the extent of the Project area to ensure the service does not return inside the UUS search area. If a logical end point is not found on a service this must be brought to the attention of the Project Manager for further action.
6.4 UNCOVERING UTILITIES

Any utilities uncovered must be by a recognised licensed body that is qualified to uncover buried utilities (i.e. pot holing or vacuum dredge). The integrity of the service and the safety of the workers and public must be maintained at all times.

6.5 ENTERING MANHOLES

Man holes and underground areas are not to be entered under any circumstances.

7 STANDARD COLOURS

The following colours should be used in the field and also on location plans:

- Cadastral boundaries – Black
- Text – Preferably black with a white halo otherwise Black or White
- Utilities related to water supply – Blue
- Utilities related to storm water – Green
- Utilities related to sewerage – Brown
- Utilities related to optic fibre – Pink or Purple
- Utilities related to copper communications - White
- Utilities related to electricity – Red
- Utilities related to gas - Yellow
- Utilities related to MRWA – Orange
- Reticulation and unknown services - Black
- Other features – can be any colour as long as it is clearly indicated in the legend of the plot.
- A bright Green Boundary string must be used to clearly identify the UUS search area in which all services have been located. This string must be labelled as Class B or Class D to indicate the quality level of each search.

8 LODGED INFORMATION

The following items must be lodged with the nominated Main Roads Survey Representative.

The Survey Representative will then deliver all the information to the Main Roads, Survey and Geospatial Data Manager in accordance with the 'Data Lodgement' guideline, 67-08-119.

(i) The underground utilities survey file. (MX Genio)
(ii) UUS search area boundary file. (MX Genio)
(iii) Detail ground survey features file (MX Genio)
(iv) Original utilities search data. (as received from provider)
(v) Service Locators utilities plot (.pdf)
(vi) Control listing (xls format)
(vii) Metadata Statement in accordance with Metadata Requirements Guideline

8.1 UNDERGROUND UTILITIES SURVEY FILE

All utilities are to be searched, converted and supplied as MX Genio data files.

Scaling of hard copy utility provider plans may only be performed when no electronic version exists with the utility provider.

Each individual component of a service should only be represented once in the file.
Once the quality of a services location has been improved from a lower data quality standard to a higher standard, the old version must be removed to avoid confusion over the number of services in the ground.

Only Main Roads feature codes detailed at Appendix A can be used. Any relevant feature not represented in the code list must still be captured. A unique code is to be assigned. Point feature codes must start with ‘P’. Non-standard feature codes are to be detailed in the metadata report. All additional approved codes must be clearly noted within the underground utilities survey metadata statement. Existing Main Roads codes must be used with text clearly denoting differences in details. Identified features used to show logical end points and other relevant utility markers must be coded according to the 67-08-43 Detail Ground Survey Standard.

All utilities must be 3D. Where original utilities are without levels these must be made 3D and given a null level of –999.000.

8.1.1 TEXT

Text / annotation must be situated at an appropriate coordinate location accompanying the feature or characteristic being described. The orientation of the text / annotation should maximize legibility but minimize interference with other features.

The maximum length (including spaces) for any single element of text / annotation is 44 characters. If the description exceeds 44 characters, multiple text elements are required and must be positioned correctly to ensure legibility.

The height of the text is to be 1m in ground units.

Comment lines in the MX GENIO file must be preceded by three spaces.

8.1.2 STRING COMPRESSION ON MX GENIO DATA FILES

All utility strings supplied in MX Genio files must be run through compression software to ensure that the number of Main Roads captured labels do not exceed the permutation of possible labels available.

Acknowledgement must be written within the metadata statement that the MX Genio files supplied to Main Roads have been compressed.

Compression software can be obtained from the Data Manager, Asset & Geospatial Information Branch, Main Roads WA. Or at the following link:


8.2 UUS SEARCH AREA BOUNDARY FILE

An outline of the UUS search area must be supplied in a single file and labelled as a two-dimensional “B” string. The string must form a closed polygon.

The Data file name must contain Verified or Unverified to indicate the quality of the locate data. If two different quality UUS search areas are requested two boundaries should be supplied in two separate files named appropriately.
8.2.1 MX GENIO DATA FILE NAMING CONVENTION

All underground utilities survey data must be provided to Main Roads in MX Genio format files.

Digital files shall be named in accordance with the following naming convention and consist of two files. These are the utilities data and the boundary of the UUS search area (ext).

For example, if the Great Northern Highway had utilities collected within the road reserve corridor from 25 – 55 SLK then two data files would be supplied and labelled accordingly:

All utilities data would be supplied within the data file named

H6_25_55_UUS.gen

Where:

- **H6** is the Main Roads code for the Great Northern Highway
- **25** is the start SLK
- **55** is the end SLK and
- **UUS** is the annotation to denote a utilities file

Additionally a second file would outline the extent of the service survey and would be labelled

H6_25_55_ext.gen

Where:

- **H6** is the Main Roads code for the Great Northern Highway
- **25** is the start SLK
- **55** is the end SLK and
- **ext** is the annotation to denote that this file outlines the “extent” of the area that the service search was performed on.

Road numbers and SLK’s for each project will be supplied by the project manager.

8.3 DETAIL GROUND SURVEY FEATURES FILE

Additional surveyed detail such as utility pits, taps, meters, markers etc. should be removed from the underground utilities survey model. This information should be supplied separately and in accordance with the main roads standard- 67-08-43 Detail Ground Survey Standard

8.4 ORIGINAL UTILITIES SEARCH DATA

All original utilities search data provided from the utility provider must be supplied to Main Roads along with contact details (contact name, date of contact, company)

8.5 SERVICE LOCATORS UTILITIES PLOTS

The underground utilities plots must be provided and checked by the lead location technician who conducted the field search. These plots are to verify the information gathered by the survey team. The following details apply:

- The plot shall be supplied in (pdf) file to standard A3 series page sizes.
• All service plots must be supplied at a scale that allows all services to be clearly identified.
• All utilities data is to overlay base data that will consist of aerial imagery and/or cadastral data. The base data shall be the latest information available at the time of the plan creation and can be supplied by Main Roads WA. Contractors must request the base data from Main Roads if it has not been provided.
• Example plots are attached in Error! Reference source not found.

8.5.1 LEGEND KEY

Each plan will include a legend key identifying the colours used and the services located. The colours used in the Legend must match the colours used in the plot and the field.

The legend and sketch should be used to identify features that are not clearly identified in the code list. Examples include high voltage and low voltage power, high pressure gas mains and medium pressure gas lines.

8.5.2 MAIN ROADS LOGO AND DISCLAIMER

The “Government of Western Australia” and “Main Roads Western Australia” logo must appear on all plots. The Government of Western Australia logo must appear before the Main Roads Western Australia logo as shown below.

The logos must be accompanied with the following disclaimer below it:

“Copyright and Intellectual property over the information displayed on this plan shall remain the property of Main Roads. The copying, exchange, sale or release of the information cannot be undertaken without prior notification and written agreement of Main Roads.”

8.5.3 NORTH POINT

A standard Main Roads North point is to be located on each plot.

North points are never to face downwards.

8.5.4 COMPANY LOGOS

Company Logos and acknowledgements may be discretely placed on the utilities plot within the title bar or on the title pages of a booklet. The placement of the logos is as per Appendix B. A company’s logo, address, phone numbers etc. (combined) must not be larger than the Main Roads logo.

8.6 SURVEY CONTROL LISTING
This file must contain the details of all survey control in the search area along with details about the checks performed on each mark.

### Survey Control checks for Contract 2018UUS0123
Mitchell Fwy SB Widening Hepburn to Warwick

<table>
<thead>
<tr>
<th>Point ID</th>
<th>Published</th>
<th>Surveyed</th>
<th>∆ East</th>
<th>∆ North</th>
<th>∆ Elev</th>
<th>Notes</th>
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</thead>
<tbody>
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<td>46001.123</td>
<td>46001.123</td>
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<td>0.003</td>
<td>0.002</td>
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</tbody>
</table>

8.7 UNDERGROUND UTILITIES SURVEY METADATA STATEMENT

Any survey supplied to Main Roads must have a metadata statement attached. The report template is supplied through the Asset & Geospatial Information Data Manager.

All sections of the statement should be filled out correctly additional information can be attached if required.

An example of the statement is attached at Error! Reference source not found. Underground Utilities and the report template can be downloaded from:


9 APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>Plot Layout Examples</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Metadata Statement – Underground Utilities</td>
</tr>
</tbody>
</table>
APPENDIX B: METADATA STATEMENT – UNDERGROUND UTILITIES

Metadata Statement - Underground Utilities
Survey and Geospatial Services Branch

KEY DETAILS
Survey Title: Random Hwy, Example Rd Intersection Digital services model
Panel Contract Job #: 21110000
Consultants Ref #: SC9876

CONSULTANT DETAILS
Organisation: SurveyCompany
Contact Name: A. Surveyor
Position: Survey Manager
E-mail: A.Surveyor@surveycompany.com.au
Telephone: (08) 9876 5432
Mobile: 04 9876 5432

CUSTODIAN DETAILS
Organisation: Main Roads WA
Contact Name: Greg Myers
Position: Senior Engineering Surveyor
E-mail: Greg.myers@mainroads.wa.gov.au
Telephone: (08) 9323 4067
Mobile: 04 1990 4094

GEOGRAPHIC DETAILS
Projection: PCG94
Road: H999
Vertical Datum: AHD71
SLK Start: 10.5
SLK End: 10.8
Boundary File Supplied

DATA COLLECTION
Start Date: 14/05/2015
End Date: 15/05/2015

DATA CLASS
Construction (A)
Design (B)
Planning (C)
Data (D)

SERVICES DATA COLLECTION METHODS
EMF
GPR
RTK-GPS
Potholing
Other Method

SURVEY DATA COLLECTION METHODS
Total Station

NON STANDARD CODES

STANDARDS USED
Survey has been performed in accordance with the below standards:
Digital Ground Survey
Underground Utilities Survey
Earthwork Volume Calculations
Standard Survey Mark Control
Road Reference Marks
Minor Control Points
Differential Levelling
Settlement Monitoring
Mapping
Digital Rectified Images
Aerial Lidar Delivery Standard
Mobile Laser Scanning Delivery Standard
## UNDERGROUND UTILITY SERVICE DESCRIPTIONS

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<th>Service Accuracy</th>
<th>Service Accuracy</th>
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<th>Contact Name</th>
<th>Contact # or email</th>
<th>Contact # or email</th>
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<td>Telstra</td>
<td>Western Power</td>
<td>Class B - EMF / GPR</td>
<td>Class B - EMF / GPR</td>
<td>Megan Smith</td>
<td>Katherine Townsley</td>
<td><a href="mailto:Megan.Smith@team.telstra.com">Megan.Smith@team.telstra.com</a></td>
<td><a href="mailto:DQT@westernpower.com.au">DQT@westernpower.com.au</a></td>
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<td>Reticulation</td>
<td>City of Vacant</td>
<td>Class B - EMF / GPR</td>
<td>A. Dmin</td>
<td><a href="mailto:A.Dmin@COV.wa.gov.au">A.Dmin@COV.wa.gov.au</a></td>
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<td>Class B - EMF / GPR</td>
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<td>Robert Vittiglia</td>
<td>Robert Vittiglia</td>
<td><a href="mailto:Robert.vittiglia@watercorporation.com">Robert.vittiglia@watercorporation.com</a></td>
<td><a href="mailto:tang.nguyen@mainroads.wa.gov.au">tang.nguyen@mainroads.wa.gov.au</a></td>
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<td>Contact # or email</td>
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<td>Jaylene Baker</td>
<td>Robert Vittiglia</td>
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<td><a href="mailto:Robert.vittiglia@watercorporation.com">Robert.vittiglia@watercorporation.com</a></td>
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<td><a href="mailto:drawing.office@atcogas.com.au">drawing.office@atcogas.com.au</a></td>
</tr>
</tbody>
</table>

## OTHER NOTES / COMMENTS

Construction Class A pot holes performed on all services. Refer to UUS sketches for further details.

## LIST OF CONTROL USED

- RTK Base: SSM - BEL101 (20ppm 12rootK)
- Check Shot: SSM - BEL102 (20ppm 12rootK)