

# **SURVEY AND DRAFTING DIRECTIONS FOR MINING SURVEYORS**

**NSW  
Metalliferous and Extractive Industries  
2008**

Issued by the Surveyor-General on the advice of the Board of Surveying and Spatial Information pursuant to clause 4 of the Surveying and Spatial Information Regulation 2012

Note: These directions are for the Metalliferous and Extractive Industries in New South Wales. Refer to the document entitled *Survey and Drafting Directions for Mine Surveyors* in respect to mining surveys carried out for the purposes of the Coal Mines Health and Safety Act 2002 and the Coal Mines Health and Safety Regulations 2006.

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# 1. GENERAL

## 1.1 Authorisation

The surveys, plans and digital data standards detailed in these Directions are required by the Surveying and Spatial Information Act 2002 and clause 4 of the Surveying and Spatial Information Regulation 2012. Specifically the Mine Workings Plan (MWP) is required to be kept in satisfaction of Part 7 of the Mine Health and Safety Regulation 2007 **Mine Plans**.

## 1.2 Preparation

These Directions provide principally for the conduct of surveys and preparation of plans for metalliferous mines in New South Wales. They provide guidance for preparation of the Hard Copy and the Digital recording, storage and preparation of the Mine Workings Plan and Mine Workings Spatial Information for the whole of the mine. They also provide some guidance to the preparation of other plans based on the Mine Workings Spatial Information that are required by the Mine Health and Safety Regulation 2007 and various Departmental guidelines. Preparation of plans required in support of various applications that may be required from time to time for the conduct of mining operations in New South Wales.

## 1.3 Compilation

- 1.3.1. The Mine Workings Plan and Mine Workings Spatial Information shall be surveyed and compiled on the Map Grid of Australia 1994 (MGA94) based on the Geocentric Datum of Australia 1994 (GDA94) values. The Mine Workings Plan shall be sectionalised into sheets as a best fit for individual mines. In determining the best fit for the sheet layout the surveyor should be mindful of the need to provide for expansion of the mine and to fit with adjoining mine workings. If in doubt the surveyor should consult with the Department and with neighbouring mines.
- 1.3.2. The Surveyor-General may request of the Department copies of all or any Mine Workings Spatial Information to be lodged with the Register of Public Surveys in accordance with the Surveying and Spatial Information Act 2002.
- 1.3.3. Where old workings exist it shall be assumed, for the purpose of marking the Mine Workings Plan, that they constitute a danger until the contrary is proven. In this situation, all plans should be regarded with suspicion until their accuracy has been verified. Reasonable effort should be made to obtain all existing information about old workings and, once obtained, to ensure that they are recorded on the Mine Workings Plan in accordance with these Directions.
- 1.3.4. A Mine Workings Plan consists of any number of sheets showing the entire workings of a mine in plan or section. Each sheet will represent a part or whole of one or more mining horizons or an area of the mining or quarrying operation shown in plan. The Mine Workings Plan as defined in these Directions includes any cross section or longitudinal section sheets used.

**Note:** Clause 47 (a) & (b) of the Regulation prescribes this.

## **1.4 General**

- 1.4.1. These Directions are to be followed by all Nominated Mining Surveyors in all open cut and underground operations: -
- i. all mines employing 20 or more persons and
  - ii. those places described in Part 2 of the Mines Health and Safety Act 2004
- 1.4.2. Other plans may be required as set out in Section 5 of these Directions.
- 1.4.3. The Chief Inspector may grant an exemption from any clause of these Directions if particular circumstances warrant. Any application for an exemption from compliance with any clause of these Directions must be made in writing to the Chief Inspector.

## **1.5 Symbols**

The technical symbols, sign conventions and definitions for strata to be shown on the Mine Workings Plan and the Mine Workings Spatial Information shall be in accordance with these Directions, and shall conform to those illustrated in the Australian Standard for Mine Plans – Preparation and Symbols (AS-4368-1996), the Australian Standard for Geological Symbols (AS-2916-2007). If a symbol is not provided for in AS4368 or AS2916 the Nominated Mining Surveyor may create a suitable symbol to be also shown in the legend.

## **1.6 Nomination of a Mining Surveyor**

The Operator of the mine shall inform the Department, Mine Mapping-Titles Section of the name and BOSSI Identification Number of the Mining Surveyor nominated under Section 35 of the Act, responsible for the conduct of Mining Surveys and preparation of formal Mining Survey Plans for the Operation. Such nomination will continue until such time as information required by Section 7.2 or 7.3 of these Directions, is submitted to the Secretary.

## **1.7 Duties of a Nominated Mining Surveyor**

A Nominated Mining Surveyor must ensure that:-

- a) any variation of the mine operation workings from a mine workings plan of which the surveyor becomes aware, or
- b) any interference with or obstruction to the performance of his or her functions, or
- c) any doubt about the accuracy of any plans
- d) is brought to the attention of the relevant operator.

**Note:** Clause 108 of the Regulation prescribes this requirement.

## **1.8 Liability of a Nominated Mining Surveyor**

The liability of a Nominated Mining Surveyor in complying with these Directions for a Mine shall be limited to the period of time of nomination as the Nominated Mining Surveyor for that Mine.

**Note:** Subdivision 3 of Division 2 of Part 5 of the Act applies to the Management Structure for a Mine Operation.

## **1.9 Conversion to MGA94**

- 1.9.1. When new sheets of the Mine Workings Plan are being prepared to comply with Clause 1.3.1 and the workings of any part of the mine are deemed to be completed, sealed or otherwise become inaccessible, it shall be acceptable to draw an outline of such workings and to endorse the new Mine Workings Plan to refer to the previously prepared Mine Workings Plans for detail.
- 1.9.2. Any previously prepared Mine Workings Plan referred to in clause 1.3.1, may also be a historical set of mine drawings, not in current usage, but accessible and in good condition. The relationship of the origin and height datum of any set of drawings to the current mine grid and datum or to MGA94 and AHD must be established.
- 1.9.3. Should the workings referred to in clause 1.3.3 become active, or are used for access in an area previously shown in outline the survey of the workings shall be transferred in full to the new Mine Workings Plan.
- 1.9.4. Nothing shall prevent the Nominated Mining Surveyor from transferring inactive mine workings in full to the new Mine Workings Plan.
- 1.9.5. A notation must appear on the Mine Workings Plan as to the location of any additional information relevant to the Mine Workings Plan including reference to datum.
- 1.9.6. It must be noted all mine working plans and spatial information shall be submitted on MGA94 and AHD regardless of the "Letter of Datum Reference" used for surveying and the Nominated Mining Surveyor is responsible for any grid or transformations to MGA 94.

## 2. DEFINITIONS

In these Directions the following words and terms have the meanings indicated:

### **Abandoned Mine**

Includes a discontinued mine, a closed mine (other than a suspended mine) and a former mine.

### **Adit**

Means a horizontal or near horizontal entrance to a mine

### **Attribute**

A database field attached to a feature object in a theme used to describe spatial data and is also known as “object data”.

### **Australian Height Datum (AHD)**

AHD is the datum surface approximating mean sea level that was adopted by the National Mapping Council of Australia in May 1971.

### **Bench Marks**

Marks established at or in a Mine from which the levels (heights) of the Mine workings are determined.

### **Borehole**

A Borehole includes any hole (whether vertical, horizontal, inclined, or a combination of these), that may affect the safety of the Mine, drilled for: -

- a) exploration,
- b) gas or water drainage,
- c) auger holes,
- d) for transport of materials including (but not limited to), sand, inflammable materials or fuels, cement, slurry, sewage or water
- e) services (e.g. power, water and other services)
- f) or any other purpose,

but does not include blast holes or shallow holes from the working area that do not intersect another area of the mine.

### **Borehole Plan**

A plan or plans prepared in accordance with these Directions as an addition to the Mine Workings Plan where density of boreholes affects the clarity of the Mine Workings Plan.

### **BOSSI**

Board of Surveying and Spatial Information as Constituted by the Surveying and Spatial Information Act 2002 No 83.

### **BOSSI Identification Number**

Is an individual identification number issued by BOSSI, located on Certificate of Authority e.g. 8221.

### **Care and Maintenance**

Discontinued Mine workings are said to be under Care and Maintenance where mining is suspended and when the Mine workings are maintained in a generally safe and accessible condition so as to allow for recommencement of mining activities without sterilisation of reserves.

**Note:** Clause 144 (1) of the Regulation provides further information.

### **Certification**

A written statement or a schedule signed by the Nominated Mining Surveyor attesting that the surveying procedures and plan preparation for the period certified, have been carried out pursuant to the standards required by these Directions, the Surveying and Spatial Information Regulation 2012, the Act and the Regulation.

### **Chief Inspector**

Chief Inspector of Coal Mines, New South Wales Department of Trade and Investment, Resources and Energy Division, Mineral Resources Branch. The same meaning as defined in the Act.

### **Control Surveys**

Substantially marked surveys forming a closed survey network completed in accordance with ICSM (2007) SP1 (version 1.7).

### **Cross Section Sheet**

A sheet prepared as part of the Mine Workings Plan for open cut or underground operations, which shows the cross sections referred to on the plan sheets of the Mine Workings Plan.

### **DCDB**

Means Digital Cadastre Database as defined by the Land and Property Information (LPINSW)

### **Department**

New South Wales Department of Trade and Investment, Resources and Energy Division, Mineral Resources Branch.

### **Development**

In relation to a mining operation, includes all work undertaken to open up a mine by driving development openings or pre-stripping an open-cut body of ore.

### **Escape and Rescue Plan**

Plan required by clause 34 of the Regulation.

### **Endorsement**

A notation created, initialled and dated by the certifying Nominated Mining Surveyor, drawing attention to any aspect of the compilation of the Mine Workings Plan or Mine Workings Spatial Information that is considered necessary or informative that may or may not be a requirement under these Directions or any legislation.

### **ESRI Geodatabase**

A Database created through *ESRI ArcGIS* software containing digital themes and their attribute information, allowing access to large volumes of geographic data. (See SECTION 9 of these Directions)



**Feature Type**

Description on how spatial data should be defined, for example, a point, line, or polygon.

**Geocentric Datum of Australia (GDA)**

Datum surface approximating the shape of the earth's surface that was adopted by the Inter- Governmental Committee for Surveying and Mapping in May 1990.

**Note:** The datum surface is described in a notice published by the Surveyor-General in NSW Government Gazette No 88 of 8 August 1997 and designated in that notice as "The Geocentric Datum of Australia (GDA)".

**GNSS**

Means a Global Navigation Satellite System as per Survey and Spatial Regulation 2012.

**Hard Copy**

In regard to paragraphs 3.1.8, 3.4.2, 7.2.1 and 7.2.2 of these Directions Hard Copy means plans prepared on 0.4mm/72 Micron double matt transparent drafting film with permanent inks, for all other cases coated paper Hard Copy with durable inks is acceptable. Whenever Hard Copy plans are submitted to the Secretary they shall be backed-up in PDF (Portable Document Format) on CD-R which shall accompany any such plans submitted.

**Height Datum**

All levels shown on the Mine Workings Plan, and all other plans prepared under these Directions, shall be reduced to Australian Height Datum (AHD).

**ICSM (2007) SP1 (version 1.7)**

The Inter-Governmental Committee on Surveying and Mapping Special Publication 1 "Standards and Practices for Control Surveys".

**Inrush**

Under Clause 37 of the regulation, The operator of a mine must ensure that, in assessing risks associated with any possible sudden and unplanned entry of water, gas, rock or other substances into the underground workings of the mine, the OH&S risk assessment for the mine takes into consideration, but is not limited to, the following:

- a) the location of other workings and the accuracy of any plans of other workings,
- b) the strength of any ground between workings,
- c) the possibility of accumulation of hazardous water, gas, rock or other substances.

**Longitudinal Section Sheet**

A sheet prepared as part of the Mine Workings Plan for open cut or underground operations, which shows the longitudinal sections referred to on the plan.

**LPINSW**

Means Land and Property Information New South Wales.

**Map Grid of Australia 1994 (MGA94)**

MGA means Map Grid of Australia that is a rectangular co-ordinate system using a Universal Transverse Mercator Projection with zones 6 degrees wide and based on the Geocentric Datum of Australia.

**Note:** As defined by Clause 5(1) of the Survey and Spatial Information Regulation 2012.

**Metadata**

“Information about data” and is used to inform the user of the lineage, accuracy and limitations that may exist within the data. The aim of metadata is to enable the end-user to work with the data with a known level of confidence.

**Mine**

Has the same meaning as defined in the Act

**Mine Baseline**

A permanently marked survey line included as part of the State Survey Control Network.

**Mine Holder**

As defined in the Mine Health and Safety Act 2004 and means:

- a) in relation to land subject to a mine holding that is registered--the person in whose name the mine holding is registered in the register of mine holdings kept by the Secretary under section 163A of the *Mining Act 1992*, or
- b) in relation to land not subject to a mine holding but otherwise subject to a mining title granted under the *Mining Act 1992* or a mining licence granted under the *Offshore Minerals Act 1999* --the person who holds the title or licence, or
- c) in relation to land where there is no requirement for grant of a mining title under the *Mining Act 1992* --the person with the right to extract minerals or quarry product from the land.

**Mine Services Plan**

Plan prepared showing services around the surface of the mine and any information that may assist in the case of an emergency.

**Mine Surface Plan**

Plan prepared in accordance with section 4 of these Directions showing surface features.

**Mine Workings Plan (MWP)**

The plan required to be kept under Part 7 of the Regulation *Mine Plans* to accurately show the position of the Mine workings and compiled in accordance with these Directions.

**Mine Workings Digital Themes**

Any spatial data that is required to be submitted, as Mine Workings Spatial Information under these Directions. Compilation of the digital themes will be in accordance with Part 9 of these Directions. See also *ESRI Geodatabase*.

**Mine Workings Spatial Information**

Digital files containing Mine Workings Plan data in the form of digital themes prepared in accordance with these Directions.

**Nominated Mining Surveyor (Mine Surveyor)**

A person registered as a Mining Surveyor under the Surveying and Spatial Information Act 2002 No. 83 and nominated under Section 35 of the Act as responsible for the conduct of Mining Surveys and the preparation of formal Mining Survey Plans for an Operation.

**Open Cut**

Means a surface excavation

**Operator**

As defined in MHSa 2004 and means:

- a) the mine holder, if the mine holder nominated himself, herself or itself as the operator of the mine under Section 22 of the MHSa 2004 and that nomination is not rejected, or
- b) the person nominated by the mine holder as the operator of the mine, and not rejected by the Chief Inspector, under Section 22 of the MHSa 2004, or
- c) the person declared by the Chief Inspector to be the operator under section 23 of the MHSa 2004, or
- d) the person prescribed by, or determined in accordance with, the regulations to be the operator of the mine.

**Potential Sources of Inrush**

Potential sources of inrush include sudden and unplanned entry of water, gas, rock or other substances into the mine (Clause 37 of the Regulations).

**Precision**

Coordinate precision refers to the mathematical exactness of a coordinate and is based on the possible number of significant digits that can be stored for each coordinate.

**Prescribed Dam**

Means a dam, or proposed dam, specified or described in Schedule 1 of the Dams Safety Act 1978 No 96.

**Raise or rise**

Means a development excavated upwards from a level drive or crosscut

**Regulation**

Unless otherwise stated means the Mine Health and Safety Regulation 2007.

**Reporting Period**

The Reporting Period shall be twelve (12) monthly.

**Secondary Surveys**

A survey originating from Control Surveys or Subsidiary Surveys utilised by the Nominated Mining Surveyor to accurately locate all of the workings of the mine that are not included in Control Surveys or Subsidiary Surveys.

**Secretary**

Secretary of the Department. The same meaning as defined in the Act.

**Shaft**

Means an opening into a mine having an inclination to the horizontal of 15° or more through which persons or materials are raised or lowered, or which is used as a main intake or outlet for ventilation.

**Stope**

Means an excavation, other than development workings, made for the purpose of excavating ore.

**Subsidiary Survey**

A survey originating on Control Surveys to develop the workings of a Mine or to locate the position of the workings of a Mine.

**Supervision**

When a survey is carried out in accordance with these Directions the Nominated Mining Surveyor must exercise such personal oversight and direction of the work as is necessary to ensure that the Nominated Mining Surveyor has the knowledge to certify all aspects of the survey and that the survey has been carried out in accordance with sound professional practice and these Directions.

**Surface Plan**

The Plan prepared in accordance with these Directions showing surface features, infrastructure and services subject to mine operations, whether open cut or underground, and includes mineral processing and handling facilities located on a mine site.

**Survey Records**

For the purpose of these Directions, survey records shall be taken to mean any plan, survey or spatial information required under these Directions and includes field books, level books, co- ordinate books, calculations and any other note books, sheets or plans used for recording relevant survey data, all survey observations, and compilations whether recorded or stored in written, photographic, digital or electronic form.

**Surveyor-General**

Surveyor-General means the person holding office or acting as the Surveyor-General under Part 4 of the Government Sector Employment Act 2013.

**The Act**

Unless otherwise stated means the Mine Health and Safety Act 2004.

**The Regulation**

Unless otherwise stated means the Mine Health and Safety Regulation 2007.

**Themes**

Theme refers to a type of information stored on a single layer of a digital drawing document. The Department uses ArcInfo as a GIS database, and for the purposes of these Directions, a theme and a layer are similar.

**Ventilation Plan**

Plan prepared in accordance with these Directions showing all ventilation appliances and airflow.

**Void**

All excavations, ramps and disturbed ground, including insitu blasted material within an open cut mine.

**Winze**

Means a development excavated downwards from a drive or crosscut.

### **3. SURVEY STANDARDS AND PROCEDURES**

#### **3.1 Origin of Co-ordinates**

- 3.1.1. An existing mine operating to a local grid and height datum, may apply in writing to the Chief Inspector for an exemption where the relationship between the local grid and height datum and MGA94 and AHD can be accurately provided.
- 3.1.2. To allow for the mine to be surveyed on a local grid and datum where an application for exemption is granted under clause 1.4.3, the relationship in terms of bearing, distance and height between local grid and MGA94 must be set out in a 'Letter of Datum Reference' to be provided to the Chief Inspector. The letter will be kept on file at the Department of Primary Industries and the information updated as necessary.
- 3.1.3. All surveys are to originate from the Mine Baseline or may originate from any other mark included in the State Survey Control Network having a standard of accuracy consistent with that of the Mine Baseline.
- 3.1.4. The horizontal survey of the Mine Baseline should be planned and surveyed to Class "B" standards of accuracy as defined in ICSM (2007) SP1 (Version 1.7). The geometry of the network should be consistent with this standard of accuracy.
- 3.1.5. Each end of the Mine Baseline should be assigned an AHD Reduced Level surveyed to ICSM (2007) SP1 (Version 1.7) Class "LD" spirit levelling or Class "B" from Trigonometric Heighting or GPS Heighting (AHD derived).
- 3.1.6. At each end of the Mine Baseline there shall also be established a reference mark of durable nature connected by bearing and distance to the baseline permanent marks.
- 3.1.7. Should the position or co-ordinate values of the Mine Baseline change, this information shall be reported in accordance with the Surveying and Spatial Information Regulation 2012, Clause 41.
- 3.1.8. Surface Baseline terminals shall be approved Permanent Marks as described in Surveyor-Generals Direction No1.
- 3.1.9. Where Permanent Marks are placed for a Baseline, a Hard Copy plan and an electronic record with digital survey data shall be forwarded to the Secretary who in turn shall forward the information to the Surveyor-General for approval to be included in the State Control Network.
- 3.1.10. The Mine Baseline, where possible, shall not be less than 250 metres in length.
- 3.1.11. For an existing mine, the current baseline marks should be retained provided they are of a durable nature.

#### **3.2 Control Surveys, Subsidiary Surveys and Secondary Surveys**

- 3.2.1. Accuracy: Each control survey and subsidiary survey must be planned and surveyed to ensure these surveys satisfy the conditions to achieve a standard of accuracy as prescribed in ICSM (2007), SP1 (Version 1.7) to achieve Class D or better. All control surveys observed data must be analysed to ensure all control surveys achieve a standard of accuracy as prescribed in ICSM (2007) SP1 (Version 1.7) to a minimum standard of Class D. When calculating compliance to ICSM (2007) SP1 (Version 1.7) Class D via the formula  $r = c(d + 0.2)$  this Direction specifically defines  $d$  as the following:

*d = distance to any station in km, with a minimum value of 1(km).*

- 3.2.2. Marking: Each control survey station and subsidiary survey station shall be adequately referenced and substantially marked. As far as practicable the marks shall be placed in a position least likely to be disturbed.
- 3.2.3. Where offset survey stations (wall stations) are employed the spigot and prism required to replicate the co-ordinate shall be specified on the Mine Workings Plan.
- 3.2.4. Secondary surveys shall be employed by the Nominated Mining Surveyor where necessary to accurately locate all of the Mine workings on the Mine Workings Plan to within 1mm at 1:2000 Scales. Such surveys shall be completed to the highest appropriate standards of accuracy.

### **3.3 Correlation of Surface and Underground Surveys**

- 3.3.1. Correlation between surface and underground surveys shall be consistent with a Class D survey as prescribed in ICSM (2007) SP1 (Version 1.7).
- 3.3.2. In correlation of surface and underground surveys where methods other than direct traverse are employed for azimuth or co-ordinate transfer, the surveys shall be shown on a plan separate from the Mine Workings Plan and shall disclose the special survey methods employed. The plan shall be submitted to the Secretary and the Nominated Mining Surveyor shall certify that the survey shown on the plan is accurate and meets the requirements of these Directions.

### **3.4 Elevation Surveys**

- 3.4.1. Order of accuracy of benchmarks:  
Such surveys shall be completed to ICSM (2007) SP1 (version 1.7) Class "LD" or Class "D" standards of accuracy.
- 3.4.2. Accuracy of Mine workings:  
Such surveys shall be completed to ICSM (2007) SP1 (version 1.7) Class "LE" standard of accuracy or to within 0.1 metre. Where vertical measurement is necessary for transference of the value of the surface bench mark to a nominated underground bench mark, the maximum permissible error should not exceed 0.05 metre.

### **3.5 Survey Records and Supply of Survey Information**

- 3.5.1. Systematic and reasonable care shall be taken by the Nominated Mining Surveyor for the safe preservation of all survey records required under these Directions.
- 3.5.2. Survey records for each of the following purposes shall be kept at the survey office for the mine:-
  - a) control surveys
  - b) subsidiary surveys
  - c) secondary surveys
  - d) elevation survey
  - e) surface movement and subsidence surveys
- 3.5.3. Such survey records shall be maintained manually on either field book or other stable material electronic text or image or other means not visually perceptible without the aid of a machine or other device. Where a machine or other device is required to access the stored data the Nominated Mining Surveyor shall ensure the data is regularly updated to a media and format that is currently available.

- 3.5.4. Survey records are to be permanently recorded and maintained in accordance with ISCM (2007) SP1 (1.7 version) and these Directions.
- a) All survey books shall be maintained in good order and shall have the following description clearly and permanently marked on the cover and inside title page:
    - i. the Mine name,
    - ii. for underground mines, the level name, and catalogue number to which the book refers,
    - iii. consecutive index number
  - b) The following procedures shall be adopted for entries into survey books:-
    - i. all survey observations and measurements shall be recorded at the time of survey;
    - ii. in the event of alteration of a mistake there shall be no erasure. The erroneous entry should be struck through and the correction written above;
    - iii. the datum line of the survey and the azimuth adopted shall be clearly indicated;
    - iv. lengths shall be entered at the time they are measured. Where appropriate, corrections shall be noted and the lengths deduced there from shall be clearly indicated;
    - v. bearing and distance from reference marks must be clearly shown; reference marks and Bench Marks placed by the surveyor shall be so noted and the positions and descriptions thereof shall be shown by a sketch in the appropriate book;
    - vi. lines remeasured shall be so specified and original distances and bearings shown;
    - vii. The Nominated Mining Surveyor shall sign the field book that the work shown therein was performed by him or under his supervision and indicate the date on which the work was performed.
- 3.5.5. Where surveys are recorded in electronic form the information to be recorded shall be consistent with that required for survey books (see 3.5.4 (b)). A complete and separate duplicate of such records shall be preserved on paper or disc or other permanent electronic medium. Where a machine or other device is required to access the stored data the Mining Surveyor shall ensure the data is regularly updated to a media and format that is currently available.
- 3.5.6. The Nominated Mining Surveyor of any Mine, upon the request of the Chief Inspector, shall make available, in a format specified by the Chief Inspector all or any survey records or certified copies thereof.
- 3.5.7. Upon abandonment of an operation all survey records relevant to the preparation of the Mine Workings Plan shall be prepared by the Nominated Mining Surveyor for submission to the Department. A guidance document shall be included detailing file structure, formats, descriptions and other necessary information to enable additional end users to interrogate the information. On abandonment these records shall be submitted to the Department for retention unless otherwise directed in writing by the Chief Inspector.

### **3.6 Requirements when workings are to become inaccessible**

- 3.6.1. Before any part of the workings of a mine becomes inaccessible, where reasonable, practical and safe to do so, the position of all points of the workings shall be established from a control, subsidiary, or secondary survey.
- 3.6.2. Sufficient levels shall be taken to enable contours of the floor of the working section to be calculated and shown on the Mine Workings Plan. (See Section 3.4.2 Elevation Surveys)
- 3.6.3. Where inaccessible workings are not surveyed in accordance with these Directions, the Nominated Mining Surveyor may draw upon any available resources of the mine to best locate the inaccessible workings for the purpose of completion of the Mine Workings Plan, with suitable Endorsements.

### **3.7 Surface Movement and Subsidence**

- 3.7.1. Where the Chief Inspector directs, surveys are to be undertaken to record surface movement, including subsidence induced by mining.
- 3.7.2. Such surveys shall be carried out in accordance with the standards set out in these Directions, or as otherwise directed by the Chief Inspector.
- 3.7.3. Such surveys shall be carried out under the supervision of, and certified by, a Nominated Mining Surveyor.
- 3.7.4. All subsidence survey data including field notes is to be kept at the Mine in accordance with Clause 3.6 of these Directions.

### **3.8 Survey of Boreholes**

Boreholes are to be identified by unique name or number and are to be shown on the Mine Workings Plan. Collar and/or commencement locations of Boreholes, are to be established from a control, secondary or subsidiary survey, with both MGA coordinates and AHD levels in accordance with these Directions. The following information will also be recorded, wherever possible, whether from direct survey or other source (i.e.: drillers log, geophysical survey): -

- a) total length (or depth);
- b) inclination (or declination), and
- c) plan projection (bearing or azimuth) when other than near vertical.

The Nominated Mining Surveyor shall satisfy himself that the holes are accurately recorded and represented on the Mine Workings Plan with regard to mine safety.

### **3.9 Maintenance of Survey Equipment**

- 3.9.1. Survey equipment should be maintained regularly and kept in good adjustment according to the manufacturers recommendations.
- 3.9.2. Electronic distance measuring equipment used for Control and Subsidiary surveys should be verified against the State Primary Standard of Measurement of Length, by using pillared test lines, at least once each year and immediately after service and repair in accordance with Surveyor General's Direction No5 "Verification of EDM equipment".
- 3.9.3. GNSS equipment used in Mining Surveys should be verified against the Mine Baseline upon acquisition and after any change in software, firmware or hardware.



## **4. MINE WORKINGS PLAN**

### **4.1 General**

#### **4.1.1. Direction**

The Mine Workings Plan (MWP) shall be prepared by or under the supervision of the Nominated Mining Surveyor within three months of commencement of the mining operation or such other time as the Chief Inspector may direct by notice in writing served on the Operator of the Mine.

#### **4.1.2. Updating the Mine Workings Plan**

Except where the mine is considered suspended or abandoned the Mine Workings Plan must be updated when it no longer accurately reflects the workings have been carried out at the mine or the workings that are proposed to be carried out at the mine (Clause 94 of Regulation) and at the end of each Reporting Period. Sufficient surveys must be undertaken to ensure that the mine workings and/or stopes are accurately represented on the Mine Workings Plan in accordance with these Directions.

#### **4.1.3. Composition**

- a) In the case of an underground mine the Mine Workings Plan shall comprise sheets for each Working Level, and other layout data, for the whole of the Mine as required by these Directions.
- b) The Mine Workings Plan sheets shall be AO size International Standards Organisation and may be orientated in either portrait or landscape direction. A standard (recommended) layout is available from the Department.

#### **4.1.4. Presentation and Archiving – Hard Copy**

- a) A Hard Copy of the Mine Workings Plan should be produced stable and durable material depending on the requirements of these Directions.
- b) The Hard Copy will comprise all sheets on which workings have occurred.

### **4.2 Working Level Plans and Void Plans**

- a) The underground mine workings or open cut voids shall be mapped on Level Workings Plans or Void Plans, respectively, for the whole of the mine workings area of a Mine.
- b) The Level Workings Plans and Void Plans shall be compiled from the Mine Workings Spatial Information and other digital themes as necessary to truly represent the survey of the mine as required by these Directions.

### **4.3 Working Level Sheets and Void Sheets**

- a) The Working Level Sheets and Void Sheets shall be compiled from the Level Workings Plan and Void Plan, respectively, at a ratio that best reflects the mine workings with sufficient clarity and number of sheets to cover the extent of the workings and necessary adjacent workings.
- b) The Working Level Sheets and the Void Sheets shall be sized to fit the mapping area of the Mine Workings Plan sheets.
- c) Full lines are to be shown for the Map Grid of Australia commencing at the lower left corner of the mapping area. The extremities of each grid line shall be annotated with the grid value. For an existing mine operating to a local grid and height datum under Clause 1.9.6, the full lines shall represent the mine's datum and a second grid, comprised of tick marks, shall display the MGA coordinate system.

## 4.4 Preparation of the Mine Workings Plan

Information to be shown on the Mine Workings Plan.

### 4.4.1. In the mapping area

#### 4.4.1.1. General for both Underground and Open Cut Mines

- a) **Adjacent Mine Workings** - an outline of all workings in any direction within 100 metres of the current mine being worked.
- b) **Barriers and Restricted Zones**
- c) **Borehole Locations**
  - i. Where it is not practical to show all Boreholes on the Level Workings sheet, a separate "Borehole Plan", which shall become part of the Mine Workings Plan, shall be produced as an overlay.
  - ii. a reference on the Level Workings Sheet is required to indicate the existence of any Borehole Plan sheet.
  - iii. All Boreholes should be identified as to type and name and their current status (e.g. open, sealed, filled and/ or capped).
  - iv. Where Boreholes are drilled in adjacent strata sufficient reduced levels should be shown to indicate their position.
  - v. Any Borehole that is removed by the mining process or is in the void is not required to be shown. Remnant stubs of these holes, however, which may present a hazard to future mining operations, must be shown.
- d) **Cadastral Parcels** - (State if LPI DCDB is used).
- e) **Tailings/Dump Areas**
- f) **Grid Lines**
- g) **Mining Approvals/ Acceptances** (extent to be shown in red)
- h) **Mining Lease Boundaries.**
- i) **Parish Boundaries**
- j) **County Boundary**
- k) **Potential Sources of Inrush** (to be shown outlined in green)
- l) **Prescribed Dams / Tailings Dams**
- m) **Survey Control Stations** including Bench Marks
- n) **Surveyed Geofeatures** - all known, faults, dykes and other significant dislocations, as surveyed.

#### 4.4.1.2. Underground Mines (Level Workings Plans)

- a) **First workings** - Development
- b) **Mine Underground Access** - mine shafts, staple shafts, adits, and drifts
- c) **Second workings / Stopes**
- d) **Date Lines** (dashed) indicating the extent of workings for each survey Reporting Period along with the date and initials of the Nominated Mining Surveyor
- e) **Working Level Floor Heights** (from spot heights and shown in blue)
- f) **Level Names**
- g) **All major ventilation devices** as per Clause 48(e) of the Regulations

#### 4.4.1.3. Open Cut Mines (Void Plans)

- a) **Void Contours** at five (5) metre vertical intervals.
- b) **Void detail line** (breakline)

#### 4.4.2. Mine Workings Plan layout information

##### 4.4.2.1. In the sheet heading area:-

- a) The name of the Mine.
- b) The Mine Workings Plan Catalogue Number.
- c) The Parish and County names.
- d) The name of the Level being represented.
- e) The number of the sheet and the number of sheets that make up the mine operation.

##### 4.4.2.2. In the map surround area:-

- a) The reduction ratio and a graphical (bar) scale together with a statement that all measurements are in metres,
- b) A north point indicating grid north,
- c) A schedule of symbols used on the particular sheet,
- d) A sheet index showing (A vertical level index may be necessary):-
  - i. All the sheets necessary to cover the Mine Operations Boundary
  - ii. The number of each sheet
  - iii. The particular sheet shown by a heavy outline
  - iv. Outline of Mine workings
- e) A schedule of Endorsements made by the Nominated Mining Surveyor
- f) A statement or schedule certifying the accuracy of the sheet, including:
  - i. The name and signature of the certifying Nominated Mining Surveyor
  - ii. The certifying surveyor's BOSSI ID Number
  - iii. The date of Certification
- g) The origin of levels and the grid bearing and terminal survey stations of the Mine Baseline or survey control marks used for surveys within the sheet
- h) For underground Mines, a schedule or schedules of survey marks and Bench Marks containing their identification, coordinates and height
- i) For underground Mines, a schedule of shafts, rises, winzes, boreholes, with coordinates and heights of the commencing and finishing locations.
- j) A schedule of Boreholes showing coordinates and heights of the collar or starting location together with the general direction, inclination and length.

## 4.5 Additional Information

4.5.1. Nothing in these Directions shall prevent the inclusion of any additional information on the Mine Workings Plan providing it is shown in a manner consistent with these Directions.

4.5.2. The Nominated Mining Surveyor shall show on the Mine Workings Plan any additional information as directed in writing by the Chief Inspector.

4.5.3. Any additional information discovered by or indicated to the Nominated Mining Surveyor which may present a hazard either to the Mine, adjacent mines or persons in those mines should be recorded on the Mine Workings Plan.

#### **4.6 Endorsement**

Where any information shown on the Mine Workings Plan is considered to be in doubt or any other information that the Nominated Mining Surveyor considers requires Endorsement, the Mine Workings Plan shall be suitably endorsed.

#### **4.7 Old Workings/Surveys**

Where old surveys or old workings are converted to the current Local Grid/Datum or MGA94/AHD, such conversion shall be suitably endorsed on the Mine Workings Plan.

#### **4.8 Certification**

- 4.8.1. The Hard Copy of the Mine Workings Plan shall be certified by the Nominated Mining Surveyor in the Certification of Accuracy schedule after the most recent Reporting Period has been charted.
- 4.8.2. The Nominated Mining Surveyor shall, by signing and dating the Certification of Accuracy schedule declare for their period of nomination that: -
  - a) the Mine Workings Plan has been prepared in accordance with these Directions, and,
  - b) the surveys shown on the Mine Workings Plan have been completed to an accuracy as prescribed in these Directions.

#### **4.9 Certification History**

The Mine Workings Plan shall have recorded in the Certification of Accuracy schedule the certification details for each period of nomination.

#### **4.10 Catalogue Number**

The Department's cataloguing system shall continue for each Mine according to a unique number identification system prefixed by the letters '**MWP**'. This unique number is to be clearly identified on the Mine Workings Plan or any copy thereof.

## **5. MINE WORKINGS SPATIAL INFORMATION**

This section refers to the preparation, composition and supply of the Mine Workings Spatial Information as a digital file.

### **5.1 Preparation**

- 5.1.1. The Mine Workings Spatial Information shall be prepared by or under the supervision of the Nominated Mining Surveyor.
- 5.1.2. The Mine Workings Digital Themes shall be prepared to the standards required by **Section 9** of these Directions.
- 5.1.3. All Mine Workings Digital Themes shall be kept at the survey office for the Mine.

### **5.2 Composition**

The Mine Workings Spatial Information shall be digital files of the Mine Workings Digital Themes for the whole of the Mine. Digital files may be 3D format that are compatible with the Departments ESRI GEODATABASE.

### **5.3 Supply**

- 5.3.1. The Digital File shall be supplied on a CD-R (Compact Disc – Read only) and shall be submitted to the Secretary at the end of each Reporting Period to coincide with the preparation of the Hard Copy to be kept at the mine.
- 5.3.2. The following Mine Workings Digital Themes are the minimum number of themes to be supplied, as appropriate to each Mine:-
  - a) For Underground Mines – Mine Workings Outline
  - b) For Open Cut Mines - Void Contours and Breaklines
- 5.3.3. The following information will be recorded on the label of the CD-R with a permanent marking pen:
  - a) The name of the Mine Operation
  - b) The MWP catalogue number for the associated MWP.
  - c) The name and signature of the certifying Nominated Mining Surveyor
  - d) The certifying Mining Surveyor's Registration Number.
  - e) The date of Certification.
  - f) Disk Name and Reporting Period

### **5.4 Certification**

The Nominated Mining Surveyor shall, by signing and dating the CD-R, declare that the Mine Workings Digital Themes contained on the CD-R, are an accurate representation of the mine workings and comply with these directions.

## **6. CLOSING PLANS**

### **6.1 Authorisation**

Clause 103 of the Regulation as required by section 69 of the Act.

### **6.2 Suspension of Operations**

Where a Mine or Seam therein has not been worked for a period of 2 months the owner of the Mine shall have the Mine Workings Plan charted and shall send a copy to the Secretary in accordance with these Directions.

### **6.3 Charting for Suspension of Operations**

These procedures are to be followed in the case of the suspension of a mine or seam:-

- 6.3.1. The Mine Workings Plan shall be charted, dated and signed by the Nominated Mining Surveyor to the date of suspension. The Nominated Mining Surveyor shall place a broken line around the extent of the workings, which shall be dated and initialled.
- 6.3.2. The note "Charted to date of Suspension of Operations" is to be shown in the "Schedule of Certification of Accuracy" above the date and the Nominated Mining Surveyor's signature.

### **6.4 Charting for Abandonment**

These procedures are to be followed in the case of the Abandonment of a Mine:-

- 6.4.1. The Mine Workings Plan shall be charted, dated and signed by the Nominated Mining Surveyor to the date of abandonment. The Nominated Mining Surveyor shall place a broken line around the extent of the workings, which shall be dated and initialled.
- 6.4.2. The note "Charted to date of Abandonment" is to be shown in the "Schedule of Certification of Accuracy" above the date and the Nominated Mining Surveyor's signature.

### **6.5 Cessation of Duties of the Mining Surveyor**

- 6.5.1. Upon permanent cessation of duties of the nominated Nominated Mining Surveyor the Mine Workings Plan shall be charted, dated and signed by the Nominated Mining Surveyor. The Nominated Mining Surveyor shall show the date of the workings at the time of cessation in a similar manner to that of the normal survey Reporting Period.
- 6.5.2. The note 'Charted to date of Cessation of duties of the Nominated Mining Surveyor' is to be shown in the 'Schedule of Accuracy' above the date and the Nominated Mining Surveyor's signature.
- 6.5.3. The Nominated Mining Surveyor shall by signing and dating the Certification of Accuracy schedule declare for that period from the last Reporting Period until the date of cessation of duty that:
  - a) The Mine Workings Plan has been prepared in accordance with these Directions; and
  - b) The surveys shown on the Mine Workings Plan have been completed to an accuracy prescribed in these Directions.

### **6.6 Replacement of Operator**

When an operator is to cease to operate a mining operation and is to be replaced by another operator, the outgoing operator must update the mine workings plan and provide the updated plan to the incoming operator.

**Note.** Clause 102 of the Regulation sets out this requirement.

## **7. SUPPLY OF MINE WORKINGS PLAN AND DIGITAL DATA**

### **7.1 Period Supply**

- a) The Mine Workings Plan (a certified copy of the Mine Workings Plan) shall be supplied to the Secretary as a pdf file on a read only CD for each Reporting Period (within 1 month of the end of each Reporting Period).
- b) The Nominated Mining Surveyor shall advise the Secretary that the Mine Workings Plan has been sent from the Mine and by what means of transport.
- c) The Secretary shall advise the Nominated Mining Surveyor within 7 days of receipt that the Mine Workings Plan has been received.
- d) The CD containing the pdf files of the Mine Workings Plan shall be kept safe and secure by the Secretary and made available for examination as required.
- e) The Nominated Mining Surveyor shall archive the current copy as Hard Copy, plot file, or other electronic format.

### **7.2 Supply on Suspension and Abandonment**

- 7.2.1. Where a Mine has been discontinued, the Mine Workings Plan shall, after charting, be supplied to the Secretary, in Hard Copy form, within one (1) month of such discontinuance, unless otherwise advised by the Secretary.
- 7.2.2. Where a Mine has been abandoned, the Mine Workings Plan shall, after charting, be supplied to the Secretary, in Hard Copy form, within one (1) month of such abandonment, unless otherwise advised by the Secretary. As per Clause 103 of the Regulations.
- 7.2.3. After the Secretary is satisfied that the charting requirements have been met, the Mine Workings Plan, the Mine Workings Spatial Information and all survey records required to be kept under these Directions, are to be forwarded, by a date specified by the Secretary, to the Department for preservation.

### **7.3 Supply on Cessation of Duties of a Mining Surveyor**

- 7.3.1. At the time of cessation of duties, and after Certification has taken place, the Nominated Mining Surveyor shall produce, a Hard Copy of the Mine Workings Plan and a copy of the Mine Workings Spatial Information on CD-R for retention at the office for the mine.
- 7.3.2. The outgoing Nominated Mining Surveyor, with the consent of the mine owner, should take a Hard Copy of the sheets for his own record.
- 7.3.3. The incoming Nominated Mining Surveyor should make a Hard Copy of the sheets for a record of commencement of work.
- 7.3.4. A copy of mine working spatial information should be supplied to the Department.

### **7.4 Exemption**

Under special circumstances, the operator of a mine may apply to the Secretary for an exemption from the requirement to supply the Mine Workings Plan or Mine Record Tracing in accordance with these Directions. In granting exemption the Secretary may direct in writing any other requirement for the supply of the Mine Workings Plan.

### **7.5 Extension of Time**

The Secretary may, should the circumstances so warrant, grant an extension of time for the preparation of the Mine Workings Plan.

## 8. OTHER PLANS REQUIRED

Nothing shall prevent the Nominated Mining Surveyor from combining one or more of the following plans provided legibility of the combined plan is retained. All such plans should be prepared generally in accordance with these Directions and should be certified and endorsed, as required, by the Nominated Mining Surveyor or appropriate mine official as described in paragraph 8.8 of these Directions.

### 8.1 Ventilation Plan (Underground Mines)

The ventilation plan shall be compiled generally in accordance with these Directions at a scale that best reflects the mine workings and ventilation appliances. Ventilation appliances will be symbolised in accordance with AS 4368.

The plan shall show stoppings, trapdoors, regulators, ventilation doors, the direction and nature of ventilation, auxiliary fans, booster fans and air reading stations with air quantity, in relation to the mine workings. The plan will also show the locations of fixed gas monitoring plant.

A legend will be shown on the plan depicting symbols used together with a graphical representation of the scale.

This plan shall be updated as often as it becomes necessary.

**Note.** In accordance with the Clause 48 (e) of the Regulation (Ventilation) is to be prepared for all underground parts of an operation.

### 8.2 Escape and Rescue Plan (Underground Operations)

The Escape and Rescue Plan shall be compiled generally in accordance with these Directions at a scale best reflects the mine workings and displayed appliances. Symbols used will be in accordance with AS 4368 and AS2916. The plan will include all levels of the mine to enable the self-escape and/or rescue of personnel from any level from the mine.

This plan shall show each mine level, working or not, and means of egress from each part of the Mine to the surface, all self-escape systems, shafts, all underground telephone stations, in relation to the mine workings. The plan shall also show main access roads, refuge chambers, main electric supply cables, fixed electrical apparatus, positions of First Aid Stations, hydrants, isolation valves, fire substations and fire depots underground telephone stations, belt conveyors, known falls, accumulations of water, stowage identified as non-passable.

The plan shall also show any information including ventilation or any additional information identified as necessary for the dealing with an emergency at the operation.

The plan is to be displayed and reviewed at least once every 3 months and updated when it no longer accurately reflects the workings or circumstances of the mine.

**Note.** In accordance with the Clause 34 of the Regulation, an Escape and Rescue Plan is to be prepared for all underground parts of an operation.



### **8.3 Surface Plan**

A surface plan is to be kept at the Mine. The Surface plan shall be of a scale to best represent the surface features of the mine and shall cover the areas where mining operations have been or are being carried out and construction zones, as required by Clause 77 of the Regulation.

Symbols used will be in accordance with AS 4368.

Topography may be shown if it adds to the interpretation of the plan. Compilation shall be generally in accordance with these Directions and the plan may be maintained as spatial information.

In the case of an Underground Mine, the Surface Plan shall show all streets, roads, reservoirs, swamps, water bodies, unconsolidated surface deposits, railways, main pipelines and any other feature whether of the same or of a different kind which, if disturbed by mining operations, is likely to cause damage to or danger in the Mine.

In the case of an Open Cut Mine, the Surface Plan shall show all streets, roads, reservoirs, swamps, water bodies and any other permanent feature whether of the same or of a different kind which, if disturbed by mining operations, is likely to cause damage to or danger in the open cut workings.

This plan shall be updated as often as it becomes necessary.

### **8.4 Site Services Plan (Underground and Open Cut Mines)**

The site services plan shall be at a suitable scale. Symbols used will be in accordance with AS 4368. Compilation shall be generally in accordance with these Directions and the plan may be maintained as spatial information.

This plan should show only surface improvements and infrastructure that are part of the Mine, including but not limited to: buildings including administration, bathhouse and workshops, mine access points (portals, shafts, ramps); mine access roads including parking areas; processing plants and stockpiles; power reticulation including sub stations; water reticulation; compressors and compressed air reticulation; gas reticulation; sewer mains, treatment plants and transpiration areas; telephone and other communications lines; magazines including buffer zones; fire fighting equipment including fire stations, hydrants, extinguishers, depots; hazardous materials locations; dams and surface drainage; , Boreholes which can be used for gas testing, and any information which may assist in the case of an emergency.

Topography may be shown if it adds to the clarity and understanding of the plan.

This plan shall be updated as often as it becomes necessary.

### **8.5 Mining Rehabilitation and Environmental Management Process (MREMP)**

The MREMP guidelines are published by the Department and include both the Mining Operations Plan (MOP) guideline and the Annual Environmental Management Report (AEMR) guideline. Plans prepared under these guidelines shall be prepared in accordance with the standards required by these Directions. All such plans will be certified by a Registered Mining Surveyor and suitably endorsed where necessary.

**Note.** The Department publishes Guidance Notes for applications of the Rehabilitation and Environmental plans process under the Mining Act 1992

## **8.6 Tailings Dams/Waste Dump Areas**

Plans prepared in support of any such application to the Minister shall be prepared in accordance with the current guidance note and comply with the standards required by these Directions. The plan shall be certified and suitably endorsed by a Registered Mining Surveyor.

**Note.** The Department publishes Guidance Notes for applications of the Rehabilitation and Environmental plans process under the Mining Act 1992

## **8.7 Plan Standards - General**

Any plan (including, where appropriate, plans subject to these Directions) required to be drafted by a Registered Mining Surveyor for purposes of the Mine, should be prepared in accordance with the relevant Australian Standard -in particular, but not limited to, AS 4368 and AS 2916.

## **8.8 Declaration**

A plan referred to in Section 8 of these Directions shall have an appropriate area on the plan allocated for Certification by the manager of mining engineering and/or Registered Mining Surveyor as appropriate for information on that plan. Such certification shall indicate the origin of the information and that the information shown on the plan is truly represented.

## 9. STANDARDS FOR THE PREPARATION OF MINE WORKINGS DIGITAL THEMES

### 9.1 General

These Directions require that the Mine Workings Plan be prepared using the Mine Workings Digital Themes as described in Section 4.4 (Preparation of Mine Working Plan) of these Directions.

The aim of this Section 9 is to provide standard methods for the construction and preparation of the Mine Workings Digital Themes. This section identifies how each theme should be represented graphically and the attribute information that should be included to describe each featured object in the theme.

This section also identifies other supporting information that is required to be submitted to the Secretary on the CD-R as provided for in Section 5.2 (Composition) of these Directions.

### 9.2 Theme Attribute Names and Definitions

- 9.2.1. Table 9.2 Identifies attribute names and definitions that must be used for all Mine Workings Digital Themes.

Attribute names are not to exceed ten characters in length. All theme names and attribute names can be in either title case or lowercase, and individual attribute values may be expressed in upper or lower case. Underscores must be used to join multiple words as gaps are not permissible. Attribute names and format must be consistent with those shown in **Table 9.2**.

- 9.2.2. **Attribute Values;** It is required, where possible, to use standard attribute values. This will allow the Department and other users of the themes to develop standard enquiries through their GIS software. Values for all attributes are required to be attached for all objects in the theme.

All themes are to be prepared using the database format specified in **Table 9.2**. Numbers with decimal values should be stored as floating number. All other numbers should be stored as integers or characters.

### 9.3 Theme Attribute Allocation and Feature Type

All objects in a theme must have attributes attached and be of the same feature type (e.g. point, line, or polygon). Each theme required is listed in **Table 9.3** with corresponding attributes and feature types that must be used to represent the theme spatially.

In some instances a Mine Workings Digital Theme may need to be represented by more than one theme. For example, Borehole Locations would normally be points for vertical boreholes and lines for horizontal or inclined boreholes. Where multiple shapes are to be used to represent a theme, and a separate theme is created, attribute fields must be consistent with that particular Mine Workings Digital Theme.

### 9.3.1 Theme Attribute Categories

Mine Workings Digital Themes attributes are divided into three categories. The attribute categories are as follows and the attribute names for each category are identified in **Table 9.3**.

- a) **Core attributes** are those attributes that are common to all the themes and include such attributes as mine name, RT number (catalogue number), date the theme data was charted to, and the person charting the theme data to the Mine Workings Plan.
- b) **Additional attributes** are those attributes that are unique to a particular theme or maybe common to several themes. Attributes that are common to several themes may include seam name, type of workings and when the workings were driven or mined.
- c) **Metadata attributes** are attributes that are required to be attached to the themes only when they are written to the CD-R for submission to the Secretary in accordance with these Directions. These attributes include the theme name, the identifying name of the CD-R from which the theme originates, the file name of the theme on the CD-R, the date on which the CD-R was provided to the Department and the name of the Nominated Mining Surveyor providing the CD-R.

### 9.4 File Naming Convention

**Table 9.4** identifies the specific filename that must be used for each Mine Workings Digital Theme that is to be written to the CD-R for submission to the Secretary in accordance with these Directions.

### 9.5 Metadata Statements

A metadata statement for the Mine Workings Digital Themes must be included and written onto the CD-R when it is submitted to the Secretary in accordance with these Directions. The metadata statement must be in Adobe Acrobat (.pdf) format and in the form identified in **Table 9.5**. Metadata statements must be given a filename indicating mine name, RT number and date.

The metadata statement should include information such as version date, custodian name, coordinate system, accuracy, potential limitations for data use, definitions of any codes used within the dataset and any other information about the data that is not evident in the attributes attached to the theme.

The completed metadata statement must be disseminated with the dataset that it describes. It may be one document sectionalised for each Mine Working Digital Theme or a separate document for each theme. Where two or more themes or a group of themes have the same metadata, a single metadata statement may be prepared that clearly lists all themes relating to the statement.

## **9.6 File Format**

All Mine Workings Digital Themes that are to be submitted to the Secretary in accordance with these Directions and be submitted as shapefiles

The shapefile format consists of three or more files with the following file extensions

- .shp - The main file that stores the feature geometry; required.
- .shx - The index file that stores the index of the feature geometry; required.
- .dbf - The dBASE table that stores the attribute information of features
- .sbn and .sbx (optional) - The files that store the spatial index of the features.
- .prj (optional) - The file that stores the coordinate system information.

## **9.7 Date**

Date attributes are to be in database format 'character' and be in the form "dd/mm/yyyy" where date of workings are accurately known, general format "month year" (May 2006) or as a time period (1950-2000 or pre 2000) when the charted period cannot be accurately shown.

## **9.8 Precision**

Spatial themes should be provided in the best available precision.

## **9.9 Preparation of Additional Themes**

In the event that additional themes are to be submitted with those required by these Directions the attributes, the attribute names and formats should be consistent with this Section 9 of the Directions.

## **9.10 Preparation of Additional Attributes**

In the event that additional attributes are required for a theme, the attributes and their formats should be developed consistent with this Section 9 of the Directions.

Nominated Mining Surveyors are encouraged to create additional attributes that will assist in the preparation and supply of the Hard Copy and in support of safe mining operations.

**Table 9.2**  
**Theme Attribute Names and Definitions**

Attribute Name	Description	Database Format	Max Length	Input Value	Example	Options List
Caution	Warning on use of theme	Character	254	Compulsory and must be in the form described in the options list.	This theme should not be read in isolation. It is one of many themes that comprise the Mine Workings Plan. The Mine Working Plan held by the Secretary is the true record of the mine workings.	
Chart_date	Date the feature was inserted into the theme	Character	10	Chartor determined	30/11/2005	
Chartor	Person inserting the feature into the theme	Character	50	Chartor determined	Joe Bloggs	
Descript	Description of feature and/or theme.	Character	100	Chartor determined		
Disk_name	CD-R identifier	Character	50	Provider determined		
Endorse	Feature status	Character	254	Chartor determined		
File_date	CD-R date	Character	10	Provider determined		
File_name	Theme file name	Character	50	Provider determined		
Height	Height (AHD)	Character	20	Chartor determined	123.123	
Horizon_Name	Name of Underground Mining horizon	Character	20	Chartor determined	Level 980	
Minimum_RL	Maximum RL (AHD) on underground level	Character	50	Chartor determined	100	

Attribute Name	Description	Database Format	Max Length	Input Value	Example	Options List
Maximum_RL	Minimum RL (AHD) on underground level	Character	50	Chartor determined	120	
Mine_name	Name of the operation relating to the MWP	Character	50	Department Trade & Investment , Resources and Energy Division and Chartor determined	Acme Mine	
MWP_No	(MWP Catalogue Number)	Character	10	Department Trade & Investment, Resources & Energy Division determined	MWP123	
Provider	Mining Surveyor signing the CD-R	Character	50	Provider determined		
Source	Feature status	Character	50	Select from Options List		Mine survey, Other survey, Digitised, CAD drawn, Calculated, Coordinate entry, Mine records, Department records, Mining lease, Planning Approval, Mining Approval, other
Status	Feature status	Character	50	Select from Options List		Working, Discontinued, Abandoned, Current, Final, Destroyed, In progress, Temporary, Sealed, Open, Adopted by mine, Adopted by Department, Flooded, Indicated, Inferred
Theme_name	Name of theme	Character	50	Provider determined		

Attribute Name	Description	Database Format	Max Length	Input Value	Example	Options List
Work_Start	Date when workings first commenced in this horizon	Character	10	Chartor determined	30/11/2005	
Work_Finish	Date when workings completed in this horizon	Character	10	Chartor determined	30/11/2005	

**Table 9.3**  
**Theme Attribute Allocation and Feature Type**

Theme Name	Underground or Open Cut	Description	Feature Type	Attribute Category		
				*Core Attributes	Additional Attributes	**Metadata Attributes
*Core Attributes are: Mine Name, MWP Number, Chart Date, Source, Endorse, Chartor, Descript,						
**Metadata Attributes are: Theme Name, Disk Name, File Name, File Date, Caution, Provider,						
Mine Workings Outline	Underground	Extent of workings at each level of an underground mine	Polygon	All	Level Name, Minimum RL, Maximum RL, Work Start, Work Finish, Status	All
Void Contours	Open Cut	Extent of the Open Cut void depicted by contours	Line	All	Height, Status.	All
Void Breaklines	Open Cut	Breaklines of the Open Cut void depicting edge of void, ramp edges, tops and toes etc	Line	All	Height, Status.	All



**Table 9.4**  
**File Naming Convention**

<b>Theme name</b>	<b>Filename definition</b>	<b>Example</b>
Mine Workings Outline	extents_ <i>[MWPnumber]</i> _ <i>[Chart_date]</i>	extents_MWP701_Dec2008 (Mine Workings Outline theme for MWP701 charted December 2008)
Void Contours	void_cont_ <i>[MWP number]</i> _ <i>[Chart_date]</i>	Void_cont_MWP701_Dec2008 (Void Contours theme for MWP701 charted December 2008)
Void Breaklines	void_break_ <i>[MWP number]</i> _ <i>[Chart_date]</i>	Void_break_MWP701_Dec2008 (Void Breaklines theme for MWP701 charted December 2008)

**Table 9.5**  
**Metadata Statement**

<b>Category</b>	<b>Element</b>	<b>Definition</b>
<b>Theme</b>	Theme name (user input)	Theme file name. (user input)
<b>Features</b>	Feature Type	Point, line or closed polygon. (user input)
<b>Department Reference</b>	MWP Catalogue Number	Mine Workings Plan catalogue number. (user input)
<b>Custodian</b>	Mine Operator	Corporation or individual person that operates the mine. (user input)
	Mine Name and Address	The name and postal address of the mine. (user input)

<b>Category</b>	<b>Element</b>	<b>Definition</b>
<b>Description</b>	Abstract	Brief summary description of the content of the theme. (user input)
<b>Data Currency</b>	Date of First Version	When the theme was first created. (user input)
	Date of this Version	Date of this version of the theme. (user input)
<b>Theme Status</b>	Progress	The status of the process of theme creation. (user input)
	Maintenance and update frequency	Frequency of changes or additions made to the theme. (user input)
<b>Access</b>	Stored data format	The format in which the theme is stored by the Mine Surveyor. (user input)
	Available format type	The format in which the theme is available. (user input)
	Access constraints	Restrictions or legal prerequisites that may apply to the access and use of the theme including licensing, liability, and copyright. (user input)
<b>Data Quality</b> Data Quality (Cont'd)	Lineage	A brief history of the source or production the theme. (user input)
	Accuracy Statement	A brief assessment of the closeness of the location of objects in the theme in relation to their true position on the Earth.

Category	Element	Definition
	Accuracy Attribute	A ranking that best determines the positional accuracy for a particular feature in the theme. 1: Error ellipse no greater than 100mm 2: 100mm - 500mm 3: 500mm - 2m 4: 2m - 10m 5: Greater than 10m
	Logical Consistency	A brief description of the degree of adherence of logical rules of data structure, attribution, and relationships. (user input)
	Completeness	An assessment of the extent and range in regard to completeness of coverage, attributions and verification. (user input)
<b>Attributes (All)</b>	<b>Attributes attached to each feature object in the theme.</b>	<b>List each attribute attached as a data field to the features in the theme.</b>
	Caution	Warning as to use of the theme.
	Chart_date	The date the feature object was recorded on the Mine Workings Plan.
	Chartor	Person recording feature object onto the Mine Workings Plan.
	Descript	Description of feature object.
	Disk_name	The name of the CD-R submitted for the Reporting Period.
	Endorse	Reference to a field book or other appropriate notation
	File_Date	The date the theme was supplied to the Department.
	File_name	Theme file name.
	Height	Height (AHD) of feature
	Horizon Name	Name of the underground horizon

Category	Element	Definition
	Minimum_RL	Minimum RL of the underground horizon
	Maximum_RL	Maximum RL of the underground horizon
	Mine_name MWP_No	Name of the operation relating to the Mine Workings Plan. Department Catalogue Number
	Provider	Surveyor providing the theme to the Department.
	Source Status Theme_name Work_start Work_finish	Where the feature object was sourced from. The status of the feature object in the Mine Workings Plan. The name of the theme. The date work commenced in an underground horizon The date work commenced in an underground horizon
<b>Miscellaneous</b>	No. of features: Source Pathname: Application Environment:	Number of individual features, for example, 500 boreholes Data location. This not required for submission but may support internal data management . Development environment.
<b>Projection:</b>	Name : Zone: Units : Datum: Ellipsoid:	Map Grid Australia (MGA 94) MGA [zone] (user input) Metres Geocentric Datum of Australia 1994 (GDA94) GRS80
<b>Metadata date</b>	Metadata date	Date on which the metadata record was created or modified. (user input)