



Government of **Western Australia**  
Department of **Mines, Industry Regulation and Safety**

**GUIDELINE**

# Guideline on how to prepare a Field Management Plan

Petroleum (Submerged Lands) (Resource Management and Administration) Regulations 2015

Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulations 2015

## Document Hierarchy

Legislation	<i>Petroleum (Submerged Lands) Act 1982 (PSLA82)</i> <i>Petroleum and Geothermal Energy Resources Act 1967 (PGERA67)</i> Petroleum (Submerged Lands) (Resource Management and Administration) Regulations 2015 Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulations 2015
Guidelines	<a href="#">Guidelines to RMAR 2015</a> <b>This Document</b>

## Version History

Version	Date	Changes
Version 1.0	March 2022	First release

## Purpose

This document provides guidance to applicants on how to prepare and submit field management plans (FMPs) and revisions to FMPs.

## Objective

This guideline aims to assist applicants submitting FMPs to:

- ensure the technical quality of the information provided;
- ensure all significant aspects in relation to the management of the resource are included in the application;
- reduce the time for assessment; and
- minimise the requirements for ongoing submission of data after the lodgement of the application.

Each application is assessed based on the requirements of the Resource Management and Administration Regulations 2015 (RMAR 2015) created under the *Petroleum and Geothermal Energy Resources Act 1967* and the *Petroleum (Submerged Lands) Act 1982*, in addition to the applicant demonstrating the field will be managed in a manner consistent with good oilfield practice and compatible with the optimal long-term recovery of petroleum as per regulation 47(1)(b). Early engagement with Department of Mines, Industry Regulation and Safety (DMIRS) prior to application, and quality of applications that meet these requirements will aid in a timely assessment process.

## Scope

This Guideline covers the submission of field management plans under two sets of resource management and administration regulations referred to collectively as RMAR 2015, namely:

- the Petroleum (Submerged Lands) (Resource Management and Administration) Regulations 2015 ([PSL RMAR 2015](#)) and
- the Petroleum and Geothermal Energy (Resource Management and Administration) Regulations 2015 ([PGER RMAR 2015](#)).

## Legislative Context

### Requirement for a FMP:

An approved FMP must be in place and a production licence must have been granted before petroleum recovery operations can commence from a field. An FMP can only be applied for by a production licence holder (licensee) or a production licence applicant, as per regulation 43(1).

Schedule 3 of the RMAR 2015 sets out the detailed technical content that must be included in an FMP as required by regulation 48. The [Guidelines to RMAR 2015](#) describe the FMP requirements as identified in the regulations.

### Requirement for a revision of an FMP:

The licensee must apply for a revision 90 days prior to a **major change** in relation to recovery of petroleum from the field as identified in regulation 50. A revision may also be requested in written notice by the Minister in accordance with regulation 54, including the technical grounds for requiring the revision, along with a proposed date for submission and effect. Significant events and incidents may initiate the need for a FMP revision.

## Guidelines for Field Management Plan Submissions

An FMP is a comprehensive document comprising the following information:

- an executive summary (summarising the field development proposal)
- a detailed description of the reservoir
- details of the proposed development including well location, design and completions
- details and schematics of all development concepts considered and the rationale for the chosen concept
- an overview of the project and a project schedule, including a Gantt Chart or equivalent
- details of proposed field operations and production processing facilities
- a petroleum resource maturation plan outlining the development stages
- a description of planned decommissioning and rehabilitation.

An FMP revision must also identify the reasons for the revision. Major changes can include, but are not limited to, the following proposed actions of the title holders:

- Changes to the development strategy or management of the field or pool, for example:
  - increase or decrease in rate of recovery
  - revised ultimate recovery or reserves, due to changes in the understanding of the geology or underground formation
  - changes to the configuration or numbers of wells in the development plan
  - additions or modifications to the production processing facilities, other than minor modifications for the purpose of maintenance or process.
- Changes to the plan for development of additional pools in the field
- Cessation of production, permanently or for the long term, before the date proposed in the approved FMP
- Introduction of new methods for petroleum recovery, such as enhanced recovery or injection of fluids.

Note that some of these major changes may be initiated by what is currently defined as a significant event under regulation 62 – further details are described in the [Guidelines to RMAR 2015](#) (pg. 28).

### Lodgement

An FMP or a revision of an approved FMP should be lodged online through the [Petroleum Geothermal Register](#) (PGR) system. Each of the ten steps of lodging an FMP through PGR is designed to ensure all of the information as required by Schedule 3 of the RMAR 2015 is included in an FMP submission.

This Guideline provides a detailed description of the type of information that is required in an FMP submission in the order of the Steps displayed in the PGR online form. All steps must be completed and shapefiles attached. You may prepare an FMP document pdf to be attached at Step 10, and reference the relevant chapters in that document in each Step of the PGR form. The FMP document does not need to be ordered in the same way if an alternative report schedule of contents is more appropriate for you.

Appendix 1 identifies the format requirements of figures, data and shapefiles. Appendix 2 provides a concordance table of information requirements according to Schedule 3 of the RMAR 2015. Appendix 3 provides a glossary of terms.

## Step 1. Registered Holders

This section identifies the registered holders' name and contact details.

### PGR Lodgement requirements

This PGR step should auto-fill from Departmental records.

- Company, ACN, ABN
- Street Address, Postal Address
- Contact Person
- Registered title holder(s)

## Step 2. Titles

This section identifies the relevant petroleum titles for the Field Management Plan.

### PGR Lodgement requirements

This PGR step should auto-fill, however if there are more than two titles you may have to add the documents manually. This section provides the ability to add adjoining titles if the field extends over more than one Production Licence, when the registered holders are the same.

## Step 3. General

This section essentially covers an Executive Summary. You may elect to include the exploration history in a different section in your own FMP document.

### PGR Lodgement requirements

At least one shapefile comprising the development concept and facilities infrastructure must be uploaded in **Step 3** to be able to submit the application.

### Information Requirements

The document must include the following information where relevant:

- An overview of the proposed development and management plan
- The history of any previous exploration of the field including geophysical surveys and drilled wells (discovery and appraisal wells are applicable)
- For an FMP revision, provide the development history.

An application for a revision of an FMP must also be accompanied by the reason(s) for the FMP revision and the approval sought.

## Step 4. Geology & Geophysics

This section (in conjunction with information provided in Step 5) addresses Items 1, 2 and 3(a) of RMAR 2015, Schedule 3.

This section addresses the applicant's understanding of the regional geology and licence-specific field geology and geophysics. You may elect to include the history of previous exploration, appraisal and development (in the case of a FMP revision) here. You may also prefer to include the details on subsurface mapping, petrophysical analysis and rock characterisation in a more field specific section in your own FMP document, such as denoted by Step 5, Reservoir and Fluid Properties.

### Information Requirements

Examples of information that are commonly used in support of the above technical assessment include the following:

#### (Items 1, 2 and 3(a)): General Geology & Geophysics

- The history of any previous exploration of the field including geophysical surveys and drilled wells (discovery and appraisal wells). For a revision of an approved FMP, please provide the development history:
  - A map showing the location of seismic coverage; include permit boundary, well locations and field extent
  - A table outlining the wells drilled and seismic acquired with the associated year assigned.

- Regional synthesis, including images
  - Regional geological description at basin level specifying the location of the field(s)
  - Regional stratigraphic column, with reservoir, source and seal highlighted
  - Map showing the main regional tectonic elements with the location of the field(s) and the licence boundary.
- Geological depositional model
  - Describe depositional setting and reservoir facies of each reservoir unit
  - A summary composite log of the reservoir section at an appropriate scale, showing the general reservoir characteristics, with depth, stratigraphic reservoir units, palynology, conventional core coverage and description, standard wireline log data response and interpreted petrophysical analysis
  - Gross depositional environment maps or schematics.
- Reservoir units and sub-units (preferably described as per Geoscience Australia conventions)
  - Provide, at an adequate scale, at least one well log correlation through the field showing reservoir units, sub-units and fluid contacts, along with core coverage and drill stem test (DST) test intervals
  - General description of the lithology of the reservoir; indicate the depths where significant changes in lithology occur that affect reservoir quality (flow units)
  - A comprehensive table of the data collected in each exploration and appraisal well, including LWD, wireline, conventional core, sidewall core (SWC), pressure data (RFT, MDT, etc.), vertical seismic profile (VSP) and well tests, etc.
- Geophysics acquisition and processing
  - Detail the seismic acquisition and processing history, with vintages and quality
  - Describe any seismic reprocessing undertaken, with year and type, e.g. pre-stack time migration (PSTM), pre-stack depth migration (PSDM), inversion, etc.
  - Provide this information in a tabulated form
  - Synthetic seismograms
  - Seismic to well ties description and sections
- Subsurface mapping
  - A detailed description of the subsurface mapping with description of horizon mapping
  - Describe the depth conversion methodology and uncertainty
  - Include a depth map (TVDSS) of the field(s) at the top of each reservoir at an appropriate scale (generally 1:25,000)
  - Ensure the maps are clearly labelled, with mapped faults and field compartments and include the fluid contact depth
  - Quantitative interpretation
- Fault interpretation
  - Fault polygons clearly showing the interpreted throw on the faults
  - Tectonic elements of the field(s)
- Interpreted seismic sections, crossline and inline, through the field (at an appropriate scale), showing amplitude anomalies or relative impedance, if available
- If applicable, provide a seismic amplitude or inversion map, clearly labelled with scale bar and legend for each target/reservoir in the field(s) and the existing plus planned well intersections
- Regional stress regime and geomechanics
- Regional hydrodynamic system with aquifer gradient and supporting data.

**(Items 1, 2 and 3(a)): Petrophysical Log Analysis and Description**

Outline details of the data available and petrophysical log analysis undertaken, with environmental corrections applied, to determine Vshale, net to gross, porosity, permeability and water saturation.

- Describe the database and methodology that was used to define each of the parameters

- Provide evidence that reservoir properties are in line with the regional trends
- Individual petrophysical interpretations for each well on a plot (A3 size)
- A table of petrophysical analyses for each well and reservoir unit, including:
  - Formation tops for the reservoir(s) and sub-divisions
  - Porosity evaluation: Effective and total
  - Permeability evaluation: Calculated, and if applicable from mobility or core
  - Net to gross ratio, net reservoir thickness and net pay flag (indicate cut offs)
  - Volume of shale (indicate sand and siltstone also, if available)
  - Water saturation and how this was calculated.
- Saturation height function (if applicable)
- Describe the fluid contact evaluation (TVDSS) and support the interpretation, with log, pressure and amplitude data (if available)
- Include pressure/depth plots with hydrocarbon and water gradients
- Outline uncertainties in the petrophysical analysis, including hydrocarbon contact depth
- A regional fracture gradient, and pressure plots at the reservoir level. Show evidence with offset wells from nearby fields.

#### **(Items 1, 2 and 3(a)): Rock Characterisation**

Supply details of the available core analysis utilised in the interpretation of the field (as available), including:

- Core analysis results, including porosity, permeability, grain density, core gamma and core photography
- Rock compressibility, including overburden porosity and permeability
- Special core analysis including:
  - Capillary pressure data, J-function
  - Relative permeability analysis.
- Source rock analysis.

### **Step 5. Reservoir & Fluid Properties**

This section (in conjunction with information provided in Step 4) addresses Items 1, 2, 3(a) and 8(a) of RMAR 2015, Schedule 3.

This section essentially provides a detailed description of the petroleum field, including the structure and extent of the discovered petroleum pools. It should include an in-depth discussion of all geophysical, geological and reservoir engineering data that comprise the modelling of the petroleum pools. You may want to include the petrophysical analysis, and rock characterisation data in this section in your own report. However, it is important that all premises that have gone into the modelling of the field for the static and dynamic models and associated in place and recoverable volumes, along with the interpreted production forecasts, are documented and supported by the technical evaluation. Reserves and resources must be reported in line with Society of Petroleum Engineers – Petroleum Resources Management (SPE-PRMS) guidelines.

#### **PGR Lodgement Requirements**

At least one shapefile for the field must be uploaded in **Step 5** to be able to submit. Other required shapefiles can be uploaded in Step 10 (Other Information), if preferred.

#### **Information Requirements**

Examples of information that are commonly used in support of the above technical assessment include the following:

#### **(Items 1, 2 and 3(a)): Petroleum Pools in the Field**

- Details of the of the structure(s), extent, trap description and interpreted images from seismic
- Depth maps (TVDSS) for the different hydrocarbon pools in the field with fluid contacts
- An interpreted seismic section crossline and inline through the field (scale as appropriate), showing amplitude or inversion anomalies, if available

- If applicable, provide a seismic amplitude or inversion map clearly labelled with scale bar and legend for each target/reservoir in the field(s) and the existing plus planned well intersections
- Detail the main uncertainties in relation to the field extent and volumes.

#### **(Items 2 and 3(a)): Fluid Properties**

- General data on the reservoir physical properties, temperature (measured from logs and adjusted by Horner Plots)
- Fluid composition
- Fluid properties, including density, viscosity, expansion factor, liquid dropout curve for condensate, etc.
- General data on the fluid physical properties, pressure volume temperature (PVT), and gas analysis (compositional, isotopes)
- PVT experimental data (e.g. CCE, CVD, etc.)
- Formation water chemical analysis
- Evidence that formation water chemical analysis is in line with the observed water salinity of the basin
- Oil, gas and water interfacial tension.

#### **(Items 2 and 3(a)): Well Test Analysis**

- Field-based performance characteristics, e.g. DST, production testing history
- Provide well test analysis (permeability, flow capacity, wellbore storage, skin effects, reservoir geometry, etc.)
- Include pressure plots and interpretation.

#### **((Items 2, 3(a) and 8)) Aquifer Study**

Aquifer identification and description of all aquifers present in area.

- Include both a description of the reservoir aquifer and any shallower aquifers
- Discuss the reservoir aquifer and relate this to the type of drive expected in the field development plan, e.g. aquifer drive, depletion drive, etc.
- Include brief details on mapping and identification of shallower aquifers.
- Aquifer management and protection of shallow aquifers may be addressed in Step 8 (note baseline monitoring included in Step 8).

#### **(Items 2 and 3(a)) Resources Evaluation**

A detailed discussion of the technical work that led to the in place volumes and contingent resources/reserve estimates must be presented. Document all reservoir modelling undertaken, including the static and dynamic modelling methodology for the field. This should include input parameters for modelling. A discussion of the main subsurface uncertainties for the field should be described, in support of the range of in-place volumes and estimated ultimate recovery (EUR) documented for the field.

- Detailed description on static and dynamic modelling and simulation studies, should include the following:
  - Details on the range of models constructed, from the identified uncertainties
  - Input parameters range as P10, P50, P90, mean, plus the type of probability distribution function used
  - Details on the predicted hydrocarbon contacts and the data used to support this
  - Details on the generation of the static and dynamic models (grid size, zones/layers, type of faults, facies and property model methodology and results). Include upscaling methodology, if applicable
  - Evidence of reservoir connectivity/communication through different compartments or evidence of baffles that may affect the recovery of petroleum
  - Details on the expected drive for the field through the dynamic modelling, e.g. aquifer drive, depletion drive, etc. and the evidence for this
  - Experimental design details
  - Tornado charts or other graphs and tables documenting the main subsurface uncertainties impacting the in-place and recoverable volumes
  - Details on well creasing analysis, justification of well count and well placement with selection of proposed development wells locations
  - History match of dynamic model(s) to previous well tests and/or past production performance, pressure data and relative permeability

- A thickness map of each reservoir, including perhaps hydrocarbon pore thickness (HCPT) or hydrocarbon pore volume (HCPV) with existing and proposed well locations shown.
- Include any other material that you consider will contribute to reducing the uncertainty of the presence and volumes of hydrocarbons in the field.
- In-place and EUR volumes data, including cut-offs and assumptions.
- Provide in-place and EUR volumes in a tabulated manner for each individual reservoir plus the total field. An example table is given below.
- Metric units are a requirement, with field units supplied as desired.
- Ensure you clarify the definitions used for each fluid in the volumes reporting, as shown by the subscripts at base of table, which outline the definitions of dry gas (including inerts), condensate, etc.

Resource Category	Product	Units	Low (P90) or IP/IC	Mid (P50) or 2P/2C	High (P10) or 3P/3C
<b>Initially in Place</b>	Dry Gas <sup>1</sup>	10 <sup>9</sup> m <sup>3</sup>	XX	XX	XX
		Bscf	XX	XX	XX
	Condensate <sup>2</sup>	(Bscf)	XX	XX	XX
		(MMbbl)	XX	XX	XX
	Oil	GL	XX	XX	XX
		(MMbbl)	XX	XX	XX
<b>Estimated Ultimate Recovery</b>	Dry Gas <sup>1</sup>	10 <sup>9</sup> m <sup>3</sup>	XX	XX	XX
		(Bscf)	XX	XX	XX
	Condensate <sup>2</sup>	GL	XX	XX	XX
		(MMbbl)	XX	XX	XX
	Oil	GL	XX	XX	XX
		(MMbbl)	XX	XX	XX
<b>Estimate of Recovery Factor</b>	Dry Gas <sup>1</sup>	(%)	XX	XX	XX
	Condensate <sup>2</sup>	(%)	XX	XX	XX
	Oil	(%)	XX	XX	XX

<sup>1</sup> Where dry gas is defined as C4 -, component plus inerts

<sup>2</sup> Condensate is C5+

- Provide details on reserves and contingent resources for the total field
- Provide reserves and resources by individual pools/reservoir units
- Details on contingent resources should be included for any future opportunities discussed in the FMP, but not part of the proposed development
- All reporting must be done in line with Society of Petroleum Engineers – Petroleum Resources Management (SPE-PRMS) Guidelines.

## Step 6. Development Scenarios

This section addresses Items 3(c), 4, 5 (a), 6, 7, 9, 10(a), 13 (b) (c) and 14 of RMAR 2015, Schedule 3.

This section outlines what development concepts were considered and the reasoning behind the selection of the planned development concept. This selected concept is discussed in detail, with the proposed infrastructure and generic well design including completion strategy of the development wells. As stated prior, you may vary where you include this in your own FMP document, but ensure that this is addressed. Detailed Well Management Plans (WMPs)

will be required to be submitted for each development well and approved prior to development drilling. A detailed production forecast is required, with any restrictions highlighted. The production forecast must be for the life cycle of the field with an estimate of end-of field life. An estimated rate of recovery is required, which will form part of the application for approval in the FMP. The applicant must demonstrate that they have undertaken a thorough technical analysis of the field in a manner to optimise long-term recovery.

### **Information requirements**

Examples of information that are commonly used in support of the above technical assessment include the following:

#### **(Items 3(c), 4, 5(a), 6, 9 and 10(a)): Development Scenarios in Detail**

- Proposed or selected development strategy
  - Description of development concept, infrastructure, equipment and procedures (number of wells, other facilities required, tie-ins, production mechanism)
  - Include a map of the field that shows location of production and injection (if applicable) wells used in the dynamic simulations and/or production engineering studies
  - Preliminary schedule for the field development indicating expected timing of production start and finish, well sequencing, facilities start-up, pipeline installation, etc.
  - A chart, preferably a Gantt chart, outlining the proposed project schedule.
- Alternative development scenarios
  - Comparison between the different alternatives
  - Methodology of selecting the proposed development strategy described above.
- Market and sales outlook
  - This is a summary of the commercial concept of the project. Full details of the work and expenditure (including decommissioning costs) should have been supplied with the production licence application.
- Flexibility for future opportunities and select concept optimisation
  - Phases of infill drilling and/or appraisal, installation of artificial lift equipment, potential tie-ins, opportunities for applying new technologies and any activities that will enhance the recovery of petroleum.
- Incorporation plans for all pools
  - This should include a look at pools that are not currently commercial, but could be commercial at a later date.
  - Facilities should be designed to incorporate these as well as potential infill or appraisal drilling as defined above. This should address additional drilling, flowlines and potential extra capacity on proposed facilities.

#### **(Items 4, 5(a), 6, 7, 9, 10(a) and 13): Production Forecast**

- Provide annual production rates for the field and by individual wells by production layer or zone, with the definition of the method used for production forecasting, e.g. from the reservoir simulation studies.
- The forecast should include export as well as domestic gas supply, as applicable
- If rates are subject to considerable uncertainty, supply the predicted range of uncertainty
- Supply economic cut-offs for the production rates proposed and split these into production zones
- Detail any restrictions on the production rate proposed for the field and individual production zones
- Specify how production from more than one pool is handled (if applicable).
- If more than one well is planned to extract hydrocarbons from one pool, describe how production will be allocated to each well
- Document annual production rates of different fluids
- Supply a table of gas, condensate, oil, and water production (yearly), with definition of the method used for the production forecasting.
- Estimate of flaring and venting proposed, plus fuel usage.
- Any proposals for the enhanced recovery or recycling of petroleum (e.g. enhanced oil recovery (EOR)) and evidence for the selection of the method
- Provide details and timings of predicted end of field life from the production forecasts and timings of associated field decommissioning.

### **(Item 7): Maximum Rate of Recovery**

- The estimated maximum rate of recovery (per day/year), based on dynamic simulation and/or other reservoir engineering studies
- Evidence that the proposed rate of recovery is the maximum achievable – i.e. it will not impact negatively on the reservoir performance and will not sub-optimize the ultimate recovery of the resource
- Production facilities constraints (processing and storage) of fluids need to be aligned with maximum rate of recovery.

## **Step 7. Engineering**

This section addresses Items 5, 8(b), 9, 10, 12, 13, 14 (a) to (f), 15 and 17 of RMAR 2015, Schedule 3.

This section primarily details the proposed well and infrastructure engineering, associated with the development concept. This section refers to surface engineering. Generic well design is discussed in this section on the PGR system, although you may want to locate it in a different section of your FMP document. The well numbers and locations will have been defined based on the simulation studies and well creaming analysis described earlier. Waste management should be high level and consistent with what is supplied in the more detailed environment plan (EP). Well plans should be high level and consistent with the detailed information supplied in the WMPs.

### **PGR Lodgement Requirements**

At least one shapefile for the infrastructure for the proposed development must be uploaded in Step 3. Further shapefiles can be uploaded here or in Step 10, if preferred.

### **Information requirements**

Examples of information that are commonly used in support of the above technical assessment include the following:

#### **(Items 5, 10, 12, 13, and 14): Well planning toward optimisation of drainage (note details must be contained in separate WMPs)**

The generic development well design(s) and completion concepts should be discussed in the FMP. Note that WMP applications on each development well will be required to be approved before drilling can commence. These WMPs will contain full details on each individual well proposed, but will need to be consistent with the FMP.

- Proposed well positions and proposed drilling pattern, for both production and injection wells (if applicable)
- Detail any phasing or scheduling of production wells, in addition to any wells which are contingent on previous well results
- Supply these in a table with a schedule
- General details on the development well concept(s), hole size, completion intervals and type of completion, etc.
- Brief description of drilling operations, including mud types and disposal of waste (specifically cuttings). This should be on a high level and consistent with the EP and WMPs
- Describe risks and high level mitigation strategies (e.g. sanding or other borehole stability issues, high pressure and/or high temperature expected, formation fracturing risks)
- Detail flexibility and contingency plans for the basic well plans, based on currently defined uncertainties
- Workover operations, and indicative plans for tie-ins and peripheral expansions.

#### **(Items 9, 10, 12 and 13): Production Processing Facilities and Infrastructure**

- Details on production processing facilities that include design and operating capacity, operating conditions and metering locations, and estimated life of the facility
- Details of surface connections and equipment used such as flowlines, separators, storage and disposal facilities and associated licensed pipelines
- Volumetric estimates (equipment and procedures used to determine quantity and composition of petroleum and water). Equipment should conform to international standards and be verifiable, whilst procedures should be auditable
  - Metering devices (including gas chromatograph): type, accuracy and operating range
  - Procedure of hydrocarbon allocation: method, equation and compositional analysis, monitoring system
  - Maintenance and inspection of metering system
  - Calibration certificates of custody transfer meters (CTM) and wellhead meter.

The applicant should provide the following engineering details on its proposed production processing facility and associated flowlines and licensed pipeline(s), where relevant:

- Engineering drawings:
  - Piping and instrumentation diagrams (P&ID), including custody transfer and well head meters
  - Process flow diagrams (PFD)
  - Details of each crude oil/condensate storage tank and its associated tank bund area
  - General arrangement drawings (GAD) or plot plans drawings (PPD) that show plan and elevation views for the major equipment in the production processing facility
  - Plot plan drawing (PPD) or site map that show the overall locations of the production wells and associated flowlines and licensed pipeline relative to the fenced compound containing the production processing facility
  - Cathodic protection facilities schematics.
- Survey report and associated data of:
  - The proposed fenced compound containing the production processing facility and any water evaporation ponds on the production licence area
  - The start and end points and the route of each proposed flowline and licensed pipeline.

Details on how to supply the engineering drawing, surveys and associated shapefiles are shown in the Appendix 1.

The description of facilities and infrastructure should be consistent with that recorded in the Safety Management System and environment plan documents.

**Note:** When the construction of the production processing facility has been completed and operations have commenced, the licensee is to provide to the department, the above listed engineering drawings and survey report and survey data, which have been updated and revised to an “As Built” or “As Constructed” status. These drawings and survey data are to be provided within six months after the completion of the construction of flowlines, pipelines, production processing facility and associated facilities.

#### **(Items 10, 14 and 15): Waste Treatment and Underground Injection**

Basic details should be given in the FMP on the treatment of waste material and proposed underground injection, along with any proposed flaring, venting or use for fuel. This should be consistent with the EP, which will cover it in more detail:

- Plans for treatment of waste (fluids and materials), including naturally occurring radioactive materials
- Water injection as disposal, where and how it is to be injected
- Provide evidence that fluid injection programs will maintain containment and will not affect overlying aquifers or spill to the surface
- Describe any fluids injected for enhanced petroleum recovery, if applicable
- Arrangements for the disposal or flaring and venting of any produced petroleum. Note that flaring and venting will be covered in more detail in an EP. The basic proposal presented here should be consistent with the EP.

#### **(Item 17): List of Australian and International standards that apply to operations**

These refer to operations used in connection with the infrastructure by the applicant, with associated references.

## **Step 8. Monitoring and Reporting**

This section addresses Items 8(b), 11 and 14(g) of RMAR 2015, Schedule 3.

This section addresses the associated monitoring of the reservoir through the production life cycle, in order to keep an easily accessible and auditable trail for the management of the petroleum field. Reporting and recording should be in line with good oilfield practice and as outlined in Part 8 of the: [RMAR Guideline](#).

## Information requirements

Examples of information that are commonly used in support of the above technical assessment include the following:

### (Item 11 and 14(g)): Reservoir Management

- Comments on how the monitoring and reporting of pressure and composition of the fluid will be conducted
- Discussion of risks and mitigating activities
- Any other reservoir management issues and contingencies associated with perceived geological risk
- Outline of procedures for notification and communication with the Minister in case of any significant events. Include details on notification of significant events as defined under regulation 62, or potential revisions of the FMP required due to significant events, as detailed under regulation 62, see Part 7 attached link; [Guidelines to RMAR 2015](#)
- Contingency plans in case of loss of containment.

### (Item 11): Field Development Activities

- Advise how record-keeping and reporting procedures will be undertaken for daily drilling, monthly and cumulative production per well and per field. Note this should be in alignment with Part 8 of RMAR 2015, see link: [Guidelines to RMAR 2015](#)
- Submission procedures of cuttings/samples and field data, as outlined in Part 8 of RMAR 2015; [Guidelines to RMAR 2015](#).

### (Item 8(b) and 11): Aquifer Monitoring

- Basic details on aquifer monitoring regarding acquisition procedures of baseline surveys, ongoing monitoring, storing and reporting
- This should be consistent with the EP, which will cover this in more detail.

## Step 9. Decommissioning

This section addresses Item 16 of RMAR 2015, Schedule 3 and should outline the plans and timing for decommissioning and rehabilitation of the field, at cessation of production.

The document is to include:

- A description of the plans for closure and field decommissioning, including:
  - wells with a brief description of isolation of the reservoir
  - infrastructure facilities
  - pipelines and flowlines
  - production processing facilities
- A description of the plans for rehabilitation
- Estimated timing of these in relation to cessation of production.

## Step 10. Other Information

This section addresses Item 3(b) of RMAR 2015, Schedule 3.

### Information Requirements

This section outlines any other information relevant to the field development, including future exploration opportunities, if they have not been included elsewhere in the FMP application. This should include:

- Details of leads and prospects identified within the production licence
  - Include a map(s) of the closure and seismic line showing the prospect(s), the estimated volumes and the geological chance of success
  - Include a program with plans for exploration activities to identify near field opportunities
  - Outline any plans for further appraisal.
- Any other relevant information the applicant considers necessary in respect to managing the field's whole life cycle.

### PGR Lodgement Requirements

Your application must include the following:

- **PDF copy of complete FMP document**
- All figures must also be provided as separate files in an Appendix, at a resolution of at least 300dpi.
- Engineering drawings in PDF format, as a separate file
- Survey data as a zip file
- **Shapefiles:** The shapefiles required to be uploaded in Steps 3 and 5 for successful online lodgement should also be **resubmitted** in Step 10 as a zip file containing the full shapefiles (up to 8 components) for each dataset uploaded, along with any further outstanding spatial data. This will allow DMIRS to quality check all FMP spatial data on the in-house software and assess the FMP application in accordance with the regulatory requirements.
- **Registered Titleholder Authorisation:** An FMP must be accompanied by evidence that the applicant is authorised to submit the FMP on behalf of multiple registered titleholders and/or signatures of all registered titleholders on the FMP document.

## Appendix 1. Format Requirements of Figures, Data and Shapefiles

### Figures

All figures within the document must be legible and also be provided as separate files in an Appendix, at a resolution of at least 300dpi. Important or detailed figures (especially well logs and correlations) must be in A3 format, with clearly legible headers and scales. Cross sections, including seismic maps must be shown on structure maps and demonstrate the location of the wells clearly.

### Numerical Data

All numerical data must be in metric units, with field units also supplied for reserves and resources if desired. Reserves and resources must be presented in line with SPE-PRMS Guidelines.

### Engineering Details

- Engineering drawings in PDF format
- Survey data provided must be geo-referenced in Map Grid of Australia coordinates stating the datum used and include digital ArcGIS shapefiles.

### Shapefiles

The following shapefiles are required to be submitted with the application:

- Field outline(s)
- Infrastructure and wells, showing the locations of flowlines and metering stations
- Production processing facilities and licensed pipeline locations.

Please follow the **two** requirements detailed below, outlining successful **online** lodgement **(1)** and successful **regulatory** submission **(2)**.

(1) For successful PGR online submission shapefiles at Step 3 and Step 5 must adhere to predetermined formats:

- The following three (3) Esri ArcGIS files must be uploaded for each submission:
  - .dbf – attribute format; columnar attributes for each shape
  - .prj – projection format; the coordinate system and projection information
  - .shp – shape format; the feature geometry itself.

(2) These should be reloaded with any additional shapefiles in Step 10, as required, as a zip file containing the full shapefiles (up to 8 components) for each dataset.

The projection of the digital files must be spatially geo-referenced to GDA\_1994\_MGA\_Coordinates with the relevant MGA\_Zone (49-52) specified; for example: GDA\_94\_MGA\_Zone\_50.

## Appendix 2. Concordance table:

Information requirements according to Schedule 3 of the Regulations

PGR Step	Regulation requirement
4. Geology and Geophysics	1, 2, 3(a)
5. Reservoir and Fluid Properties	1, 2, 3(a), 8(a)
6. Development Scenarios	3(c), 4, 5(a), 6, 7, 9, 10(a), 13(b)-(c) , 14
7. Engineering	5, 8(b), 9, 10, 12, 13, 14(a)-(f), 15, 17
8. Monitoring and Reporting	8(b), 11, 14(g)
9. Decommissioning	16
10. Other Information	3(b)

### Appendix 3. Glossary

<b>CAPEX</b>	Capital expenditure
<b>CCE</b>	Constant composition expansion
<b>CTM</b>	Custody transfer meters
<b>CVD</b>	Constant volume depletion
<b>DST</b>	Drill stem test
<b>EOR</b>	Enhanced oil recovery
<b>EP</b>	Environment Plan
<b>EUR</b>	Estimated ultimate recovery
<b>FMP</b>	Field management plan
<b>GAD</b>	General arrangement drawings
<b>HCPT</b>	Hydrocarbon pore thickness
<b>HCPV</b>	Hydrocarbon pore volume
<b>LWD</b>	Logging while drilling
<b>MDT</b>	Modular formation dynamics tester
<b>P&amp;ID</b>	Piping and instrumentation diagrams
<b>PFD</b>	Process flow diagrams
<b>PPD</b>	Plot plans drawings
<b>PSDM</b>	Pre-stack depth migration
<b>PSTM</b>	Pre-stack time migration
<b>PVT</b>	Pressure volume temperature
<b>RFT</b>	Repeat formation tester
<b>SPE-PRMS</b>	Society of Petroleum Engineers – Petroleum Resources Management System
<b>SWC</b>	Sidewall core
<b>TVDSS</b>	True vertical depth subsea
<b>VSP</b>	Vertical seismic profile
<b>WMP</b>	Well management plan

Government of Western Australia

**Department of Mines, Industry Regulation  
and Safety**

8.30am – 4.30pm

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