Kestrel Management Plan

Erosion and Sediment Control Plan: LW500

Status: Active
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Contents

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Abbreviations

CH	Cultural heritage
DSDILGP	Department of State Development, Innovation. Local Government and Planning
EA	Environmental Authority
GDP	Ground Disturbance Permit
Kestrel Mine	Kestrel Coal Mine
Kestrel Coal Resources	Kestrel Coal Resources Pty Ltd
Mitsui	Mitsui Coal Pty Ltd
ML	Mining Lease
PED	Personal Emergency Device
RIDA	Regional Interests Development Approval

1 Purpose

This Erosion and Sediment Control Plan (ESCP) has been drafted to address erosion and sedimentation risks identified for mining related development and operations within Kestrel Mine, with a specific focus within mining lease (ML) 70481. This ESCP outlines the relevant mitigation measures to be carried out.

1.1 Background

The Kestrel Coal Mine (Kestrel Mine) is located in the Bowen Basin, approximately 51 km northeast of Emerald in central Queensland, Australia – refer (Figure 1).

Currently within the 400-series panels, coal extraction and production occurs at depths of 300–450 m, with production rates of 8–10 Mt run of mine coal per year. The current approved life of mine includes mining of a further series of longwall panels, referred to as the 500 series, which extends into ML70481 at depths of between 360 m and 470 m, Typical mining seam thickness ranges between 2.5–3.1 m with the longwall minimum extraction height being 2.6 m.

2 Scope and objectives

This ESC Plan has been developed to control erosion and sedimentation risks associated with longwall mining within Kestrel Mine, with a specific focus on panel development of the 500 series panels.

Supporting surface infrastructure is required ahead of mining and will result in limited and temporary surface disturbance. These works include access tracks, gas drainage works, and other surface support infrastructure. Where groundworks are being undertaken, the potential exists for erosion to occur and the release of sediment through surface water runoff. The objectives of this ESCP are to:

- identify areas subject to erosion and sedimentation;
- minimise erosion of disturbed and undisturbed land;
- minimise release of sediment caused by mining activities to receiving waterways;
- define and implement adequate erosion and sediment management practices and infrastructure that ensures minimal contamination of storm water;
- ensure erosion and sediment control infrastructure are appropriately maintained; and
- ensure all works are completed in accordance with requirements of the Environmental Authority (EA).

3 Relevant resource activities

Resource activities associated with Kestrel Mine having the potential to cause land disturbance and subsequent erosion and sediment control impacts include:

- surface subsidence resulting from underground longwall panel progression; and,
- disturbance associated with supporting surface infrastructure development and operation.

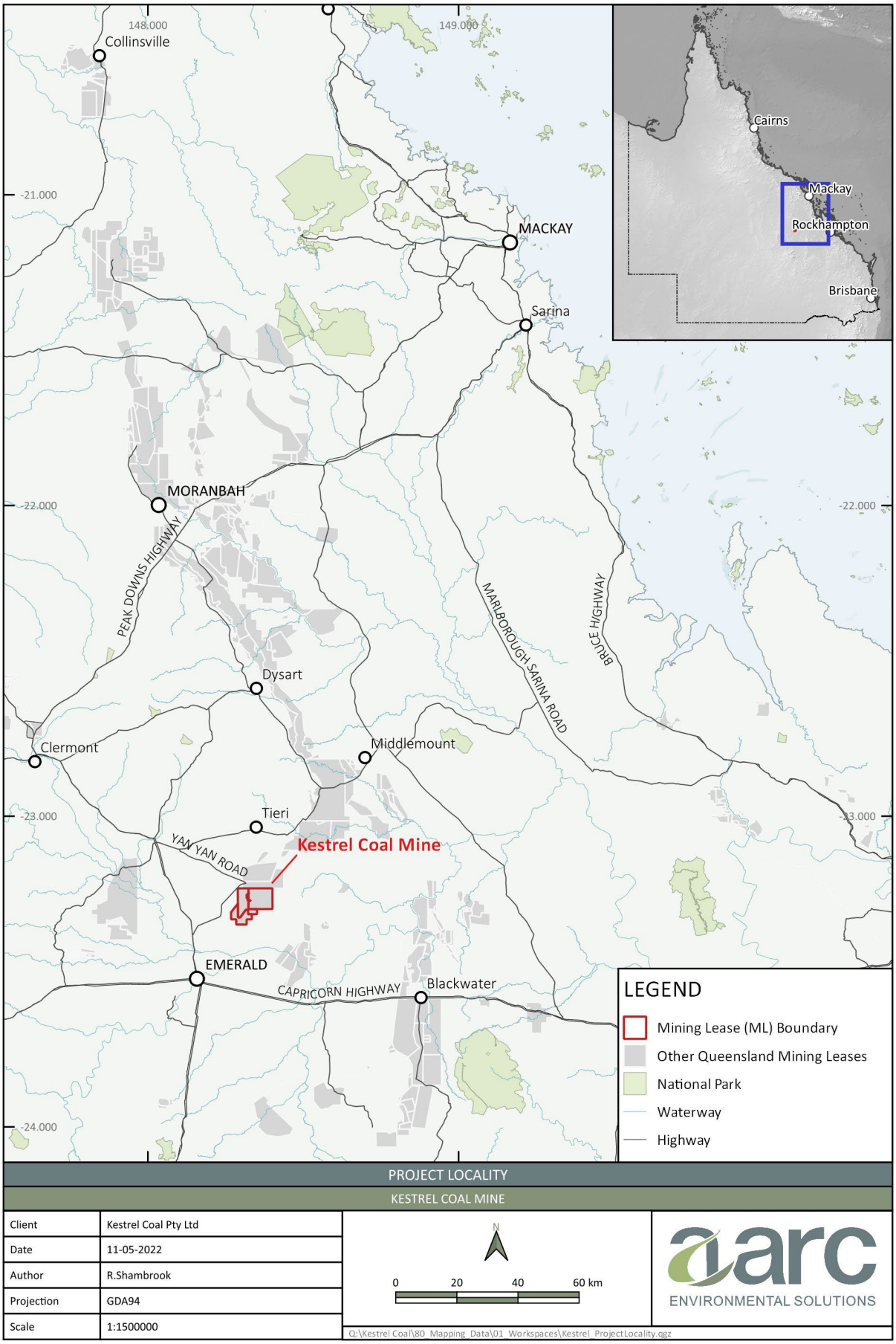

Figure 1: Project location

3.1 Longwall panel progression

The key resource activity associated with Kestrel Mine will be the progression of a longwall panel at depth, following a pre-defined longwall panel sequence, progressively extracting the coal seam. The principal land disturbance impact associated with underground mining activities at Kestrel is subsidence arising as longwall panels progressively extract the coal seam. Subsidence predictions have been undertaken for all Kestrel longwall panel series out to completion of the 500 series and have been updated as and when mine planning changes occur. Subsidence monitoring of prior longwall panels is used to verify the relative accuracy of subsidence predictions as well as informing subsequent subsidence predictions. Data referred to in this ESCP is taken from the most recent update for panels LW500 to LW510.

Maximum vertical subsidence over the 500-series longwall panels is predicted to range from between 1.6–2.3 m mid-panel to 0.1–0.3 m over longwall inter-panel pillars. Longwall panel widths are either 396 m (LW500) or 424 m. Maximum slopes arising from subsidence typically occur within 100–150 m of the panel edge. As a conservative comparison, measured maximum slopes from the adjacent 400 series panels are approximately 1.5–2% (or approximately 1°).

The slopes and troughs formed as a result of subsidence are subtle and not easily distinguishable from the surrounding topography, as the range of movement associated with subsidence is well within the range of natural elevation variation. In other words, the topography of subsided areas is not inconsistent with the surrounding un-subsided topography (i.e. gently rolling country with low relief).

Potential land impacts associated with subsidence include localised changes in slope, surface tensile cracking, and changed drainage systems including, in some areas, localised ponding. Where waterways traverse subsidence areas, localised longitudinal slope increases and waterway re-alignment may occur.

3.2 Supporting surface infrastructure

Underground mining operations at Kestrel Mine are supported by a range of surface-located services and infrastructure, including the following infrastructure types:

- Well established administration offices, maintenance buildings, washrooms and first aid facilities;
- Water management infrastructure, including a range of dams for water storage, and pipelines for water movements;
- Coal Handling and Preparation Plant (CHPP);
- Overland conveyor to transport run of mine (ROM) coal to the CHPP;
- Co-disposal Facility;
- Exploration and pre-production drilling;
- Pre-drainage and dewatering infrastructure consisting of vertical production wells and flaring infrastructure, end of hole and laterals drill locations;
- Post production gas drainage consisting of vertical goaf wells, goaf reticulation pipelines and access roadway; and,
- PED surface lines installed along the line of the longwall panel.

Any new or potential surface disturbance activities are subject to an internal environmental management approval process (Ground Disturbance Permit), as such, the location and installation of surface infrastructure is managed to minimise any potential impacts.

Surface infrastructure will remain either for the life of mine, the life of the panel series, or the life of the panel. Removal of surface infrastructure will be undertaken once the service life of the infrastructure has passed and the mining area is rehabilitated and returned to its former productive capacity.

4 Erosion and sediment control measures

This section describes the management and rehabilitation measures utilised to address the potential impacts to land identified and described in Section 3.

4.1 General erosion and sediment control principles

The general erosion and sediment control principles to be used at Kestrel Mine include the minimisation of:

- Clearing of land ahead of mining or for other mining related activities;
- Surface services and infrastructure corridors;
- Changes to natural drainage lines and/or catchment systems;
- Stockpile locations;
- Runoff from construction and maintenance activities;
- Topsoil degradation and appropriate storage;
- Vehicle and equipment movement outside dirty water catchments; and,
- Disturbed areas not yet rehabilitated.

4.2 Management measures

4.2.1 Subsidence

The following general management measures relevant to subsidence related impacts will be utilised, as applicable, for Kestrel Mine:

- Subsidence prediction assessments will continue to be undertaken in advance of each new panel series, and updated as required to align with mine planning changes or where monitoring identifies a variation from predicted subsidence behaviour.
- Pre- and post-subsidence survey monitoring will continue to be undertaken to assess and validate subsidence predictions.
- Where longwall panels pass under watercourses, and for areas where slopes are predicted to increase to greater than 3%, these areas are to be observed and monitored during and following passage of the longwall face.
- In areas where subsidence movements are predicted to result in moderate or high risk of instability to the bed and banks of a watercourse, stock are to be excluded from the immediate bed, bank and overbank areas, as recommended by Gilbert & Associates (2012). Fencing is to be installed as required to enable effective stock management to occur.
- Agricultural activities will be managed in consultation with the lessee for at least 12 months in advance of subsidence occurring to ensure that a high level of pasture cover exists, such that erosion potential is minimised.
- Any agricultural/soil erosion control infrastructure in the path of subsidence will be removed or, if required to be retained, subject to observation and monitoring to identify any potential soil erosion or drainage risk.

4.2.2 Ground disturbance permit (GDP)

The management of land disturbance by surface infrastructure development and operation is controlled through the Kestrel Ground Disturbance Permit (GDP) system (PA-SH-0065). The GDP system is designed to ensure that all compliance, environmental impact and safety aspects of any proposed disturbance are properly assessed, and that targeted management measures developed and implemented. Relevant key components assessed by GDP process include:

- Disturbance location: confirming that any proposed disturbance/excavation only occurs within the approved disturbance footprint.
- Existing services: ensuring that existing infrastructure and services are not disrupted or, if disruption is unavoidable, ensuring appropriate mitigation measures are put in place.
- Communication: ensuring that all relevant parties (including the agricultural lessee) are aware of the proposed disturbance and have been adequately consulted.
- Environmental aspects: ensuring that environmentally sensitive locations (e.g. watercourses) have been identified and appropriate mitigation measures instigated.
- Cultural Heritage (CH) aspects: specific focus is given to ensure that appropriate cultural heritage management activities (including CH surveys, salvage of identified artefacts, protection zones around areas of high significance) are undertaken and that Clearance Notices are provided where required by the recognised Native Title applicants, the Western Kangoulu people.
- Permitting: ensuring that disturbance complies with applicable permitting conditions e.g. EA conditions, Regional Interests Development Approval (RIDA) conditions, EPBC conditions.
- Operational aspects: for example,
    - ensuring that topsoil is recovered, stockpiled and managed in accordance with site procedures;
    - ensuring that all relevant requirements of Kestrel's Erosion and Sediment Control Plan (KES-0000-PL-OC-0009) are adhered to.

For any disturbance associated with surface infrastructure, the removal, storage and management of topsoil is to be to leading Industry practice, and in accordance with the Environmental Authority (EPML00693413) and the existing ML70481 RIDA (RPI16/002/Rio Tinto).

Where disturbance occurs, stripped topsoil is to be windrowed or stockpiled adjacent to the infrastructure area and either actively revegetated or allowed to revegetate. Topsoil is to be replaced as soon as practicable after the activity has been completed. The site detailed topsoil management procedures are to be followed.

4.2.3 Topsoil management

Topsoil is managed to leading Industry practice, and in accordance with the Environmental Authority (EPML00693413).

Topsoil must be stripped prior to any disturbance that may lead to the loss or destruction of topsoil and stored in stockpiles if not able to be used immediately. Kestrel's topsoil management conforms to the following process:

4.2.3.1 Stripping Topsoil

Topsoil will be stripped to the depth determined by the site Environmental Superintendent and stated on the GDP. The depth of stripping shall be such that no subsoil is stripped.

Machinery movement over soil should be kept to a minimum during stripping operations to avoid compaction and loss of soil structure.

For surface infrastructure associated with Kestrel Mine, topsoil stripping will be minimised wherever possible.

4.2.3.2 Stockpiling Topsoil

Topsoil stockpiles for large scale infrastructure projects, likely to be in place for longer than 12 months, are to be located in designated areas and constructed to a shape and depth as specified by the Environmental Superintendent in the GDP.

Soil stockpiles should be located:

- As close as practicable and readily accessible to respreading areas
- Where they will not interfere with present and future mining and ancillary operations
- Out of the flood zone of watercourses (at least 20m from the bank of a watercourse) and not in flood plain areas
- Not on steeply sloping land.

The vertical height of any topsoil stockpiles shall not exceed 2.5m.

For the minor surface infrastructure associated with the LW500 area, and where topsoil stripping is required for drill pads, monitoring or gas flaring bores, topsoil will be windrowed adjacent to the infrastructure area and allowed to revegetate.

4.2.3.3 Topsoil Stockpile Maintenance

Stockpiles from large infrastructure projects - greater than 1m in height and in place for longer than 12 months - will be shaped and revegetated with a cover crop specified by the Environmental Superintendent to provide initial stability, maintain soil viability and minimise erosion.

For minor infrastructure, windrowed topsoil will be replaced as soon as practicable after the activity has been completed.

4.2.3.4 Topsoil Inventory

For topsoil stockpiles from large infrastructure projects - greater than 1m in height and that will be in place for longer than 12 months - the Mine Surveyor will survey and record the location and volume of each stockpile.

The Environmental Superintendent shall maintain a site topsoil inventory of all surveyed topsoil stockpiles.

For minor infrastructure, it is considered unlikely that any topsoil stockpiles will be added into the existing site topsoil inventory.

4.3 Erosion and sediment controls

Technical studies and experience to date have demonstrated that, where the management measures detailed at Section 4.2 are followed, there is little risk of erosion occurring. Regardless, the following erosion and sediment control measures may be required:

- Silt fences to prevent run-off from disturbed and/or unvegetated areas; to be maintained until such time as revegetation provides sufficient stabilisation. Silt fences must be correctly installed to be effective and are to be inspected and assessed following rain events. They should only be considered as short-term structures, and should not be placed in concentrated flow paths.
- Shallow spoon drains where it is necessary to collect and divert flows around disturbed areas.

- Rock check dams/gabions or rock lined drainage ways where flow paths are sufficiently steep that it is necessary to slow flow velocities. Such structures may be necessary to stabilise watercourses.

The erosion and sediment control structures utilised will be contingent on soils, slopes, the land use of the impacted area, and the impact type i.e. surface disturbance, excessive subsidence cracking or ponding. The following control activities may be required either alone or sequentially as a component of a larger rehabilitation program:

4.3.1 Where slope increases initiate erosion, or exacerbates erosion of degraded areas:

The following rehabilitation sequence will be utilised:

- Review and modify fencing as required to exclude stock from the area and/or manage grazing as appropriate in consultation with the agricultural lessee.
- Undertake amelioration works and/or earthworks as appropriate, (e.g. reprofiling, scarifying, topsoiling, etc.,).
- Revegetate the area as soon as practicable, using either traditional seeding methods or more intensive revegetation methods, as required.
- Monitor revegetation works and assess rehabilitation program success.
- Plan the re-introduction of cattle and future grazing activities with the agricultural lessee.

4.3.2 Where watercourses are observed to have been adversely impacted by subsidence

An adverse impact to watercourses is likely to be exhibited as creek bed or bank erosion and associated bank steepening or undercutting; initiated following panel passing. Within ML70481, the lower reach of Belcong Creek where it traverses the ML and prior to its confluence with Crinum Creek has the greatest risk of bed shallowing and steepening. Other watercourses traversing ML70481 will be subject to lesser substantial shallowing and steepening as they cross inter-panel pillars.

Where monitoring identifies sequential pooling and scouring of streambeds due to increased variation in longitudinal bed slope, watercourse monitoring will be initiated to ensure that detailed monitoring of the impacted sections is occurring. It is considered most beneficial to carefully monitor the natural reestablishment of the watercourse bed and banks and only intervene if an area of pooling or scouring is observed to be on deteriorating trajectory. In this event, relevant expertise will be obtained to develop an appropriate rehabilitation strategy and program. Rehabilitation works may utilise one or more of:

- regrading of bed and banks to produce stable profiles;
- vegetation re-establishment on watercourse banks; and
- construction of rock armouring where high energy sections have resulted.

Erosion and sediment control structures that might be required for any surface infrastructure development will be defined via the GDP process, which will identify the rehabilitation requirements specific to that development. Typical rehabilitation requirements identified may include:

- regrading of the disturbed area to pre-disturbance grades, wherever practicable;
- reinstatement of any drainage paths that may have been diverted;
- respreading of recovered topsoil, topsoil surface preparation and revegetation;

- implementation of appropriate erosion and sediment control works (e.g. silt fences, sediment traps etc.); and
- temporary or permanent fencing to enable stock exclusion and manage stock re-introduction.

5 Monitoring and maintenance

5.1 Monitoring and maintenance requirements

The GDP for any surface infrastructure development will identify the ongoing rehabilitation monitoring requirements specific to that development. Monitoring requirements are likely to include:

- disturbance and rehabilitation area inspections;
- regular inspections of installed ESCP controls;
- water quality monitoring of downstream waterways;
- monitoring of any revegetation or seeding works at a frequency to be determined for each instance; and
- vegetation transects and photographic monitoring points as required.

Due to the seasonal nature of the rainfall experienced at Kestrel, the erosion and sediment control (ESC) structures employed on site will systematically be in active use through the year. For this reason, a pre-wet season inspection and maintenance routine will be implemented, followed by ad hoc inspections throughout the wet season. The pre-wet season inspection will include:

- visual inspection of all ESC structures to identify maintenance requirements;
- identification of high potential erosion or sedimentation areas not currently serviced by ESC infrastructure; and
- implementation / maintenance of control measures where required.

During the wet season, the following proactive field methods shall be executed by the Environment Department, mining personnel or a suitable delegate:

- Regular visual inspections by mining personnel during hauling and mining activities, reporting any abnormalities to regular operations and structures.
- Site inspections of ESC structures, temporary infrastructure items (i.e. flow diversions, drainage works) prior to large rain event forecasts.

Following run-off producing events, site staff will conduct the following:

- An event-triggered inspection (after >50mm rain events) to maintain ESC structures and prompt improvements and repair.
- Dewatering of any sediment basins.
- Removal of excessive sediment deposits.
- Manage any occurrences of new and emerging erosion, sedimentation or mud deposition around the site.

5.2 Reporting

Results of any surface water monitoring, the effectiveness of established water management structures, sediment control devices and the particulars of any remedial measures undertaken in instances where uncontrolled erosion or heavy sediment deposition occurred will be reported as required under existing Environmental Authority conditions.

5.3 Review

The ESC Plan will be reviewed and updated as appropriate to reflect changes in environmental requirements or in operational practices. The review will include an assessment of the effectiveness of the erosion control system. The measures will be considered effective if:

- The water quality measured in watercourses and water bodies is within acceptable limits.
- There is no active erosion observable in operational areas.
- There are no observable impacts on watercourses downstream of the mine which would be likely attributed to on site erosion.
- Disturbance from the mine's activities is restricted to areas approved under the EA.

Progressive amendments will be made to this ESCP through Kestrel's continuous improvement process.

Where any failures of erosion and sediment control works are identified through monitoring, these works are to be repaired and maintained as required.

6 Administration

6.1 Incident and complaint management

Kestrel's established incident management process will be utilised for any incidents or non-compliances related to erosion and sediment control. This procedure outlines:

- managing any related complaints;
- the process to resolve any disputes with lessees, property owners, landowners or other persons;
- the process to respond to any non-compliances with the EA and ML70481 RIDA;
- the process to respond to any related incidents or emergencies.

In accordance with Schedule 3(b) of the RIDA, any incident, or serious non-compliance with the Soil Conservation Plan (SCP) (including the receipt of monitoring results demonstrating serious non-compliance) will be reported in writing to the Chief Executive (of the Department administering the *Regional Planning Interests Act 2014* within 10 business days. The information to be reported to the Department of State Development, Innovation, Local Government and Planning (DSDILGP) includes:

- details of the nature of the incident or serious non-compliance;
- results and interpretation of any samples taken and analysed;
- the outcome of actions taken to rectify the incident, and the associated impacts;
- and details of the actions proposed to prevent a recurrence of the incident or serious non-compliance.

7 Accountabilities

The following accountabilities have been identified for this ESCP:

Role	Accountability
General Manager & SSE	• Ensure compliance with the requirements of this ESCP • Provide the required resources and systems to ensure that Managers, Supervisors, Employees Contractors and Visitors are aware of their responsibilities under this ESCP • this ESCP to be implemented in all applicable areas of ML70481 • Training for personnel to meet requirements of this ESCP
Area Managers	• Familiarity with requirements of this ESCP • Maintain working knowledge of GDP procedure and system • Maintain working knowledge of ESCP requirements
Technical Services Manager	• Ensure that all works and activities under their control or influence are conducted in accordance with the requirements of this ESCP
Superintendent Environment	• Maintain familiarity with this ESCP • Responsibility for correct operation and maintenance of GDP procedure and system, including review and sign-off of GDPs • Knowledge of and accountability for implementation of ESC Plan requirements • Maintain this ESCP within the Site Document Register • Initiate review of this ESCP at intervals not exceeding 3 years • Communication of the requirements of this ESCP to relevant personnel.
Environment Team	• Maintain familiarity with this ESCP and its operation • Initiate rehabilitation and monitoring requirements of this ESCP • Maintain regular monitoring of works being undertaken within the jurisdiction of this ESCP
General workforce (employees and contractors)	• Familiarisation with requirements of this ESCP and management through GDP process and obligations • Ensure all persons are competent to perform the tasks they are assigned.
Supervisors	• Have familiarity with the requirements of this ESCP sufficient to identify Plan application and to report non-compliances