

Report

Surface Water Management Plan

Environment

June 2018 100-PL-EN-1015 0B



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	Surface Water Management Plan		
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ACRONYMS

The following acronyms, defined in Table 1, have been used throughout this Plan.

Acronyms Definitions DWER Department of Water and Environment Regulation LUC Land Use Certificate En Act Environmental Protection Act 1086	Table 1: Acronyms	
DWER Department of Water and Environment Regulation LUC Land Use Certificate En Act Environmental Protection Act 1086	Acronyms	Definitions
LUC Land Use Certificate En Act Environmental Protection Act 1086	DWER	Department of Water and Environment Regulation
En Act Environmental Protection Act 10%6	LUC	Land Use Certificate
	Ep Act	Environmental Protection Act 1986
EPA Environmental Protection Authority	EPA	Environmental Protection Authority





1. INTRODUCTION

Fortescue Metals Group (Fortescue) is an integrated business comprised of mine, rail and port operations based in the Pilbara region of Western Australia, with its head office located in Perth.

Detailed background information regarding the projects, timing and nature of Fortescue's environmental approvals under the *Environmental Protection Act 1986* (WA), the *Environment*

1.1 Requirements for Management Plan

The Surface Water Management Plan is required by the Environmental Scoping document as part of the environmental scoping document for development approval for Fortescue Iron Ore related infrastructure in the Pilbara under:

- Environmental Scoping Document: Action Item 20 Eliwana Iron Ore Mine Project
- Environmental Scoping Document: Action Item 48 Eliwana Railway Project

The surface water management requirements for the Eliwana Iron Ore Mine Project have been developed in accordance with item number 20 of the Environmental Scoping Document for the Eliwana Iron Ore Mine Project (Assessment No: 2125).

The environmental objectives and targets for surface water management are outlined in Table 3.

1.2 Objective and Scope

The Plan addresses the EPA's objective for the following key environmental factors:

- inland waters environmental quality "to maintain the quality of groundwater and surface water so that environmental values are protected"
- hydrological processes "to maintain the hydrological regimes of groundwater and surface water so that environmental values are protected."

The objective of this Plan is to identify surface water management and monitoring measures to minimise the impact on surface water dependent systems to be retained from disturbance within and adjacent to Fortescue controlled sites.

The conditioned environmental objectives and targets for surface water management are outlined in Table 3.





This Plan has been provided to meet the requirements of the EPA's "Instructions on how to *prepare Environmental Protection Act 1986* Part IV Environmental Management Plan". The provisions addressed within this Plan are outlined in Table 2 below.

Provision	Location in Plan
Requirement for Plan	1.1
Outcomes	1.2
Performance Indicators	1.2
Key Environmental values	1.3
Management actions ¹	4
Key environmental impacts and risk	3.1
Monitoring	5
Corrective actions	5.6
Reporting	8
Adaptive management and review of the EMP	7 and 9
Stakeholder Consultation	10

Table 2: Management Plan Provisions

¹ Outcomes based Environmental Management Plans do not require management actions in accordance with the EPA's "Instructions on how to *prepare Environmental Protection Act 1986* Part IV Environmental Management Plan". Management actions have been included in the Plan to demonstrate effective management of the factor but will not be reported against to demonstrate compliance.



Approval	Condition Type	Conditioned Environmental Outcome	Trigger and Threshold Criteria
Eliwana Railway	Outcome	No adverse impacts to downstream surface water quality	Trigger Criteria
outside the pro	outside of assessed impact areas ² as a result of implementing the proposal	An exceedance of water quality guidelines values (see Table 7) in comparison to reference site values over two consecutive monitoring events	
			Threshold Criteria
	Ar cc Al	An exceedance of site specific background trigger values ³ over four consecutive monitoring events in comparison to reference sites AND	
			Subsequent investigations determine that the impacts are probably a result of the implementation of the proposal.
		Surface water management infrastructure operates as per	Trigger Criteria
conservation significant vegetation	design to minimise adverse impacts to downstream conservation significant vegetation	+/- 300mm water elevation change between recorded and modelled flood depth ⁴	
			Threshold Criteria
			+/- 500mm water elevation change between recorded and modelled flood depth ⁴
Eliwana Mine	Outcome	No adverse impacts to downstream surface water quality	Trigger Criteria
outsi the p	outside of assessed impact areas ⁵ as a result of implementing the proposal	An exceedance of water quality guidelines values (see Table 7) in comparison to reference site values over two consecutive monitoring events	
			Threshold Criteria

Table 3: Environmental objectives and measures/targets

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² Refer to *Eliwana Railway Public Environmental Review* (EW-RP-EN-0004)

³ Site specific trigger values will be developed in accordance with guidance outlined in ANZECC Guidelines.

⁴ The water elevation trigger is based on consideration of modelling approach, grid size and sensitivity analysis of modelling results undertaken for peer review of the Surface Water Impact Assessment.

⁵ Refer to *Eliwana Iron Ore Mine Public Environmental Review* (EW-RP-EN-0003)



Approval	Condition Type	Conditioned Environmental Outcome	Trigger and Threshold Criteria
			An exceedance of site specific background trigger values ⁶ over four consecutive monitoring events in comparison to reference sites
			AND
			Subsequent investigations determine that the impacts are probably a result of the implementation of the proposal.

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⁶ Site specific trigger values will be developed in accordance with guidance outlined in ANZECC Guidelines.



1.3 Key environmental values

Key environmental values associated with surface water at the Eliwana Railway and Mine are outlined in the *Public Environmental Review: Eliwana Railway Project* (Fortescue reference EW-RP-EN-0004_A) and *Public Environmental Review: Eliwana Iron Ore Mine* (EW-RP-EN-0003_0) and listed here:

- Conservation significant fauna and their critical habitat
- Conservation significant vegetation and flora
- Surface water dependent systems.

1.4 Definitions

High risk areas are defined as areas where surface water dependent systems have been identified to be retained from disturbance and potential impacts are significant (as defined through ongoing impact assessment of potential direct and indirect impacts of the project).

Water dependent systems are parts of the environment in which the composition of species and natural ecological processes are determined by the permanent or temporary presence of flowing or standing surface water or groundwater. The in-stream areas of rivers, riparian vegetation, springs, wetlands, floodplains, estuaries, karst systems and groundwater-dependent terrestrial vegetation are all examples of water dependent systems (Department of Water, January 2013).

Rainfall runoff is water flowing over ground surfaces and in natural stream and drains as a direct result of rainfall over a catchment.

1.5 Legislative and Regulatory Framework

Fortescue employees and contractors are obliged to comply with all relevant environmental Commonwealth and State legislation. Legislation directly relevant to the management of weeds in Western Australia is provided in Table 3.

Legislation	Application
Biodiversity Conservation Act 2016 (WA)	Conservation and protection of biodiversity and biodiversity components. The Act repeals parts of the <i>Wildlife Conservation Act 1950</i> .
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	Assesses the conservation significance of fauna species and forms the framework for significant species protection at the Federal level.

Table 4: Commonwealth and State Legislation Relating to Surface Water

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Legislation	Application
Environmental Protection Act 1986 (WA)	State environmental impact assessment and Ministerial approval process.
Environmental Protection (Unauthorised Discharge) Regulations 2004 (WA)	Prevention of direct discharge of sediment or pollutants to the surrounding surface waters.
Rights in Water and Irrigation Act 1914 (WA)	Relates to rights in water resources, to make provision for regulation, management, use and protection of water resources, to provide for irrigation schemes, and for related purposes.
Soil and Land Conservation Act 1945 (WA)	Addresses the conservation of soil and land resources and the mitigation of the effects of erosion.
Wildlife Conservation Act 1950 (WA)	State process that assesses the conservation significance of fauna species and forms the framework for significant species protection.

The following standards and guidelines are also of relevance to this Plan:

- Water Quality Protection Guidelines for Mining and Mineral Processing (Department of Water, 1999)
- Water Quality Protection Note 68– Mechanical equipment wash down (DoW, 2013).





2. ROLES AND RESPONSIBILITIES

All Fortescue employees and contractors are required to comply with the requirements of this Plan.

Accountability for fulfilling the requirements of this Plan is dependent on the stage of project development (exploration, construction, operations, decommissioning) and the project type (port, rail or mine).

During exploration, the Group Manager Exploration will be accountable for ensuring the requirements of the Plan are met.

During construction stages, whether activities are undertaken by an external service provider or internal Fortescue personnel, the Project Director (Port/ Rail or Mine) will be accountable for ensuring the requirements of this Plan are met.

During operational, decommissioning and closure stages, the General Manager (Port/ Rail or Mine) will be accountable for ensuring the requirements of this Plan are met.

Where responsibilities are delegated, this must be clearly recorded and communicated.

In Section 4 specific Management Actions have been attributed to the appropriate personnel.

When site specific Vegetation Health Management and Monitoring Programs are developed to support this Plan, the RASCI framework should be utilised to delegate roles, responsibilities, and review and approval levels. RASCI is used to denote:

R-Responsible Those who do the work to achieve the task.

A-Accountable Those who are ultimately accountable for the completion of the deliverable or task and the one to whom the Responsible person is accountable.

S-Supportive Resources allocated to the Responsible person and who will also assist in completing the task.

C-Consulted Those whose opinions are sought, two-way communication.

I-Informed Those whom are kept informed, one-way communication.

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3. MANAGING ENVIRONMENTAL RISK

Fortescue actively manages risk by undertaking an Annual Environmental Impact Risk review. Although the review considers all environmental risks, there is a focus on the inherently moderate to high risk impacts. The review considers the effectiveness of management actions that are currently in place for these impacts. The review also considers any relevant incidents that have occurred, if the actions from incident investigations have translated into new management actions, and generally considers the need for any new management actions to ensure lower risk targets can be achieved.

The environmental risks associated with surface water management at Eliwana include:

- Potential impacts to surface water quality associated with the placement of infrastructure and landforms
- Potential impacts to surface water quality associated with leaching of acid and/or metalliferous drainage from temporary or permanent mine void water bodies, open mining void walls, tailing storage facilities and waste dumps during operations and following closure
- Potential changes to surface water quality as a result of excess water disposal options
- Impacts to surface water flow resulting from controlled surface discharge
- Permanent modifications to existing catchments and associated impacts to flow paths and inundation areas of surface water streamflows
- Impacts to surface water quality associated with hydrocarbon and chemical spills.
- Altered hydrologic water balance associated with the creation of permanent and episodic mining void water bodies.

Section 4 provides the management actions proposed to manage these potential environmental risks at Eliwana.



4. ENVIRONMENTAL MANAGEMENT

A series of environmental management objectives have been developed to mitigate environmental impacts on surface water dependent systems to be retained from disturbance as approved under the *Environmental Protection Act 1986* and/or the *Environment Protection Biodiversity Conservation Act 1999.* These include:

- 1. Assess potential direct and indirect impacts on surface water flows, surface water quality and any associated surface water dependent systems within identified high risk areas.
- 2. Establish management strategies to minimise potential impacts on surface water flows, surface water quality and any associated surface water dependent systems within identified high risk areas.
- 3. Develop and implement a surface water monitoring program to assess the effectiveness of the management strategies to minimise potential impacts on surface water flows, surface water quality and any associated surface water dependent systems within identified high risk areas.

For each objective, management actions have been developed to ensure the impacts from Fortescue's operations are managed, and that appropriate monitoring, reporting and corrective action functions are implemented to support the successful implementation of the management actions.

The key elements of the environmental management process associated with each objective are described in Table 5.

Element	Definition/ Description
Objective	What is intended to be achieved
Management Action	Tasks undertaken to enable the objective to be met
Performance Indicators	Metrics for evaluating the outcomes achieved by Management Actions
Reporting/ Evidence	Demonstrates that the Management Action has been applied and the outcome evaluated.
Timing	Period during which the Management Action should be undertaken.
Responsibility	Accountability for ensuring management action is completed. The responsible role is dependent on project timing.

Table 5:	Descriptions of Key Elements of Environmental Management Process to Achieve Identified
	Objectives

The key management actions, performance indicators, evidence, timing and responsibilities for each objective are provided in Table 6.

Table 6:	e 6: Key Management Actions for Surface Water Management						
Objective 1	Site Location Assess the potential direct and indirect impacts on surface water flows, surface water quality and associated surface water dependent systems within identified high risk areas						
Reference	Rail	Mine	Management Action	Performance indicators	Reporting/ Evidence	Timing	Responsibility
1.1	Х	×	Conduct a risk assessment to identify high risk areas where surface water dependent systems have been identified and potential impacts are significant.	Risk assessment conductedHigh risk areas identified	Risk assessment outcomes	Design	Manager Environmental Approvals/ Project Manager/ Group Manager Environment
1.2	X	X	Where surface water dependent systems have been identified undertake mapping surveys to determine relevant species critical habitat and if future monitoring is required.	 Mapping survey completed GIS and PIMS updated Future monitoring defined 	 Mapping survey GIS dataset PIMS record Monitoring Planned 	Design	Group Manager, Environment
1.3	х	x	Conduct a desktop assessment for all LUC ⁷ applications to ensure surface water dependent systems are identified prior to ground disturbance. Where the works have the potential to impact on surface water and any associated water dependent systems within identified high risk areas, apply relevant management measures to the LUC prior to approval.	 Management measures included in relevant LUCs 	LUC approval	Construction/ Operation	Project Manager/ Site HSES Manager
Objective 2	Site Lo	ocation	Establish management strategies to minimise potential impacts on surface water flows, sur	face water quality and associated surface	ce water dependent systems within	identified high risk are	as
Reference	Rail	Mine	Management Action	Performance indicators	Reporting/ Evidence	Timing	Responsibility
2.1	X	X	Ensure staff and contractors are provided with appropriate training to ensure impacts to surface water and associated surface water dependent systems within identified high risk areas are minimised where practicable	 Inductions completed Role dependent training completed 	 Induction materials and register of attendees Training materials/ records 	All stages	Project Manager/ HSES Manager
2.2	X	X	Ensure drainage infrastructure location and design aligns with the risk assessment outcomes to minimise impacts to surface water flows, quality and associated surface water dependent systems with reference to the <i>Standard Engineering Specification for Drainage and Flood Protection</i> (100-SP-CI-0004). For the Eliwana Rail Project, the risk assessment outcomes are provided in <i>The Surface Water Impact Assessment</i> (750EE-3100-AS-HY-0002). The process for rail design and placement of surface water management infrastructure, including drains and culverts is described in this Impact Assessment.	Location and drainage infrastructure aligns with risk assessment outcomes where possible	 Risk assessment Monitoring reports 	All stages	Project Manager/ Manager Long Term Planning and Hydrology
2.3	Х	X	Avoid interaction with major drainage lines where possible to minimise impacts on downstream surface water flows and quality.	Major drainage lines avoided where possible	• Design	Design/ Construction	Project Manager/ Manager Long Term Planning and Hydrology
2.4	Х	Х	Locate and design borrow pits to minimise interference and disruption of natural surface water flows and any potential downstream impacts to surface water dependent systems where practicable.	Location and design of borrow pits reduce downstream impacts	• Design	Design/ Construction	Planning Manager
2.5		X	Pit flood management will be undertaken in accordance with a Pit Flood Response Plan that will allow for the provision of dewatering infrastructure to remove flood water from pits with the potential to discharge directly to the environment. This Plan will be developed in accordance with the requirements of the <i>Water Quality Protection Guidelines for Mining and Mineral Processing</i> .	 Compliance with the Pit Flood Response Plan Monitoring demonstrates water quality within limits 	• AEMR	Operations	Manager Mining

⁷ An internal permit system required to undertake on-ground activities.

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2.6	X	X	Chemical and hydrocarbon storage areas will be designed, constructed and operated in accordance with the requirements outlined in the Chemical and Hydrocarbon Management Plan (100-PL-EN- 0011) and a Licence issued under Part V of the <i>Environmental Protection Act 1986</i> .	Compliance with PlanCompliance with Licence	 Design AACR Lab results AEMR 	Construction/ Operation	Project Manager/ NPI Manager
2.7	X	X	Where rainfall runoff has come into contact with chemical or hydrocarbon storage areas and is potentially contaminated, verify water quality meets discharge requirements prior to release to the environment.	Monitoring demonstrates water quality within limits	Lab results AEMR	Construction/ Operation	Project Manager/ NPI Manager/HSES Manager
2.8		X	Where surplus mine water is required to be discharged, a process of controlled discharge to the environment will be adopted where the water is allowed to flow into a designated water course in accordance with the <i>Strategic Policy 2.09: Use of mine dewatering surplus</i> (DoW, 2013). Effective erosion control measures will be implemented to ensure downstream water quality is not impacted.	 Controlled discharge adopted Effective erosion control at discharge Monitoring demonstrates water quality within limits 	• AEMR	Operations	Planning Manager
2.9		X	Where post closure mine voids are present within the project boundary and impacts to surface water dependent systems are expected, the requirements of the <i>Eliwana Mine Closure Plan</i> (EW-PL-EN-0001) will be adhered to.	Mine Closure Plan implemented	CAR AER	Closure	Planning Manager
2.10		x	Conduct progressive rehabilitation of disturbed areas no longer required for operations in accordance with the <i>Eliwana Mine Closure Plan</i> (EW-PL-EN-0001) developed in accordance with the Guidelines for Preparing Mine Closure Plans.	Mine Closure Plan implemented	• CAR • AER	Closure	Planning Manager
Objective 3	tive 3 Site Location		Develop and implement a surface water monitoring program to assess the effectiveness of t surface water dependent systems within identified high risk areas	he management strategies to minimise	potential impacts on surface water	flows, surface water qu	uality and associated
Reference	Rail	Mine	Management Action	Performance indicators	Reporting/ Evidence	Timing	Responsibility
3.1	x	X	 Ensure baseline modelling and surface water sampling are undertaken to: Document surface water flow and quality within impact and reference sites Identify baseline modelling and surface water quality at impact and reference sites Compare data across impact and reference sites (and/or regional monitoring sites where available). 	 Baseline modelling and/or surface water sampling undertaken for all sites Data comparison undertaken 	Baseline monitoring reports	Design/ Construction/ Operations	Project Manager/ Manager HSES
3.2	X	X	Implement a surface water monitoring program in areas identified as high-risk areas where surface water dependent systems have been identified and potential impacts are significant.	Monitoring program implemented	 Monitoring reports Annual Compliance Reporting (if the Plan is conditioned under the EP Act) 	Operations/ Decommissioning and Closure	HSES Manager
3.3	X	X	Where monitoring indicates a potential impact on surface water flows and/or quality or associated surface water dependent systems, implement contingency actions defined in table 9. Update this Plan where required to inform an adaptive management approach to surface water management across the business	Monitoring program implemented	 Monitoring report AEMR Reporting records 	Construction/ Operation/ Decommissioning/ Closure	HSES Manager

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Timing	Responsibility		
Design/ Construction/ Operations	Project Manager/ Manager HSES		
Operations/ Decommissioning and Closure	HSES Manager		
Construction/ Operation/ Decommissioning/ Closure	HSES Manager		

3.4	x	X	Implement the sites conservation significant fauna monitoring program as defined in the Conservation Significant Fauna Monitoring Plan to detect any impacts on conservation significant fauna and associated habitat as a result of a change in surface water flow and/or quality.	Monitoring program implemented	Monitoring reportAEMRReporting records	Construction/ Operation/ Decommissioning/ Closure	Group Manager Environment
3.5	x	X	Implement the sites vegetation health monitoring program as defined in the Vegetation Health Monitoring Plan to detect any impacts on conservation significant flora and vegetation as a result of a change in surface water flows and/or quality.	 Monitoring program implemented 	Monitoring reportAEMRReporting records	Construction/ Operation/ Decommissioning/ Closure	Group Manager, Environment
3.6	x	X	Implement the sites groundwater monitoring program as defined in the Groundwater Monitoring Plan to detect any impacts on groundwater dependent systems (inclusive of partial and infrequent dependent systems) as a result of a change in surface water flows and/or quality.	 Monitoring program implemented 	Monitoring reportAEMRReporting records	Construction/ Operation/ Decommissioning/ Closure	Group Manager, Environment





5. MONITORING GUIDELINES

A monitoring program is required to measure the effectiveness of the management actions within identified high risk areas as defined in this Plan. The outcomes of the monitoring program will contribute to ongoing improvements in management actions to ensure an adaptive management approach is adopted.

5.1 Objectives

The guiding objectives of the surface water monitoring program includes:

- 1. Determine whether the flow and water quality of surface water dependent systems potentially impacted by Fortescue activities are significantly different from baseline modelling and/or control site values.
- 2. Determine if the quality of water being discharged via drainage infrastructure is significantly different from acceptable guideline values and/or control site values.
- 3. Monitor and measure the success of management measures to inform an adaptive management approach.
- 4. Obtain adequate data to measure spatial and temporal changes in site hydrology within Fortescue controlled sites.

Baseline and operational monitoring will be informed by the findings of the monitoring itself as they become available. These findings may similarly lead to ongoing refinements to this Plan and its management strategies to ensure an adaptive management approach is undertaken during Fortescue activities.

5.2 Baseline Modelling/ Sampling

Initial baseline modelling for surface water hydrology has been conducted as part of the surface water impact assessment to obtain a representative baseline dataset of the site hydrology.

Baseline sampling for surface water quality will be conducted following significant rainfall events. To account for seasonal variation, water samples will be collected over a three-year period to ensure a statistically valid dataset of the sites water quality.

5.3 Program Summary

An effective monitoring program may be adaptive over time, dependent on quality and quantity of data collected from each site, with innovations in monitoring techniques and methodologies incorporated into program design over time. This would however be dependent on and be driven

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by the quality and quantity of data collected from each site, coupled with a periodic review of monitoring methods. Further, program design should be based on replicable sampling at impact and reference sites.

A set of preliminary monitoring parameters and methods have been selected to provide broad coverage of potential changes in surface water flow and quality that can be expected under a range of different mining related impacts. The number of monitoring parameters will vary depending on the approval conditions and surface water dependent systems.

Surface water sampling should be conducted in accordance with AS/NZS 5667.1:1998 Water Quality- Sampling - Guidance on the design of sampling programs, sampling techniques and preservation and handling of samples and the Department of Water Field Sampling Guidelines: A guideline for field sampling for surface water quality monitoring programs.

Monitoring will be undertaken in accordance with the *Surface Water Monitoring Guidelines* (100-GU-EN-0037).

A summary of monitoring parameters and methods have been provided in Table 7.

Monitoring Parameters	Method	
Rainfall	Rainfall gauge	
Surface Water Quality	Field measurements using calibrated instruments Field sample with laboratory analysis	
Water elevation	Pressure transducers Peak level indicators	

Table 7: Monitoring Parameters and Methods

Table 8 provides the monitoring parameters to be monitored per location type within Fortescue controlled sites.

Table 8:	Types and Associated Parameters and Site Locations
	Typee and Accelerated Talametere and ence Ecolutione

Туре	Parameter	Site
Rainfall	Rainfall	Suitable location within representative catchment boundary and within the approval boundary
Surface Water Discharge points	Water elevation	Downstream of discharge point, within the approval boundary
Surface Water Discharge points	Receiving Water Quality Criteria ⁸	Downstream of discharge points, within approval boundary



⁸ Water Quality Protection Guidelines for Mining and Mineral Processing – Mine dewatering (Water and Rivers Commission 2000)



Туре	Parameter	Site
Oily water ponds, sedimentation basins, wash down facilities, hydrocarbon storage areas	Surface water quality9	Discharge point of washdown bays and oily water ponds/sumps. If no discharge points are available, then a suitable location downstream of flow.
Creeks – representative sites/ specific interest	Surface water quality ⁸¹⁰	Suitable representative location with safe access
Creeks – representative sites/ specific interest	Water elevation	Suitable representative location with safe access
Waste landforms ¹¹ - any leachate or seepage accessible	Receiving water quality criteria	Suitable representative location with safe access

Contingency actions (Section 5.6) and reporting (Section 7) requirements will be implemented where required.

Results of the surface water monitoring program will also inform and be informed by the following monitoring programs to determine impacts to ecosystem health:

- Conservation significant fauna
- Vegetation health
- Groundwater.

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⁹ Water Quality Protection Note 68– Mechanical equipment wash down (DoW, 2013))

¹⁰ ANZECC water quality guidelines, 95% protection level value

¹¹ Waste landforms will be monitored when determined to be a potential source in the sites source, pathway, receptor risk model as defined by the Acid and Metalliferous Drainage Management Plan (100-PL-EN-1016)

Summary of Surface Water Monitoring Programs Table 9:

Area/Aspect to be monitored	Location	Parameter	Collection Method	Frequency
Rainfall	Centroid, upper reaches of catchments. On high ground away from buildings, vegetation etc.	Rainfall	Field collection	Quarterly
Treatment ponds, sedimentation basins, wash down facilities (any water treatment or containment facility which could contaminate surface water), hydrocarbon storage areas	Discharge point of washdown bays and oily water ponds/sumps. If no discharge point available, then a suitable location downstream of any flow.	Surface water quality	Field measurement using calibrated instruments. Grab (field) samples taken from the pond/basin/oily water separator.	Quarterly and/or event based ¹²
Surface water discharge from mine site	Discharge point from site	Surface water quality	Field Measurement using calibrated instruments. Pressure transducers (flow) Peak level indicators (flow) Water loggers (water levels) Rising stage samplers (quality) Grab (field) samples.	Quarterly and/or event based
Major waterways	Down and upstream of potential impact source	Surface water quality and water elevation	Field Measurement using calibrated instruments. Pressure transducers (water elevation) Peak level indicators (water elevation) Rising stage samplers (quality) Grab (field) samples.	Quarterly and/or event based
Waste landforms	Detention point (if applicable) otherwise nearby waterways	Surface water quality	Refer to Acid and Metalliferous Drainage Sampling Plan (100-PL- EN-1014)	Biannually
Drainage Infrastructure	Road and rail culverts	Structural integrity	Field assessment	At least annually
	Floodways/Diversion drains/Stormwater drains	Sediment, vegetation and debris accumulation Structural integrity	Field assessment	At least annually
	Bunds, levees, bridge guide banks	Structural integrity	Field assessment	At least annually
	Sediment control infrastructure such as sediment traps and sedimentation basins	Sediment levels	Grab (field) samples.	Quarterly and/or event based inspections
	Road and rail culverts, floodways	Surface water elevation, Sheetflow	Peak level indicator Pressure transducer	Quarterly and/or event based
Vegetation monitoring points	Vegetation monitoring points	Vegetation health	Refer to Vegetation Health Monitoring and Management Plan (100-Pl	L-EN-1020)
Drainage lines into the Fortescue Marsh	Drainage lines into the Fortescue Marsh	Surface water quality Groundwater quality Vegetation Health	Refer to the Fortescue Marshes Management Plan (45-PL-EN-0009) Hydrology and Vegetation Monitoring and Management Plan (CB-PL-	and the Fortescue Marsh EN-0031)

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¹² For the purposes of this Guideline, 'event based' is defined as rainfall that has resulted in visual streamflow across a floodway or down a designated river/creek/stream.



5.4 Monitoring Program Review

The overarching monitoring program will be technically assessed and reviewed upon acceptance of this plan and then every three years thereafter. The main objective of the assessment and review will be to ensure that the methods, parameters and frequency used are considerate and appropriate to the findings of the monitoring program. If no triggers are exceeded (detailed in Table 10) after three years, the frequency of monitoring will be reduced to a frequency supported by the review.

Monitoring sites may need to be adapted over time in response to project impacts.

Contingency action (Section 5.6) and reporting requirements (Section 7) will be implemented where required.

5.5 Data Handling and Statistical Analysis

Data will be handled in accordance with the data handling protocol established as part of the annual monitoring tender. The protocol will include the requirements as to data storage and protection, data extraction, quality control, analysis, interpretation, reporting and presentation.

The protocol will also directly reference and align with the requirements detailed in *Document Control, Information Management* (100-ST-DC-001) and *Geographic Information Systems and Raw Data Guidelines* (100-GU-EN-0009).

Statistical analysis of data will be undertaken where data permits. Where data capture allows, analysis will include using appropriate statistical analysis techniques. If parameter relationships appear to be present or exceedances or trends occur, determine cause and implement corrective actions.

The results of chemical and physical data should be analysed after every sample event, values of each parameter should be compared against trigger values to determine if an exceedance has occurred.

Analysis of water elevation data should be conducted using site specific flood models developed as part of the baseline assessment outlined in Section 5.2. Monitoring data will be used to identify any variation in the baseline modelling using actual flood event data recorded from rainfall and surface water monitoring sites within the project catchments. A minimum of two annual seasonal events will be required to revisit the calibration for the site, and only events that have whole of catchment runoff will be considered as significant for modelling review to take place. Where an exceedance has occurred as defined in Table 10, complete recalibration of the flood model developed during baseline modelling will be required.

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5.6 Contingency Actions

Contingency actions will be initiated during construction, operational and decommissioning activities when an exceedance of a trigger is identified, and monitoring indicates that implemented management measures within identified high risk areas are not successfully mitigating impacts on surface water dependent systems and/or the management objectives are not being achieved.

Contingency actions for surface water monitoring triggers have been developed in Table 9.





Table 10: Trigger Criteria and Associated Contingency Actions

Outcome	Trigger/Threshold Criteria	Contingency Actions		
Railway	Trigger Criteria	Trigger Contingency Actions		
No adverse impacts to downstream surface water quality outside of assessed impact areas ¹³ as a result of	An exceedance of water quality guidelines values (see Table 7) in comparison to reference site values over two consecutive monitoring	 Determine whether the changes observed in the impact sites are comparable to the observations in the reference sites 		
implementing the proposal	events Threshold Criteria	Re-examine applied monitoring parameters to validate they are operating within management levels		
Mine No adverse impacts to downstream surface water quality outside of assessed impact areas ¹⁴ as a result of implementing the proposal	An exceedance of site specific background trigger values ¹⁵ over four consecutive monitoring events in comparison to reference sites AND Subsequent investigations determine that the impacts are probably a result of the implementation of the proposal.	 Increase monitoring frequency of outlets and natural drainage lines in catchments where water quality has been compromised. Identify the reason for the change and whether it was caused by construction, operations or decommissioning/closure activities, review management measures with an adaptive management response. Threshold Contingency Actions 		
		Implement contingency measures within 24 hours of the exceedance being identified.		
		Identify the reasons for the change:		
		 Where it was caused by construction, operation or decommissioning activities, submit a plan with actions within 21 days of the determination being made by the OEPA. 		

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¹³ Refer to Eliwana Railway Public Environmental Review (EW-RP-EN-0004)

¹⁴ Refer to *Eliwana Iron Ore Mine Public Environmental Review* (EW-RP-EN-0003)

¹⁵ Site specific trigger values will be developed in accordance with guidance outlined in ANZECC Guidelines.



Outcome	Trigger/Threshold Criteria	Contingency Actions	
		 Where it was not caused by construction, operation or decommissioning activities, resume standard monitoring frequency. Report the threshold exceedance to the OEPA within 7 days of the exceedance being identified. Provide evidence to the satisfaction of the OEPA which allows determination of the cause of the exceedance within 21 days of the exceedance being identified. Where the exceedance is a result of construction, operation or decommissioning activities, submit a plan of actions within 21 days of the determination being made by the OEPA. Continue to implement actions to remediate the exceedance until approval to cease has been given by the OEPA. 	
Surface water management infrastructure operates as per design to minimise adverse impacts to downstream conservation significant vegetation outside of assessed impact areas	Trigger Criteria +/- 300mm water elevation change between recorded and modelled flood depth ¹⁶ Threshold Criteria +/- 500mm water elevation change between recorded and modelled flood depth ⁴	 Trigger Criteria Determine whether the changes observed in the impact sites are comparable to the predicted values and/or baseline modelling Re-examine applied monitoring parameters to validate they are operating within management levels Increase monitoring of outlets and natural drainage lines in catchments where changes in flow regime or water levels have been noted. 	

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¹⁶ The water elevation trigger is based on consideration of modelling approach, grid size and sensitivity analysis of modelling results undertaken for peer review of the Surface Water Impact Assessment.



Outcome	Trigger/Threshold Criteria	Contingency Actions	
		 Identify the reason for the change and where it was caused by construction, operations or decommissioning/closure activities, review management measures with an adaptive management response 	
		Recalibrate the flood model developed during baseline modelling	
		Threshold Criteria	
		• Implement contingency measures within 24 hours of the exceedance being identified.	
		Identify the reasons for the change:	
		 Where it was caused by construction, operation or decommissioning activities, submit a plan with actions within 21 days of the determination being made by the OEPA. 	
		 Where it was not caused by construction, operation or decommissioning activities, resume standard monitoring frequency. 	
		 Report the threshold exceedance to the OEPA within 7 days of the exceedance being identified. 	
		 Provide evidence to the satisfaction of the OEPA which allows determination of the cause of the exceedance within 21 days of the exceedance being identified. 	
		• Where the exceedance is a result of construction, operation or decommissioning activities, submit a plan of actions within 21 days of the determination being made by the OEPA.	
		Continue to implement actions to remediate the exceedance until approval to cease has been given by the OEPA.	

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6. **COMPLIANCE**

Fortescue ensures compliance with its legal obligations through first party quality assurance by site and corporate environment teams with a focus on effective environmental management through the implementation of the Fortescue wide Environmental Management System (EMS).

Fortescue has adopted a risk based approach to monitor compliance with its legal obligations. Site environment teams will monitor their compliance with this Plan and the required site specific management and monitoring programs using the *Self-Verification of High Risk Environmental Legal Obligations Guideline* (100-GU-EN-0030).

Where non-conformance issues or opportunities for improvement are identified these will be documented and tracked via the Business Management System (BMS).





7. **REPORTING**

Monitoring reports will be provided to the State and Commonwealth Governments as dictated by annual reporting requirements. In addition, the monitoring raw data will be made available to the Western Australian State Government and the Commonwealth Government upon request or where conditioned to provide.

An outline of the reporting requirements associated with surface water management and monitoring have been provided below.

7.1 Annual Monitoring Report

An Annual Monitoring Report will be developed with the results of the monitoring programs across all Fortescue controlled sites. This report will outline the monitoring data captured during the reporting period and the analysis required to report compliance against management targets and conditioned environmental objectives.

7.2 Annual Compliance Assessment Report

Fortescue is required to report against its compliance with the Management Plan in the Compliance Assessment report prepared in accordance with the OEPA's Post Assessment Guideline for Preparing a Compliance Assessment Report, Post Assessment Guideline No. 3.

Annual Compliance Assessment Reports (CAR) are required to be submitted in accordance with relevant Ministerial Statements conditions.

The reporting requirements against management targets and conditioned environmental objectives are provided in Table 2. In the event that trigger criteria were exceeded during the reporting period, the CAR will include a description of the effectiveness of the contingency actions that have been implemented to manage the impact and any adaptive management measures applied as a result of the exceedance.

Currently, the Eliwana Iron Ore Mine Project is not required to report on compliance with the Surface Water Management Plan. Once approval is granted under Part IV of the *Environmental Protection Act 1986* and implementation of the Surface Water Management is conditioned in the Ministerial Statement, Fortescue will adhere to the reporting requirements outlined in section 7 of this Plan.



7.3 Annual Environment Monitoring Report

Fortescue is required to report environmental monitoring data, as required by Operating Licences issued by the Department of Water and Environmental Regulation under Part V of the Environmental Protection Act 1986.

An Annual Environmental Monitoring Reports (AEMR) will be submitted in accordance with the relevant licence conditions once the Eliwana Mine project is approved and a licence is issued.

7.4 Reporting of Potential Non-Compliance

Fortescue is required to report against monitoring outcomes as per conditioned timeframes. Trigger criteria and where required threshold criteria have been identified in Table 2.

In the event that monitoring, tests, surveys or investigations indicate an exceedance of a management target in Table 2 Fortescue will report an exceedance of a management target in accordance with the requirements of the relevant Ministerial Statement condition(s).

Currently, the Eliwana Iron Ore Mine Project is not required to report on compliance with the Surface Water Management Plan. Once approval is granted under Part IV of the *Environmental Protection Act 1986* and implementation of the Surface Water Management is conditioned in the Ministerial Statement, Fortescue will adhere to the reporting requirements outlined in the Ministerial Statement.





8. ADAPTIVE MANAGEMENT

Fortescue will implement adaptive management practices to learn from the implementation of mitigation measures, monitoring and evaluation against management targets, to more effectively meet the conditioned environmental objective. Adaptive management practices that will be assessed for the vegetation health management and monitoring program as part of this approach may include:

- Evaluation of the monitoring program, data and comparison to baseline data and reference sites on an annual basis to verify whether responses to project activities are the same or similar to predictions
- Evaluation of assumptions and uncertainties of the management and monitoring program
- Re-evaluation of the risk assessment and revision of risk based priorities as a result of monitoring outcomes
- Review of data and information gathered over the review period that has increased understanding of site environment in the context of the regional ecosystem
- Review of management actions as the project matures and new management measures and technologies become available that may be more effective for environmental management
- Assessment of changes which are outside the control of the project and the management measures identified (i.e. a new project within the area or region; regional change affecting management)
- Review of the Environmental Management Plan will be undertaken following the review of the associated monitoring program and the corresponding results.





9. **REVIEW OF THE PLAN**

Review of this Plan will be undertaken every five years or as required by a condition. Revisions of this Plan will be submitted to the relevant State and Commonwealth Governments for approval, in accordance with relevant approval conditions.

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10. STAKEHOLDER CONSULTATION

Fortescue has undertaken extensive stakeholder consultation program whereby landowners, regulators and other relevant parties have been consulted with regards to investigation and design of the mine sites and port and rail infrastructure through the environmental approvals process.

Regulatory agencies will be consulted in accordance with the requirements of EAG 17 Preparation of Management Plan under Part IV of the *Environmental Protection Act 1986*.

Table 11 will be updated following receipt of stakeholder comment as a result of the review and approval process.

Stakeholder	Correspondence	Comment	Changes
DWER - Regions	CMS 17164	The proponent has prepared a site- specific Eliwana Groundwater and Surface Water management plans to support the ERD submission. RSW will comment on the content and acceptability of these plans during the assessment period, makes note that whilst the plans presented contain information on potential management strategies, the plans do not define which surface and groundwater features are significant and will need management.	See Figures
DWER - Regions	CMS 17164	No proposed management strategies (triggers and thresholds) established within the plan rather the plan commits to develop these strategies. It is unclear that this addresses the work required for task 18 of the scoping requirements.	Following discussions with the EPA, the Plan has been revised to support an outcomes-based approach. The Plan now meets the requirements of the EPA's "Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plan". Which specifies trigger and thresholds criteria to be established where an outcomes-based condition is being proposed. Water quality triggers have been identified within the Plan through reference to the ANZECC Guidelines, Water Quality Protection Guidelines for Mining and Mineral Processing and Water Quality Protection Note 68 where triggers are identified.
DWER - Regions	CMS 17164	Page 131 of the ERD states that water will be pumped back to watercourses if intercepted by pits during flood events, in accordance with Fortescues Surface Water Management Plan. The Eliwana	Pit flood management is outlined in Section 4, Table 6 (Action 2.5).

Table 11: Stakeholder Consultation, Comments and Responses

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Stakeholder	Correspondence	Comment	Changes
		SWMP should be referenced here as opposed to the more general Fortescue Surface Water Management Plan	
DWER - Regions	CMS 17164	The Fortescue SWMP referenced on page 131 addresses the issues of stormwater management onsite however the management of pit surface water capture and release to creeks requires careful planning and consideration which is additional to the onsite stormwater management addressed in this document. RSW considers this issue should be addressed specifically for the Eliwana Project and relevant catchments in the Eliwana SWMP.	Pit flood management is outlined in Section 4, Table 6 (Action 2.5). The action states that a Pit Flood Response Plan will be developed in accordance with the requirements of the Water Quality Protection Guidelines for Mining and Mineral Processing. This would be undertaken during Operations as specified within the Table.
DWER - Regions	CMS 17164	The Eliwana SWMP references the Australian guidelines for urban stormwater management. This is not an applicable guideline for mine site stormwater management.	This reference has been removed.
DWER - Regions	CMS 17164	As mentioned, the proponent has submitted the more general Pilbara wide groundwater and surface water management plans applicable to the Chichesters and Solomon Operations. These plans are not applicable because the ESD requires standalone Eliwana surface water and groundwater plans to be submitted to support the Eliwana operations.	EPA's "Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plan". enables proponents to draft factor- based plans for multiple operations. This is the approach Fortescue is using for its EMP development program. The Plans submitted for surface water and groundwater include project detail for the Eliwana Project as required by the Guidance.
DWER - Terrestrial Ecosystems	CMS 17164	The SWMP and GWMP are also inadequate. They are plans to develop plans rather than containing specific information, management actions, monitoring techniques and SMART trigger and thresholds required. The SWMP should include management actions for maintaining sheet flow dependent vegetation.	Following discussions with the EPA, the Plan has been revised to support an outcomes-based approach. The Plan now meets the requirements of the EPA's "Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plan". Which specifies trigger and thresholds criteria to be established where an outcomes-based condition is being proposed. Management actions are not required under outcomes based plans – see EPA's "Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plan". Management actions have been included in the Plan to demonstrate effective management of the factor but will not be reported against to demonstrate compliance. Management actions (Section 4), Monitoring methods (Section 5) and

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Stakeholder	Correspondence	Comment	Changes
			triggers and thresholds (Table 2) are outlined in the Plan as required under the Instruction. Surface water flows including sheetflow, that support sheetflow dependent vegetation, is managed in Section 4 Table 6 through drainage infrastructure installation (Action 2.2), surface water monitoring (Action 3.2) and vegetation health monitoring (Action 3.5).
DWER - Water	CMS 17164	RSW considers the plans should be developed to manage impacts to hydrological (Surface water) regime, water quality and water sensitive receptors within the proposal disturbance footprint and associated with the proposal, and is unsure if the above meets the EPA objectives for Inland Waters and Hydrological processes. Further to the above the proponent states that the objectives, measures and targets will only apply to those surface water dependent systems within identified high risk areas (within the project boundary). This does not appear to consider downstream surface water impacts (offsite impacts to surface water flows). RSW is unsure which areas have been identified as high risk based on the information provided.	See Figures.





11. REFERENCES

Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and Australian and New Zealand Environment and Conservation Council (ANZECC) 2000.

Australian guidelines for water quality monitoring and reporting. National Water Quality Management Strategy paper No 7, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

Department of Water, January 2013. Managing the hydrology and hydrogeology of water dependent ecosystems in urban development, Guidance Note 7.

Fortescue Metals Group (FMG), 2017. PER: Eliwana Mine Proposal – Surface Water Impact Assessment.





Figure 1:Surface Water Management Measures Near
Conservation Significant Vegetation – Eliwana Rail











Figure 2: Potential Surface Water Impact Areas – Eliwana Mine

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