Fortescue
The New Force in Iron Ore

Report

Response to Submissions

Eliwana Iron Ore Mine, EPA Assessment 2125.

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	Response to Submissions		
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1. INTRODUCTION

Fortescue Metals Group Limited (Fortescue) is proposing to develop the Eliwana Iron Ore Mine Project (the Proposal), an open cut iron ore mine located approximately 100 km west-north-west of Tom Price in the Pilbara region of Western Australia.

The Proposal includes the development of mine pits and associated infrastructure, processing facilities, water management infrastructure for groundwater abstraction and surplus water disposal, temporary and permanent waste landforms and tailings storage facilities. The Proposal involves disturbance of up to 7,900 ha within a 43,804 ha Mine Development Envelope (MDE).

In accordance with the Environmental Protection Act 1986 (WA), an Environmental Review Document (ERD) has been prepared which describes the Project and its likely effects on the environment. The ERD was available for public review for a period of 4 weeks between 1 October 2018 and 29 October 2018.

This document forms a summary of public submissions and advice received regarding the Public Environmental Review for the Eliwana Iron Ore Mine proposed by Fortescue. Fortescue notes that the Puutu Kunti Kurrama Pinikura Aboriginal Corporation (PKKP AC) were provided an additional six weeks to provide a submission.

The principle issues raised in the submissions and advice received included environmental and social issues as well as issues focussed on questions of fact and technical aspects of the proposal. Although not all of the issues raised in the submissions are environmental, the proponent is asked to address all issues, comments and questions, as they are relevant to the proposal.

The key issues raised in the submissions include:

- General Comments;
- Flora and Vegetation;
- Terrestrial Fauna;
- Subterranean Fauna;
- Hydrological Processes;
- Inland Waters Environmental Quality;
- Social Surroundings; and
- Mine Closure.

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2. RESPONSE TO SUBMISSIONS

Table 1: Response to Submissions

No.	Commentator	Comment	Response
General Comments			
1	**Department of Environment; Energy (DoEE)**	The consequence of not proceeding with the action	Section 2.2 of the ERD outlines the justification for the project from a Fortescue perspective. It is stated that the "development of the Eliwana Proposal will allow for the expansion of the Fortescue business into the Western Hub Area". "The proposed Eliwana Rail Project has been determined overall as the most effective transport option to move ore from the Proposed Eliwana Iron Ore Mine to Fortescues Herb Elliot Port in Port Hedland". "Numerous alternative haulage options (such as rail systems, truck haulage and conveyors) have also been considered. These options, however, are unable to support the proposed mine output and would therefore render the proposed mine as an unviable future option to replace the Solomon Hub Firetail Operation". As stated above, the consequence of not proceeding with the proposal renders the iron ore developments in the Western Hub unviable. Section 2.2.1 outlines the benefits of the project for the Australian and Western Australian Community. It is stated that the "Proposal supports the proposed Eliwana Iron Ore Mine and by association would result in community benefits for Australia and Western Australia through: royalties and taxation payments from the sale of iron ore products; employment and training opportunities; and encouragement in the growth of ancillary industries in WA." Fortescue is committed to ensure the growth and development of our operations provide economic opportunity to local communities through the delivery of training, employment and business opportunities. Aboriginal people comprise 15% of Fortescue's workforce with a target of 20% by 2020 and have awarded in excess of $2 billion in contracts to Aboriginal businesses, 90% of that to Pilbara Traditional Owned businesses. In addition, Fortescue awards approximately $200m per year to Pilbara based businesses and has a Pilbara based residential workforce of around 500. The development of the Eliwana project will lead to greater opportunities to employ more Aboriginal people and increase our

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			residential workforce and increase the engagement of Aboriginal and Pilbara based businesses. Furthermore, the implementation of the proposal provide a boost to employment in the mining sector, with approximately 1,900 construction roles and a further 500 full time site roles. The Eliwana Project also represents an increase in mining royalties, providing benefits to the Pilbara region, the State and the nation. The consequence of not proceeding with the project would be an absence of the benefits which have been outlined above.
2	**DoEE**	The cost of the mitigation measures	Fortescue makes a budget allocation to meet its environmental obligations across all its operational sites. Each site has different environmental obligations and these costs vary between sites. Fortescue understands that it will be required to allocate funds for meeting its environmental obligations for the Proposal, including any funds required for proposed offsets and these costs will be factored into the capital and operational expenditure for the Proposal. Fortescue also highlights its obligations to provide annual payments to the Mine Rehabilitation Fund under the *Mining Act 1978.*
3	**DoEE**	A description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action; Please note that, as this is an Accredited Assessment, the proponent needs to provide information to satisfy the assessment requirements of the Department of the Environment and Energy (DoEE) and the EPA. It is also noted that the proposal has also had two s43A change to proposal (April and September 2018). It is the responsibility of the proponent to keep the DoEE up to date with details of the proposal. The following comments provided by DoEE are included for your information. The details of the Minor or Preliminary Works (MPW) for which the EPA gave consent differs to the information provided by the proponent to DoEE as part of the proponent's request to vary the proposal (letter to DoEE dated 13 April 2018). Details of the MPW activities accepted by DoEE include:	EPA consent for Minor or Preliminary Works for the Eliwana Mine Proposal was provided on 17 August 2018 for the disturbance of 265.6 ha for the purpose of: • A Construction camp • Linear infrastructure including access roads and pipelines • Borrow Pits • Topsoil Stockpiles • Turkeys Nests; and • Abstraction of up to 1.6 Gigalitre from existing and proposed production bores. All areas must be rehabilitated if an implementation statement is not issued for the Proposal. Fortescue has also been granted approval under S156A of the *Environment Protection and Biodiversity Conservation Act 1999* to remove these activities and their disturbance from the referred Proposal. Fortescue notes there is a discrepancy between the 265.6 ha given EPA

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		• An accommodation camp • An aerodrome • Access roads and water supply pipelines • Borrow pits • Laydown areas • Topsoil stockpiles The total disturbance associated for these activities is understood to amount to 216 ha. DoEE is concerned the consent for disturbance to the area on which the MPW (265.6 ha) is greater than what was originally indicated (and subsequently accepted) to DoEE, and that the difference may result in disturbance to critical habitat for matters of national environmental significance (MNES). DoEE notes the EPA's MPW consent includes the abstraction of up to 1 Gigalitre of water during the period of the MPW from existing and proposed production bores. The proponent's variation request to DoEE did not include details of this take of water.	consent and the 216 ha of disturbance removed from the EPBC referral. Fortescue made a late change to its MPW proposal to include an access road (known as Flying Fish Road) in order to avoid disturbance to Duck Creek. This change was not communicated to the DoEE. Flying Fish Road occurs within the following fauna habitat types: • Stony Gibber Plain • Drainage Line/River/Creek (Major) • Lower Slopes/hillslopes Of these habitat types, only the Creekline habitat would be considered important habitat for MNES species, including Northern Quoll (foraging), Pilbara Olive Python (foraging and dispersal), Pilbara Leaf-nosed Bat (Foraging) and Ghost Bat (Foraging). Flying Fish Road will disturb approximately 0.77 ha of the Creekline Habitat. This is a very minor impact to MNES habitat and will not have any impact on any MNES species. Fortescue also notes that its EPBC Act 156A application did not mention the 1.6GL of groundwater abstraction. 1.6 GL of groundwater abstraction is a not a significant volume and is equivalent to the volume of water used to support typical exploration camps and associated drilling activities. Fortescue's MPW application identified that there would be no impact to groundwater dependent vegetation as a result of the groundwater abstraction. Consequently, there will be no impact to MNES habitat.
4	**Shire of Ashburton**	Whilst the proposal appears to be consistent with the Shire of Ashburton's strategic aims and objectives as they apply to future economic development and growth, there is some concern it may not be consistent with the Shire's stated goal of protecting and maintaining environmental, heritage and natural values given the significant amount of native vegetation clearing required to accommodate the project, the large amount of groundwater proposed to be discharged into natural creeks and streams and the potential impacts on numerous sites of aboriginal heritage significance. The potential environmental impacts associated with the likely increase in frequency of rail movements from site to port through the Wittenoom Asbestos Management Area (WAMA) and surrounds, including a known asbestos deposit in the vicinity of Roebourne-Wittenoom Road, have not	The Eliwana Iron Ore Mine is not located within the WAMA. The Existing Solomon Railway passes through this area. It is acknowledged that trains to and from Eliwana will use this rail line as ore is shipped to port. Note there is no disturbance to any area as a result of train movements. Licence No.47/847 does not form a part of the Eliwana Mine Proposal. Opportunities to comment on the grant of this tenement can be made through the *Mining Act 1978* process. Finally, Fortescue notes that the *Aboriginal Heritage Act 1972* manages impacts to heritage places.

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		been suitably considered and addressed therefore Council strongly objects to the Eliwana Iron Ore Mine Project on this basis. Furthermore, it is noted the proponent is seeking approval under the Mining Act for Miscellaneous Licences (e.g. Licence No.47/847) to undertake a range of works associated with the proposed Eliwana Iron Ore Mine. It is understood such licences seek approval for works in the Wittenoom Asbestos Management Area (WAMA) and surrounds. Whilst the WAMA may not form part of the proposal currently being assessed by the EPA, it is important to note the Shire does not support any works within the WAMA given the serious human health impacts associated with exposure to asbestos fibres. It is Council's position that the Shire of Ashburton should be not be required to bear any burden of any future compensation claims associated with asbestos exposure related to the Eliwana Iron Ore Mine Project should the project be approved. Further, the responsibility for responding to any such future claims associated with the Eliwana Iron Ore Mine Project should fall solely with the State Government and/or Fortescue Metals Group Ltd given the Shire's on-going objection to any development within the WAMA. Accordingly, at the Ordinary meeting of 19 November 2018, Council resolved as follows: *"That with respect to the Environmental Protection Authority's request for comment on the Public Environmental Review of the proposed Eliwana Iron Ore Mine, that Council:* *Advise the Environmental Protection Authority (EPA) that Council strongly objects to the Eliwana Iron Ore Mine Project on the basis that the potential environmental impacts associated with the likely increase in frequency of rail movements from site to port through the Wittenoom Asbestos Management Area (WAMA) and surrounds, including a known asbestos deposit in the vicinity of Roebourne-Wittenoom Road and Munjina Nanutarra Road, have not been suitably considered and addressed; and* *Advise the EPA that it is the Shire's position that the Shire should be not be required to bear any burden of any future compensation claims associated with asbestos exposure related to the Eliwana Iron Ore Mine*	

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		Project should the project be approved. It is the Shire's position that the responsibility for responding to any such future claims associated with the Eliwana Iron Ore Mine Project should fall solely with the State Government and/or Fortescue Metals Group Ltd given the Shire's on-going objection to any development within the WAMA; *That should approval be issued by the State Government the Proponent be required, as a condition of any State Government approval that may ultimately be granted, to:* *Indemnify the Shire of Ashburton from any individual or collective costs and/or claims made by any persons that may contract asbestosis as a consequence of any works associated with the rail alignment and support network; and* *Seal and drain that portion of Roebourne-Wittenoom Road and Munjina Nanutarra Road the subject of increased railing of iron ore associated with the Eliwana Iron Ore Mine at its own expense to the specifications and satisfaction of the Shire of Ashburton.* *Authorise the Chief Executive Officer to advise the Department of Planning, Lands and Heritage that is has no interest in the Aboriginal heritage place ID 37670, only that it falls with the local government authority."* The EPAS notes the proponent's response that there will be no ground disturbance to the Wittenoom Asbestos Management Area (WAMA) area as a result of the proposal and thus the proponent does not need to address this comment further at this time. The EPA will consider this impact during the assessment of the proposal.	
5	**PKKP**	We refer to our submissions provided in response to the proposed Eliwana Rail Project in which we raised concerns about the cumulative impact of the Rail Project and the Mine Project, with both being subject to separate environmental review processes. The PKKP AC again would like to highlight that technically, both the components of rail and the mine form one project. The impact on the environment, including Aboriginal heritage, is therefore broader than each component considered individually and in isolation of the other.	Fortescue highlights that cumulative impact assessment was required under requirement 26 (Flora and Vegetation) of the Environmental Scoping Document (ESD). Fortescue points the reader to Sections 4.6.5.11 where the cumulative impacts at a landscape scale (Table 31), Vegetation Community Level (Table 32) and Species Level (Table 33) have been considered. The cumulative impact assessments have considered the Eliwana Railway, Eliwana Iron Ore Mine and the Solomon Iron Ore Mine to

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		The PKKP AC is of the view that the impacts of Rail Project and Mine Project should be considered holistically, that is: what is the environmental impact of the entire Eliwana proposal? This would give a more accurate picture of the extent to which the projects will impact the country.	determine the cumulative impact from all Projects. These assessments found that: • Cumulative impacts to Land Systems is insignificant, with over 94% of all land systems occurring outside the three Project areas. • Cumulative impact to vegetation communities is not significant with no vegetation community cleared below the 30% threshold value (pg. 244); Note, column 5 of Table 32 '% remaining' is incorrectly labelled. This column should be labelled '% impact'. • No conservation significant species will be reduced by greater than 10% of the known number of individuals, except for *Triodia basitricha* (pg. 245). • The cumulative impact to *T. basitricha* is likely to be a gross overstatement given the number of known locations and the abundance of individuals at known locations and the extent of the species occurrence (Section 4.5.6.4) Therefore, the environmental impact of both Eliwana Mine and Rail Proposals has been considered together. Fortescue notes that the residual impact of the permanent loss of 7,900 ha of vegetation is a significant impact for which Fortescue has proposed an offset. Fortescue will continue to consult with the PKKP on the cumulative impacts of both proposals on environmental and cultural values.
6	**PKKP**	Fortescue Summary: The PKKP have made numerous comments in relation to Joint Management of cultural, heritage and environmental values. *Both the Rail Project and the Mine Project provides the PKKP People and FMG with the opportunity to implement best practice, world class systems and processes for managing the environmental landscape through joint management of the environment, including cultural heritage (although it should be noted that for the PKKP People there is no distinction between preserving natural and cultural heritage – it is all one living landscape).*	PKKPAC have proposed a 'joint management model' involving 'a formal power sharing management arrangement where FMG and the PKKP People are equal partners…'. In the context of the Project and this PER, a formal arrangement for power sharing and shared decision making would render PKKP a proponent in the Project rather than a stakeholder. As a proponent, PKKPAC would attract the responsibilities and liabilities of a proponent, and would lose the rights afforded a stakeholder. PKKPAC's description of their proposed joint management model emphasises the concepts of 'bringing together', 'combined knowledge and skills', 'participate and engage', 'working together' and 'strong and lasting relationships'. FMG understands these statements to express

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		Joint management would involve: • *A formal power sharing management arrangement where FMG and the PKKP People are equal partners who share decision making;* • *Bringing together cultural and technical knowledge and experience and different governance processes;* • *utilising the combined knowledge and skills of joint management partners for improved land management;* • *enabling PKKP to actively participate and engage in managing lands and waters;* • *providing opportunity for FMG to gain an understanding of PKKP heritage & culture first hand, throughout the duration of the project;* • *combining traditional and contemporary land management objectives;* • *working together to make shared and informed, consistent, transparent and accountable decisions; and* • *establishing strong and lasting relationships built on trust, shared vision, shared responsibility and mutual respect.* *PKKP are committed to a joint management relationship with FMG. PKKP want a partnership of equals, where PKKP have an active role managing the environmental impacts of the project in a culturally appropriate manner. Joint management will provide PKKP People with training in western land and heritage management techniques and in turn provide FMG with PKKP's expert knowledge in the care and maintenance of their country and the cultural values contained therein.* *PKKP are the principal knowledge holders about the environment, culturally significant flora and fauna, and heritage sites in the area. This information is privileged and cannot be simply provided to, and understood, by non-PKKP people. PKKP conceive of country and their obligations in a way that does not neatly align with western ways of knowing and associated eurocentric heritage legislative framework. For this information to be understood to the benefit of all involved it has to be shared in a collaborative environment where PKKP people can guide FMG through the process of understanding in a culturally appropriate*	PKKPAC's desire to work closely together, and proposes that a 'collaboration model' would better achieve this outcome without attracting the liabilities associated with formal joint management. This aligns well with the repeated conceptualisation of engagement with FMG as 'collaboration' throughout PKKPAC's submission. FMG has intentionally implemented a collaborative approach to engagement with PKKP People in the development of the Project as evidenced by: • regular, direct communication with PKKP People and their representatives; • PKKP preferences and feedback directly influencing decision-making in relation to infrastructure locations and access; • the agreement to provide funding to PKKPAC for an Implementation Officer to be embedded in the PKKPAC office, whose responsibilities are to coordinate PKKP activities and inputs as they relate to the Project. FMG is committed to further developing this collaborative model of engagement with PKKP People, including by exploring opportunities such as: • PKKPAC's proposed Ranger Program and how FMG can support its development and implementation; • providing practical experience opportunities to PKKP People undergoing training in environmental management and monitoring; and • the potential for joint development of a collaborative engagement model framework for the Project. Any collaborative engagement model framework agreed between FMG and PKKP People would build on the existing FMG-PKKP Land Access Agreement dated 10 May 2010 (LAA). The LAA already provides a framework for engagement and benefits intended to compensate PKKP People for the impact of FMG projects on PKKP native title rights and interests.

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		manner. PKKP believes this is best achieved through a joint management approach. *Joint management and collaboration rather than consultation. PKKP acknowledge that FMG have thus far worked with PKKP to engage beyond the minimum requirements outlined in agreements or legislation and would like to see this collaboration continue and further develop into world class land management practices. This approach aligns with PKKP's cultural protocols surrounding decision making and will promote a more holistic and nuanced approach to environmental management. As well as supporting PKKP to exercise their rights and responsibilities as the traditional custodians of this country;* *Support for a PKKP Ranger Program that will ideally be funded by FMG to undertake environmental and heritage compliance work, ongoing monitoring and management of heritages sites, and to undertake activities to support Fortescue's proposed environmental mitigation strategies including (but not limited too) weed management, pest management, flora and fauna surveys, and water monitoring; and* *Training for PKKP People to build the group's capacity to undertake the environmental mitigation strategies outlined above.* *The primary areas of concern identified by PKKP in relation to the project are:* • *Potential impact to significant sites including Duck Creek, Eagle's Nest PK10-004, and PK12-076;* • *The ongoing management of heritage sites not directly impacted by the project but located within or adjacent to the project area;* • *Maintaining access to the project area to exercise native title rights;* • *Maintain water flow and quality particularly in Duck Creek and its tributaries; and* • *Potential impacts to culturally significant flora and fauna species.* Fortescue is also aware that PKKP have provided the EPA with correspondence regarding the significance of Eagles Nest (PK10-004) and Kangaroo Gorge Painted Rock Art (PK12-076). Fortescue has been provided a copy of this correspondence and addresses the information provided here.	**Eagles Nest** Fortescue, in collaboration with the PKKP have established a Heritage Restriction Zone (HRZ) around Eagles Nest. Fortescue's stated commitment with regards to Eagles Nest remains as per the ERD: *"… that there will be no disturbance from mining to this area until the heritage or other values of this area are fully understood and further consultation on this area has been undertaken."* Fortescue would be pleased to support PKKP to undertake more thorough research to map and understand this place. Eagles Nest is also discussed at Item 88. **Kangaroo Gorge and the Painted Rock Art** Kangaroo Gorge was not discussed in the ERD. However, the rock art site PK12-076 is discussed at Item 89. Fortescue is committed to maintaining an exclusion zone around Kangaroo Gorge to protect the rock art site and other heritage values within the gorge. Fortescue also notes that a pool occurs within Kangaroo Gorge and has provided commentary on this pool both in the ERD and updated advice in this RTS document. For the purpose of EIA and ongoing management, this pool is now labelled 'Pool 2' and is the same pool as shown in Inset 2 on Figure 10 of the ERD. Fortescue considers that the presence of the pool near the rock art site suggests that the pool has cultural or heritage value, although the information provided by the PKKP in their submission to the EPA does not contain any information as to its heritage value. The Rock Art site is also discussed at Item 89. **Potential Indirect Impacts** Considering the proximity of the Rock Art site, rock shelters and the pool to the active mining and process area, potential indirect impacts to the gorge and its values may include: • Vibration (Art and Rock Shelters) • Dust (Art and Rock Shelters)

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			• Changes to surface water volume and quality (pool values) • Changes to groundwater levels from groundwater abstraction (pool values) Fortescue does not consider that the impacts from noise or dust on PK12-076 would be significant. Common mine management actions to control dust will be implemented across the Eliwana mine site. Vibration impacts will depend largely on the proximity of the site to blasting activities. However, Fortescue has demonstrated at its Solomon mine that blasting activities can occur in close proximity to heritage sites without any observed impacts. Fortescue is predicting that there will be changes to surface water flow through Kangaroo Gorge as a result of this Proposal. Both catchment tributaries to the gorge will be subject to changes in surface hydrology. Fortescue will monitor pool levels and/or contributing surface water catchment area during operations to determine the potential level of impacts this might have and provide relevant management measures as required, noting that the pool is small and would not require large volumes of water to supplement the pool if required. Impacts from changes to groundwater at Pool 2 are discussed at Item 47. To summarise, Fortescue now consider that Pool 2 is unlikely to be connected to groundwater and is unlikely to be impacted by groundwater drawdown. As above, pool levels will continue to be monitored. These impacts would be monitored and managed through a Social and Cultural Heritage Management Plan as proposed at Item 89. As per commitments made above, this plan would be developed in collaboration with the PKKP and it is envisaged that the PKKP would be actively involved in the monitoring of these places and in the development of contingency actions to be implemented should indirect impacts be observed.
7	**PKKP**	The PKKP AC confirms that FMG representatives attended meetings with representatives of the PKKP native title holders and that discussions regarding the proposed Mine Project are ongoing. Despite initial	Fortescue continues to consult with the PKKP to develop a mutual understanding of environmental, heritage and cultural values within the MDE.

No.	Commentator	Comment	Response
		reservations, the PKKP People have endeavoured to engage positively with FMG in order to foster collaboration and information sharing going forward. The result for PKKP People has been an improved level of recognition and respect by FMG staff, for culturally significant sites at Eliwana. This in turn has provided PKKP AC some degree of trust that FMG is willing to negotiate in good faith regarding the Eliwana Mine and Rail Project. While positive to an extent, the PKKP People believe there are still a number of significant matters that require discussion and agreement between the parties. We note that the table in Section 3.3 of the ERD does not outline any feedback received from PKKP, and only outlines where and when FMG has consulted and what FMG put forward. As noted previously, the PKKP AC wish to ensure that the EPA is clear that this does not mean that the PKKP AC or the PKKP People have no matters of concern in relation to the information presented by FMG. The PKKP People and PKKP AC would like to advise the EPA that they have held, and continue to hold, grave concerns about the impact of the proposed Mine Project on their country, culture and their native title rights and interests. These concerns have been repeatedly and consistently provided to FMG over a period of some six years, and while there has been some progress in addressing some concerns, the PKKP People remain vigilant in ensuring that their culture and country can be properly protected from the impacts of the proposed mine. Any serious impact has dire consequences for the obligations imposed by traditional law on the PKKP People to look after country. The PKKP AC also believes that the PKKP People should have a seat at the table with mining companies and the EPA when developing the scoping document for environmental review processes. This will ensure appropriate time frames so that matters that are of concern to native title holders can be properly considered and allow input such as traditional ecological knowledge into the process, which is generally ignored by proponents beyond superficial remarks about flora and fauna of cultural significance.	Fortescue began discussions with the PKKP on the Eliwana Mine and Railway Proposals on 23 March 2017 at a regular bi-annual PKKP Working Group meeting. Fortescue met the Working Group again on 10 October 2017 to present information on the progress of the Proposals, met again on 3 March 2018 and again on 3 April 2018. The on-country visit occurred on 26-27 May 2018. Whilst not documented in the ERD, Fortescue met with the PKKP Land Council on 15 August 2018 to give a presentation on the content of both Mine and Railway ERD. Through regular consultation, Fortescue has developed an understanding of the importance of culture and country to the PKKP and looks to foster this relationship through ongoing consultation through the life of the mine and into closure. In particular, Fortescue understands the importance of Duck Creek and Eagles Nest to PKKP. Fortescue notes the PKKP's comments regarding involvement in the scoping process for environmental impact assessment. The PKKP are recognised as a key stakeholder for the Proposal and Fortescue facilitated an on-country meeting between the EPA and the PKKP at the request of both parties. Comments regarding including traditional knowledge in the impact assessment process are addressed at Comment 92 and more broadly through responses to other comments by the PKKP.
Flora and Vegetation			

No.	Commentator	Comment	Response
8	**Department of Water and Environmental Regulation – Regulatory Services Division DWER (RSD)**	The document states that banded Mulga dominated sheet flow vegetation communities do not occur within the development area (Biota 2017, Page 197). It is also stated that these communities do not occur in areas that may be impacted by changes to surface water flows, beyond the development area (page 147), however there is no further justification. This needs further clarification, and it is recommended that the proponent provide additional mapping of sheet flow communities beyond the development area. Although the vegetation may not be located within the MDE, development of these areas will lead to reduced surface and sheet flow run-off outside the MDE and may result in off-site impacts to these communities.	Vegetation mapping is provided in Figure 16 (Maps 1 and 2) of the ERD. Fortescue also highlights the land system mapping available at Figure 5 which shows the MDE is surrounded by the Newman and Rocklea Land Systems, which are characterised as 'Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands' (Newman) and 'Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs' (Rocklea). These landforms do not support flat hardpan areas which provide the conditions suitable for sheetflow communities.
9	**DWER (RSD)**	Assessment of water regime change impacts on riparian vegetation has been separated into surface water and groundwater – resulting in some areas being assessed twice (particularly West Creek – Figure 19 and 25, Area A). Given that reduced flows would lead to reduced local recharge and hence groundwater levels (as shown in the conceptual models), changes in both water regimes should not be considered as separate impacts. Presenting these assessments separately also makes it onerous to develop a clear picture of the area of vegetation at risk from indirect impacts – although a cumulative impacts table is presented elsewhere in the document.	The separate consideration of impacts to riparian vegetation from changes to surface water and changes to groundwater drawdown is deliberate and necessary to meet the requirements of the ESD. Clearly, there are areas within the MDE that are subject to groundwater drawdown and there are other areas that are subject to changes in surface water flow. In some areas, particularly vegetation dominated by *Eucalyptus victrix*, there may be vegetation that is dependent on both surface and groundwater for its water requirements, depending on the baseline depth to groundwater. In these areas, impacts to riparian vegetation may be caused by either groundwater drawdown, or reduced surface water flow, or both. For instance, the ERD recognises that in some areas within the MDE, particularly in close proximity to the West End and Talisman mining areas, *E. victrix* dominated vegetation occurs in areas of drawdown but is far more likely to be impacted by the changes to surface water flow (Table 30 of the ERD). Fortescue consider that it is very clear which areas of groundwater dependent vegetation are at risk from groundwater drawdown. Fortescue also consider that areas of riparian vegetation downstream from the mining area are very clearly articulated in Section 4.6.5.9.
10	**DWER (RSD)**	Groundwater dependent and potential groundwater-dependent vegetation ecosystems are described in Section 4.6.4.7 (p197). FMG correctly identify a suite of tree species generally considered to be GDV – *Melaleuca argentea* (in community MaMgCYPv), *Eucalyptus camaldulensis* (community EcAcEuaTe) and *E. victrix* (communities	The purpose of Figure 19 is to demonstrate spatially the location of GDE and Potential GDE vegetation, which is generally considered to have higher conservation value than most other vegetation types, hence the requirement to provide this figure as per the ESD.

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		EvAcCcErIt and EvAcMgERIt) and describe the likely levels/ types of dependencies. Although areas of GDV are shown in Figure 19 (Section 4.6.4.7, p199), the community types are not specified, nor is there any indication of depth to groundwater nor predicted drawdown/ change. It is therefore not possible to access the impacts described in section 4.6.5.10 and Table 30. As it is unclear from the current figures provided, the EPAS requests an additional figure with labelled GDV vegetation communities (eg. EcAcEuaTe) and also potential GDV communities, relative to labelled contours of the ground water drawdown for maximum drawdown and the expected residual drawdown post mining.	Figure 26 (Maps 1 – 3) overlay these vegetation communities onto the predicted maximum groundwater drawdown. This figure, and the assessment in Table 30 provides the information the respondent seeks to determine the impacts of groundwater drawdown on GDE or potential GDE vegetation. Fortescue acknowledge that Figure 26 does not differentiate between the various GDE and PGDE vegetation communities, however, each community is discussed in Table 30. Figure 26 has been amended to differentiate between each community (Figure 1 of this document) and a further figure has been prepared which shows the extent of residual drawdown 100 years after cessation of groundwater abstraction (Figure 2 of this Document). This residual drawdown is discussed further at Item 46.
11	**DWER (RSD)**	Section 4.6.5.9: Altered surface hydrology discusses the four groundwater-dependent vegetation communities (above) in terms of impacts from reduced surface flow in five creeklines: • West Creek, at the downstream end of the development area; • Pinarra Creek; • Strike East Creek; • Flying Fish 1 Creek, Flying Fish 2 Creek; and • Unnamed Creek. These creeks are shown on Figure 12, however the vegetation communities associated with these creeks are not shown (on Figure 12). In addition, Figure 25 (A –E) does not show the full extent of impacts on one map, nor list the creek names in relation to the vegetation communities. Changes in the depth of flood levels and the areal extent of changes are estimated however, there is no information on antecedent flow/ pool depths. Therefore, it is not possible to assess and provide comment on impacts. In addition, although vegetation is mapped separately for each area (A-E), the colours used to represent communities on Figure 25 makes it difficult to differentiate/identify, and therefore to assess and comment on predicted impacts. Section 4.6.5.1 states that 51.2 ha of community MaMgCYPv is found downstream of the development area, in major drainage lines. 100% of	To clarify, Section 4.6.5.9 discusses four riparian vegetation communities, two of which (MaMgCYPv and EcAcEuaTe) are considered groundwater dependent and two of which are considered potentially groundwater dependent (EvAcCcERIt and EvAcMgERIt). Figure 12 is not intended to show vegetation communities. This figure shows areas where creeklines may experience a change in surface water flow, either reduced water flow or increased water flow (as a result of excess mine dewatering). Fortescue advise that at the scale of this map, the vegetation communities in these creeks are not visible. Figure 25 (A-E) are intended to show the vegetation communities in drainage lines that may experience a reduction in surface water flow. It is not possible to show all these locations on the one map at a scale that allows the vegetation communities to be clearly identified. Fortescue has amended Figure 25 Maps A – E to label the vegetation communities and the creeklines in which they occur, and these are provided as Figure 3 (Maps A – E) of this document. **Pools** The nature of pools identified within the study area are reliant on localised surface water/ground water systems. Work to date has indicated all pools experience significant reduction in volume due to evapotranspiration, with most having been observed to dry out altogether.

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		the community is predicted to remain intact, despite 19.6 ha being considered at risk from indirect impact ranging from "…no visible impact to significant impact' (page 217). Later in the document it is stated that (with regard to the same area of vegetation) "…community MaMgCYPV in West Creek will also experience a significant decline in groundwater" (Page 231). RSD seeks clarification on these conflicting statements e.g. the statement that 100% of the unit will be maintained is incorrect. RSD considers that altered hydrology and alteration of surface water flows has the potential to impact both directly and indirectly on vegetation. RSD requests further justification for the assertion that there will be no loss of this community, despite significant changes in both ground and surface water regimes. FMG state it is not possible to show changes in surface water (Figure 12) overlain with mapping of vegetation on creeklines that may be impacted (25a-e) on one map, due to scale. Please include a revised Figure 25a-e with named creeklines and a revised Figure 10 with pools to assist with assessment. With information on the historical flows in drainage lines/ creeklines unavailable, the environmental value of the pools is currently unclear. Please provide further information on the depth of pools and comment on their habitat values. EPAS considers a range from 'no visible impact' to 'significant impacts' is not appropriate for predicting impacts to vegetation communities - most notably the riparian community (*MaMgCYPv*). Further justification is required for FMG's statement that it is 'not possible to quantify actual impact' to this community. Alternatively, FMG may provide quantification of indirect impacts including the area of this vegetation type subject to changes in surface water flows.	Pool depth therefore is a time-varying measure. The maximum pool depth will be dictated by: a. topography, as the pools will fill only to a level whereafter water overtops and flows downstream; and b. scouring, as pools locally fill depressions in the rock or thin alluvial substrate. As repeated at Item 58, the pool levels and volumes at any point in time are heavily dependent on seasonal rainfall events and their contribution on creek flow, vadose zone/facture flow and localised groundwater recharge that cumulatively drive pool inflow. The high spatial and temporal variability of intense rainfall events in the Pilbara due to the occurrence of localised diurnal thunderstorms, will result in significant differences in recharge between pool systems and significant seasonal variation in pool depth. Consequently, caution must be exercised with absolute measures of physical pool parameters (e.g. depth) and comparisons between pool systems to draw conclusions on whether changes are related to project disturbance (e.g. comparing water level decline in two separate pool systems). Instead it is proposed that impact to pools should be inferred from the physical disruption to hydrologic regime within the likely area of influence of the pools (e.g. measurement of changes to catchments contributing to pools). NOTE: Fortescue has numbered pools within Figure 10 of the ERD to assist with nomenclature and to ensure consistency and transparency when discussing individual pools. This numbering is provided in the SWMP. **Pool habitat value** In the absence of years of data collection, Fortescue has estimated the persistence of the pools within the MDE and downstream of disturbance based on aerial imagery (Section 4.4.4.5). The three pools in Figure 10 inset 1-3 can be characterised as having the following ecological values: Figure 10 inset 1 (now Pool 1) – The pools in this creek (West Creek) appear to be present for most of the calendar year based on available aerial imagery. It is possible that these pools may be fed by groundwater, or otherwise by baseflow in alluvial sediments within West Creek. Large

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			stands of mature *Eucalyptus camaldulensis, Melaleuca argentea and E. victrix* occur within West Creek and often fringe the pools. It is likely that these pools provide refuge for a range of fauna species. Fortescue considers it possible that the pools in West Creek would attract prey for species such as Pilbara Leaf-nosed Bat, Pilbara Olive Python, Northern Quoll and Ghost Bat, although to date, no conservation significant fauna species have been recorded from within the creek. Figure 10 inset 2 (Now Pool 2) – This small pool occurs in a small rocky gully and may be either surface or groundwater fed. Water quality for most of the year in this pool is poor as the only outflow from the pool is via evaporation. As noted against other comments, Pilbara Leaf-nosed Bat have been recorded calling at this pool and it is likely that small insects swarm above the pool at night providing food for this species. No other conservation significant species have been recorded at this pool. There is no fringing vegetation around the pool. Figure 10 inset 3 (now Pool 5) – This pool is a shallow pool occurring in a creekline which appears to be a mix of base rock and alluvial substrate. Aerial imagery from March 2017 shows there to be several pools within the creekline, whilst imagery from June 2018 suggests most pools in the creek have evaporated. Recent visits to this site have found the pool to be dry. Fortescue estimates that all pools in this creek will be dry by the end of the dry season (approximately November). Vegetation in the creekline is sparse, and mapped as EvAcCcERIt, an *E. victrix* dominated community. Whilst the community is classified as potentially groundwater dependent, in this area the vegetation is more likely to be surface water dependent. Fortescue considers that this pool would have little fauna habitat value as they are dry within several months post-wet season. Fortescue consider that the ERD provides adequate information to determine the potential impacts of the proposal to riparian vegetation and pools from changes to surface water flow and the significance of those impacts. Fortescue notes that the quote "…no visible impact to significant impact" is from the explanatory note below Table 26 of the ERD (page 218). The note is provided to explain how the indirect impacts to vegetation communities has been calculated. The hectare figures in the 'Indirect Impacts' column of this table is the areal extent of those vegetation

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			communities which may experience impacts from changes to surface water flow. However, it is not possible to qualify the actual impact to the communities in terms of vegetation density, structural changes or species loss as this will depend on a number of factors, including: • The scale of the change to surface water flow; • The species present; and • The ability of those species to adapt to change to surface water flow. Therefore, a range of impacts, from 'no visible impact' to 'significant impact' is suggested. However, Fortescue agrees that a total of 19.6 ha of MaMgCYPV will experience a reduction in surface water flow. This reduction in surface water flow is predicted in the ERD and is modelled in the Surface Water Impact Assessment (Appendix 3 of the ERD). Fortescue also acknowledges that this same area of MaMgCYPV located in West Creek (Figure 25 Map A) will experience a decline in groundwater levels and is likely to experience a significant impact on the scale suggested on page 218. That is, 19.6 ha of this community is likely to experience a decline in vegetation health due to groundwater loss or changes to surface water flow. There is no conflict with either the statement on page 218 or the assessment of impacts on page 231. The Vegetation Health Monitoring and Management Plan has been amended and is provide at Appendix 4.
12	**DWER (RSD)**	The proponent states that no vegetation communities will be cleared below the 30% guidance threshold of EPA Position Statement No. 2 however elsewhere in the document it is explained that this document has been removed from the EPA website. RSD does not consider it appropriate to quote guidance which cannot be referenced, checked or assessed. Further to this, Table 32 purports to show cumulative impacts to 16 vegetation communities from the rail and mine development footprints – however it only lists 11 communities – only one of which has greater than 30% remaining. RSD request that the proponent clarify this information.	Fortescue notes that this Guidance is no longer current, but has included reference to the previous EPA Position Statement 2 as there is no other current guidance on vegetation clearing that provides a threshold for significance. Fortescue thanks the commentator for drawing attention to Table 32 of the ERD. The '% remaining' column of this table should be titled '% disturbed'. None of the vegetation communities listed in Table 32 will be cleared beyond the 30% threshold value in the previous EPA guidance note. The greatest cumulative impact will be to community EvAcCcERIt, which will experience a 32.8% cumulative loss to its areal extent (67.3% remaining).

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		EPA position statement 2 – no longer current. See: Environmental Factor Guideline – Flora and Vegetation (EPA, 2016) and Technical Guidance – Flora and Vegetation for Environmental Impact Assessment (EPA, 2016).	
13	**DWER (RSD)**	RSD requests that the proponent provide the following additional information: 1. provide shapefiles of all vegetation mapping, drawdown contours and changes to flow regimes, to allow accurate assessment of the proposal and potential impacts to GDEs; 2. review vegetation mapping to ensure communities are appropriately be delineated and identified; 3. figure(s) should be updated to show the full extent of the catchments and downstream surface water environment and include the MDE polygon. The figure should also show any surface water environmental values of significance; 4. review impacts of surface and groundwater regime change cumulatively in areas that will be impacted by changes to both processes; 5. provide detail of current/ antecedent pool depths to allow assessment of the predicted change in depth; 6. review conflicting statements regarding the nature of 'indirect impacts'; and 7. justify the use of the 30% as threshold (area to be retained) now that the EPA Position Statement No. 2 has been removed.	1. Fortescue does not consider it is necessary to provide the DWER (RSD) with the vegetation mapping data. It is not the role of the DWER (RSD) to regulate impacts to GDEs. The ESD did not require the submission of spatial data for vegetation mapping. Fortescue highlights that the DWER (TEB), which provides ecological and biological support and advice to the EPA have not commented on risks posed to GDE vegetation from groundwater drawdown, nor has the State's biodiversity conservation agency (DBCA). The information provided in the ERD and its appendices is appropriate and sufficient for impact assessment and informed commentary. Fortescue will provide groundwater modelling data to DWER (RSD) in support of its RIWI Act Licensing application. 2. Figure 16 Maps 1 and 2 are appropriately labelled to allow for communities to be identified. 3. Regional catchments are shown in Figure 6 of the ERD. Regional sub-catchments are shown in Figure 8. Surface water sub-catchments are shown in Figure 9 with major creeklines labelled. 4. The separate consideration of impacts to riparian vegetation from changes to surface water and changes to groundwater drawdown is deliberate and necessary to meet the requirements of the ESD. Clearly, there are areas within the MDE that are subject to groundwater drawdown and there are other areas that are subject to changes in surface water flow. In some areas, particularly vegetation dominated by *Eucalyptus victrix*, there may be vegetation that is dependent on both surface and groundwater for its water requirements, depending on the baseline depth to groundwater. In these areas, impacts to riparian vegetation may be caused by either groundwater drawdown, or reduced surface water flow, or both. For instance, the ERD recognises that in some areas within the MDE, particularly in close proximity to the West End and Talisman mining areas, *E. victrix* dominated vegetation occurs in areas of drawdown but is far more likely to be impacted by the changes to surface water flow (Table 30 of the ERD).

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			5. Fortescue does not have data on existing pool depths. Assessment of the pools persistence has been made using aerial imagery. 6. This has been addressed at Comment No. 9. 7. The justification for using the 30% threshold figure has been addressed at Comment No. 12

14	**DWER (RSD)**	The proposed threshold contingency action for impacts to groundwater dependent vegetation (Table 11) seem to be more of an investigative nature and falls short of specific and immediate actions (e.g. shutting down bores).	The threshold contingency measures have been updated to reflect more immediate actions to be undertaken if threshold criteria is exceeded. These actions are now reflected within the Groundwater Management Plan and the supporting Provisions Table (Appendix 3).
			Threshold Contingency Actions
			• Initiate implementation of contingency measures within 24 hours of the exceedance being identified.
			• Re-examine monitoring results (QA/QC) to validate data. Re monitor if required.
			• Ground truth the results of the disturbance to validate findings of the assessment and/or determine/identify what may be causing the exceedance. Where cause is identified during ground truthing and can be rectified, undertake action immediately. For actions which require alternate resources, schedule works to be undertaken as soon as possible.
			• Cross reference groundwater monitoring results with most recent vegetation health monitoring/surface water/conservation significant fauna results to determine whether an impact can be identified. Implement additional actions under the vegetation health management and monitoring plan where impacts are present.
			• Where the threshold exceedance was not caused by construction, operation or decommissioning activities, resume standard monitoring frequency.
			• Where the threshold exceedance was caused by construction activities:
			  ○ Implement adaptive management response (modified abstraction) management guidance within the Groundwater Operating Strategy. This may include a reduction in abstraction volumes in impacted areas.
			  ○ Once management actions have been completed, extend the monitoring program to include an additional recharge

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			event to determine if groundwater quality and level values recover. ○ Continue to implement actions to remediate the exceedance until approval to cease has been given by the OEPA.
15	**Department of Water and Environmental Regulation – Terrestrial Ecosystems Branch (DWER – TEB)**	The proponent has provided (ERD Appendix 16) a consolidated flora and vegetation report (Biota 2017). This report is a robust and comprehensive assessment of the flora and vegetation values present in the project area. It provides a sound basis for assessing the local and regional impacts on flora and vegetation values. The ERD document adequately and appropriately summarised the flora and vegetation values of the development envelope. The proponent has outlined mitigation hierarchy measures, and in particular has revised the development envelope to minimise impacts to key ecological values. The impacts to flora and vegetation are not likely to adversely impact ecological or biodiversity values at a regional scale but will directly and potentially indirectly impact priority and other significant flora populations, a portion of a PEC, and riparian/GDE vegetation. Populations and occurrences of each of these values is present both locally and regionally. The residual impacts of the proposal on flora and vegetation would be: • Direct clearing of ~7,900 ha of intact remnant vegetation, including clearing 41.4 ha of vegetation that is likely to represent the Triodia sp. Robe River assemblages of mesas of the West Pilbara PEC, and small proportions of several populations of priority flora. • Loss of 19.6 ha of groundwater dependent vegetation dominated by *Melaleuca argentea* outside of the development envelope through groundwater drawdown. • Potential further loss or decline of small proportions of populations of priority flora and riparian vegetation through reductions in surface water flows. Conditions to manage weeds and impacts associated with changed hydrological regimes are supported.	Fortescue notes the comment.

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16	**Department of Biodiversity, Conservation and Attractions (DBCA)**	Based on the information presented, it appears that several priority flora species (including the Priority 1 flora species *27id asp*. Hamersley Range), may be subject to significant impacts at a local scale. DBCA is currently unable to clearly ascertain the level and significance of impacts on potentially affected priority flora species from the information made available in the ERD. For example, it is difficult to determine whether the numbers of flora of the various taxa presented in the document related to the total number of known individuals for each species or to the number in populations within particular areas or regions. It is unclear how other impacts on flora including those associated with potential indirect impacts, have been considered. Although the impacts as identified appear unlikely to be significant at a regional scale for the majority of the affected priority flora taxa, it is important that best practice management is implemented by the proponent to maintain viable priority flora populations wherever possible, through avoiding/minimizing impacts and/or specific mitigation actions. As an example of mitigation, seed collection from priority flora populations destroyed and propagation or direct reinstatement of species in rehabilitation would be highly beneficial if removal of entire priority flora population(s) is unavoidable.	Table 25 (Pg. 205) of the ERD document outlines Priority flora taxa in terms of number of populations and individuals that occur within the MDE and the total number of individuals known to Fortescue. To use the nominated example of *Sida sp*. Hamersley Range, Table 25 states that 103 individuals have been recorded within the MDE with 760 individuals known to Fortescue (within and outside of the MDE). A total of 30 populations are known state wide with two of these occurring within the MDE. Direct impacts to Priority Flora from the proposal footprint is captured in Table 27. Where Table 25 outlines the priority flora (individuals and populations) from within the MDE, Table 27 outlines the predicted direct impacts to Priority flora. Note, no individuals of *Sida* sp. Hamersley Range are proposed to be directly impacted. Indirect impacts to Priority flora are indicated in Table 29. To continue with the example of *Sida sp*. Hamersley Range, approximately 120 individuals occur within areas that may be indirectly impacted through changes to surface hydrology. Approximately 30% of these individuals were the same that were recorded within the MDE with the remaining 70% occurring outside of the MDE.
17	**PKKP**	Figure 14 in s4.6.3 outlines the extent of vegetation and flora survey effort. PKKP AC notes that this area does not include all potential surface water impact areas shown in Figure 12. For instance, the majority of the impact area on Pinarra Creek is within an area that has not been surveyed and the impact areas on West Creek and Flying Fish 1 Creek appear to extend beyond the area that has been surveyed. Required work item 24 of the ESD requires that an analysis of the vegetation and significant flora species present and likely to be present within the MDE, including any indirect impact areas. Therefore, this required work item does not appear to have been met by the ERD. It is noted that in Figure 25, the potential impact areas have been mapped and the note in Table 28 states that the vegetation type has been extrapolated where surveys had not been completed. There is no reference provided regarding the methodology for this extrapolation or how this meets the relevant EPA guidance and Required work items of the ESD.	A total of four riparian vegetation communities (MaMgCYPv, EcAcEuaTe, EvAcCcErIt and EvAcMgERIt) have been mapped within or surrounding the MDE. It can be reasonably expected that along drainage lines, the mapped vegetation community would continue in a linear fashion outside of the mapped area if the drainage line is downstream and uniform. Using these principles, a conservative approach was taken to extrapolate vegetation communities within drainage lines and to estimate the area of riparian vegetation that may be indirectly impacted by surface water changes. Note, extrapolation was conducted using available aerial imagery which would identify if there was a change in vegetation. Fortescue considers the potential impacts of the project can be estimated using this approach.

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18	PKKP	Page 218 of the ERD refers to EPA Position Statement No. 2 with regards to the 30% threshold which is no longer current. The 30% threshold is included in the EPA Offsets guidance residual impact significance model in relation to clearing principle (e). This is noted as it is important that assessments are based on current guidance.	This comment is noted. None of the vegetation communities listed in Table 32 of the ERD will be cleared beyond the 30% threshold value. The greatest cumulative impact will be to community EvAcCcERIt, which will experience a 32.8% cumulative loss to its areal extent (67.3% remaining).
19	PKKP	Table 28 on p235 outlines that there will be 314 ha of potential indirect impacts on creek line vegetation from reduced surface water flow due to the interception of surface water flows by mining infrastructure. The nature of the change to vegetation is likely to include changes to vegetation structure and species abundance. The risks associated with this change appear to be similar to risks associated with groundwater drawdown in areas of riparian vegetation. However, no offset is proposed for either of these impacts (with the exception of 19.6 ha of obligate groundwater dependent vegetation). The creek lines and their associated ecological and heritage values are considered significant by PKKP People and therefore, a more comprehensive collaborative approach to the monitoring and mitigation of this impact should be supported.	Section 6, Table 79 of the ERD identifies significant residual impacts from the proposal for which an offset is proposed. Table 79 discuses that mine closure activities are likely to mitigate the impacts from changes to surface water flow and that the residual impacts are unlikely to be significant.
20	PKKP	Section 4.6.5.11 notes that cumulative impacts with other proponents have not been considered as data was not comparable. However, the extent of these developments and the land systems they occur within are publicly available and therefore a high level cumulative impact assessment as required in ESD Item 26 should be possible.	Fortescue highlights that cumulative impact assessment was required under requirement 26 (Flora and Vegetation) of the Environmental Scoping Document (ESD). Fortescue points the reader to Sections 4.6.5.11 where the cumulative impacts at a landscape scale (Table 31), Vegetation Community Level (Table 32) and Species Level (Table 33) have been considered. The cumulative impact assessments have considered the Eliwana Railway, Eliwana Iron Ore Mine and the Solomon Iron Ore Mine to determine the cumulative impact from all Projects. These assessments found that: • Cumulative impacts to Land Systems is insignificant, with over 94% of all land systems occurring outside the three Project areas. • Cumulative impact to vegetation communities is not significant with no vegetation community cleared below the 30% threshold value (pg. 244); Note, column 5 of Table 32 '% remaining' is incorrectly labelled. This column should be labelled '% impact'.

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			• No conservation significant species will be reduced by greater than 10% of the known number of individuals, except for *Triodia basitricha* (pg. 245). • The cumulative impact to *T. basitricha* is likely to be a gross overstatement given the number of known locations and the abundance of individuals at known locations and the extent of the species occurrence (Section 4.5.6.4) Therefore, the environmental impact of both Eliwana Mine and Rail Proposals has been considered together. Fortescue notes that the residual impact of the permanent loss of 7,900 ha of vegetation is a significant impact for which Fortescue has proposed an offset. Fortescue has re-considered the publicly available information provided by other proponents and notes that only Rio Tinto's Brockman 4 proposal quantifies the area of land systems that occur within the development envelope. However, the Brockman 4 Public Environmental Review Document does not quantify the area that will be impacted by the proposal. Nevertheless, at a landscape scale, the addition of the Brockman 4 land systems to the cumulative assessment has a negligible impact to the area of each land system impacted at a regional scale. Fortescue will continue to consult with the PKKP on the cumulative impacts of both proposals on environmental and cultural values.
21	**PKKP**	Table 34: the Mitigation measures outlined in Table 34 are very general and do not outline specifically how the Proposal has been modified to avoid and minimise impacts on flora and vegetation.	Fortescue will implement the Eliwana Vegetation Health Monitoring and Management Plan for the Eliwana Proposal. This plan outlines management measures for reducing impacts from vegetation clearing and monitoring for impacts to flora and vegetation from the Proposal.
Subterranean Fauna			
22	**DWER (TEB)**	The quality of the information included in the ERD is not adequate for assessment and there is a lack of confidence in the accuracy of the species information presented in the ERD, due to the high number of errors identified (discussed further below). Therefore, the advice on the impacts to subterranean fauna provided here is based on the information in Appendix 21 (Biologic 2018), focusing on subterranean fauna habitat, rather than individual species. No comment has been able to be provided	Fortescue acknowledge that the figures presented in the ERD and the information in the Tables within the subterranean fauna section included some errors which may have made for a more difficult assessment for the commentator. Further comments below address the errors or inconsistencies in the Section. Fortescue is confident that the corrections made to figures and

<table>
<tr><th>No.</th><th>Commentator</th><th>Comment</th><th>Response</th></tr>
<tr><td></td><td></td><td>on the significance of the residual impacts and mitigation/management actions.</td><td>maps, as well as the Biologic report will allow for a fully informed assessment of the risk to subterranean fauna from the Proposal.
Attachments 1 and 2 provide amended figures and tables.</td></tr>
<tr><td>23</td><td>DWER (TEB)</td><td>The ERD assesses the impacts to subterranean fauna independently for each mine pit, as listed in Table 45 and 47. However, no maps are included in the ERD that illustrates the locations of these pits or labels the pits by name. Figure 32 and 42 illustrate the locations of the cross-sections only. This is a serious oversight in the presentation of the figures as the information in the ERD cannot be easily related back to the location of the pits and the species that are being discussed in the text.
The following information in Table 1 has been summarised for EPA Services based on the information presented in Appendix 21 and the proponent's discussion of the predicted impacts to potentially restricted subterranean fauna in each mine pit area, as presented in the ERD (Section 4.8). The mine pit areas where there may be a higher risk to subterranean fauna are highlighted in bold below:
<table>
<tr><th>Mine Pit Area</th><th>Troglofauna</th><th>Stygofauna</th></tr>
<tr><td>Broadway</td><td>Habitat likely to extend beyond pit, particularly to west.</td><td>Habitat extends for 60m below 20m GWDD.</td></tr>
<tr><td>West End</td><td>Habitat likely to extend east and west beyond pit.</td><td>No restricted stygofauna species.
Habitat extends below GWDD.</td></tr>
<tr><td>Talisman</td><td>Well connected habitat east, west and south of pit.</td><td>Potential dyke to immediate west, may be barrier for some species. However, habitat likely extends below GWDD.</td></tr>
</table></td><td>Fortescue acknowledges that the omission of pit names from the figures has made it difficult for the reader to follow the discussion on impacts to individual species.
Figures 32 (Maps 1 and 2) and 42 (Maps 1, 2 and 3) have been updated to include pit names.
Potentially restricted stygofauna are listed by location/pit name in the stygofauna habitat section (Table 47) and again in the stygofauna species significance section (Table 48) of the ERD.</td></tr>
</table>

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				Depth of remaining habitat not quantified.	
		Eagles Nest	No potentially restricted troglofauna	**Drawdown expected to deplete most of groundwater in this area and quality of remaining habitat is questionable. Restricted species (*Brevisomabathynella* sp. A.) also at Talisman.**	
		East 3	Likely suitable habitat extends beyond	Deeper habitats may remain, but not quantified. Both species (*Brevisomabathynella* sp. A; Paramelitidae sp. 'B58') also known to occur near the Talisman pit area with less drawdown.	
		East 4	*Paradraculoides* sp. 'B12A' recorded from 150m buffer. Not expected to impact large proportion of available habitat.	No restricted taxa recorded	
		Flying Fish West	Biological surrogates (*Macranillus* sp. H-CCA021 and *Paradraculoides* sp. B12) also outside impact areas. Highly likely habitat extends beyond impact.	GWDD expected to deplete most of groundwater, but no restricted species recorded. Depth of remaining habitat not quantified.	
		Flying Fish	Restricted species (*Troglarmadillo* sp. B46; Projapygidae sp. B1) are	**Habitat extends for 100m BGL and is expected to occur below the predicted 85m drawdown.**	

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			just outside or very close to pit boundary within 150m buffer. Habitat likely to extend beyond the pit, but areas to north may contain less suitable habitat.	**The habitat quality and suitability of the remaining 15m is not discussed in the ERD.**	
		Flying Fish East	No potentially restricted species detected	**Unresolved. Groundwater drawdown modelling regards areas to be disconnected. Biological surrogate found on either side of inferred dykes based on morphology, but genetic testing was inconclusive to confirm gene flow.**	
		Other	*Paradraculoides* sp. 'new3' recorded from far western end P-tenements pits, habitat may occur locally outside of pits. Projapygidae sp. 'B14' detected in TSF area.	N/A	
24	**DWER (TEB)**	Based on the geological information provided, including core samples and detailed geological cross-sections, suitable troglofauna habitat appears to be relatively well connected throughout the mine development envelope. This is supported by the distribution of widespread species e.g. Hemiptera sp. B2, which was recorded from multiple locations across within and outside the indicative mine footprints. The use of a 150m buffer to minimise impacts to restricted troglofauna species is appropriate.			Fortescue notes TEB comment regarding suitable troglofaunal habitat being relatively well connected throughout the MDE. This comment supports the conclusion drawn in Section 4.8.7 of the ERD, Assessment of Impacts – Troglofauna: "It is concluded *that mining of the proposed pits is unlikely to threaten troglofauna"*. To be clear, the 150m buffer referred to in this comment was used during the assessment to determine which species were at risk from the Proposal. That is, if a species was recorded within 150m of a pit it was considered to be impacted by the Proposal. Fortescue has not proposed

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			any buffer distance for limiting impacts to troglofauna at this time as it is considered that no troglofauna species are at risk from the Proposal due to the extensive habitat that occurs outside the indicative pit locations.
25	DWER (TEB)	Suitable stygofauna habitat appears to be widespread throughout the mine development envelope. Suitable biological surrogates to infer habitat connectivity are provided in Figure 48: *Diacyclops humphreysi humphreysi*; Paramelitidae sp. B36 & B58; *Orbuscyclops westaustraliensis*; and Phreodrillidae AP SVC spp. However, there is disparity in the information presented between subterranean fauna (Section 4.8; Appendix 21) and the groundwater drawdown modelling (Section 4.4; Appendix 7) regarding the potential barriers to dispersal. The ERD state that 'consistent with the compartmentalised nature of the groundwater system across the MDE groundwater level drawdown contours do not extend beyond the low permeability geological units/structures which delineate each groundwater sub-catchment' (Page 135). The hydrology is predicted to be separated by low permeability aquitards (north and south) and dolerite dykes (east-west) and groundwater flow is assumed to be 'relatively insignificant' (Appendix 7). However, the distributions of some stygofauna species from multiple catchments (e.g. *Areacandona nr triangulum* and Paramelitidae sp. B58) or more widely in the area MDE (such as the surrogates listed above), does not support the groundwater drawdown modelling (Appendix 21). The proponent should address the differences in the conclusions regarding the groundwater drawdown in Appendices 7 and 21 and confirm or revise the risk to stygofauna species where appropriate. This information is critical to accurately determine the level of impact to species recorded within the compartments of predicted high groundwater drawdown, e.g. in Eagles Nest and Flying Fish East areas. EPA Services should note that the four of the abundant troglofauna species shown in Figure 47 are not suitable as biological surrogates as they are not identified to species (i.e. *Phaconeura* sp. and *Nocticola* sp.); or appear to have been recorded from one borehole only (i.e. *Nocticola quatermainei*); or were only recorded outside of the development envelope (i.e. Pauropodidae sp. B33). The ERD and Appendix 21 have not provided information on the distribution or borehole locations of 13 other non-restricted troglofauna species to inform habitat connectivity.	Aside from parallel phenotypic evolution, stygofauna species distribution can arise due to limited connection between aquifer compartments. This connection is not considered in drawdown and water supply assessments as it is of such a low order of magnitude. Connection between aquifer compartments is considered to occur via one of two methods: • Saturated Tertiary-age material. Dolerite dykes are found only within Proterozoic and Archean bedrock and hence groundwater can flow between compartments within saturated Tertiary-age material (aka detrital) where it occurs. This connection may be seasonal (I.e. only exists during recharge events where water levels rise) and is limited in occurrence throughout the valley • Structural or weathering influences on the dykes. Once again the magnitude of these "conduits" is insignificant in relation to groundwater flow; however it may permit migration of subterranean fauna. Fortescue notes TEB comment regarding suitable troglofaunal habitat being relatively well connected throughout the MDE. Fortescue also notes the TEB assessment at Comment 24, in which no mine pit area was bolded to indicate a high level of risk to troglofauna species.

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26	DWER (TEB)	Groundwater drawdown is predicted to extend across all of the MDE. The majority of the western area will have moderate to low groundwater drawdown, with high drawdown predicted in the area around the West End pit, and is predicted to be higher throughout the eastern end of the MDE (Figure 11). In some areas, suitable stygofauna habitat is predicted to remain below the extent of groundwater drawdown (see Table 1), but the amount of remaining habitat has not been quantified. The proponent should quantify the amount of habitat remaining in each area and comment on the expected quality or suitability of the remaining habitat to support stygofauna.	The stygofauna species risk assessment provided in Table 48 provides modelling of predicted drawdown and likely extent of suitable remaining habitat. Risk level has been assigned low, low-moderate or moderate where minimal groundwater drawdown is predicted and/or suitable habitat exists beyond drawdown. **Talisman** – Maximum predicted drawdown 30m, Hydrological bores in Talisman pit (EWPB004) and the valley further south (EWPB003) revealed significant deeper habitat that will be unaffected i.e. weathered dolomite to approximately 120mbgl. This translates to approximately 90m of suitable habitat beyond maximum predicted drawdown. **Eagles Nest –** Maximum predicted drawdown 40-50m. Bore log EWPB002 (Appendix 21 – Attachment 2) immediately west of Eagles Nest pit but inferred to be in the same paleochannel) showed highly weathered shales in Bee Gorge member, and weathered dolomite in the Paraburdoo member at 110-120 mbgl. This translates to approximately 15-20m of suitable habitat remaining below the maximum predicted drawdown level. **Flying Fish** – Maximum predicted drawdown 85m. Bore log located immediately south-west of pit, FFPB002 (Appendix 21 – Attachment 2) shows suitable, transmissive (35L/s) habitat i.e. fractured Bee Gorge, weathered Paraburdoo dolomite and weathered shale to 120mbgl. This translates to approximately 25-30m of suitable habitat remaining below the maximum predicted drawdown level. **Flying Fish East** – Maximum predicted drawdown 65m. Bore logs (FFPB001 and FFMB001) shows suitable habitat (highly weathered dolomite) down to 100m and 105m respectively. Therefore, there is at least 35m of suitable habitat remaining below the maximum predicted drawdown level. This response addresses animals classified as ‘moderate’ and ‘high risk’ in Table 48 of the ERD.

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			***Brevisomabathynella* sp. A** Recorded from two aquifer compartments (Talisman and Eagles Nest). Maximum predicted drawdown at Talisman pit is 30m or 60mbgl. Bore log EWPB004 (inside Talisman pit) reveals significant depths of weathered, highly transmissive dolomite (30L/s) down to 150mbgl (i.e. 90m of suitable habitat beyond maximum predicted drawdown). Bore log further south (EWPB003) reveals weathered dolomite in the Paraburdoo members down to 120mbgl (Appendix 21 – Attachment 2). *Brevisomabathynella* sp. A was also recorded near Eagles Nest. Cross sections 5 (Eagles Nest) and 6 (East 3) show a similar geological setting in this aquifer. Bore log EWPB002 (Appendix 21 – Attachment 2) immediately west of Eagles nest pit but inferred to be in the same geology) showed highly weathered shales in Bee Gorge member, and weathered dolomite in the Paraburdoo member at 110-120 mbgl. This translates to approximately 15-20m of suitable habitat remaining below the maximum predicted drawdown level. ***Areacandona* sp. BOS1020** Maximum predicted drawdown of 65m. Hydrological bore logs FFPB001 and FFMB001 (Appendix 21- Attachment Two) shows suitable habitat (highly weathered dolomite) down to 100m and 105m respectively. Therefore there is at least 35m of suitable habitat remaining below the maximum predicted drawdown level. Furthermore, extensive habitat (MMIF) beyond the inferred dykes is shown in Figure 42 of the ERD. The occurrence of *Areacandona nr triangulum* in MMIF habitats beyond the inferred dykes may suggest potential for *Areacandona* sp. BOS1020 to also occur more widely outside the extent of groundwater drawdown. ***Brevisomabathynella* sp. B03** Section 4.8.5.3 of the ERD, Stygofauna Habitat: Flying Fish 1 states a predicted 85m maximum drawdown with a range of potential habitats (fractured CID, fractured Paraburdoo Dolomite) to approximately 100 m below ground level. Habitat connectivity in these highly porous aquifers is further supported by airlift yields from bore log (FFPB002) in the range of 15-35 L/sec. Therefore there remains at least 15m of suitable habitat

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			remaining below the maximum predicted drawdown level and habitat connectivity is supported by pump test results.
27	**DWER (TEB)**	Section 4.8.7.2 of the ERD does not discuss the impacts to stygofauna and troglofauna from groundwater reinjection, as stated in Section 4.4 (Page 137). The proponent should provide a discussion of the predicted impacts to subterranean fauna from reinjection of groundwater.	Fortescue is a world leader in the management of aquifer abstraction and re-injection. Fortescue has been managing very large volumes of groundwater abstraction and re-injection at its Cloudbreak and Christmas Creek Mines for approximately 10 years to within very narrow quantity and quality parameters. Should Fortescue dispose of excess groundwater via re-injection at Eliwana, Fortescue asserts that this will not have a significant impact on groundwater quality. The groundwater to be re-injected is high quality fresh water and will be similar in hydrochemistry to the existing groundwater. Fortescue will monitor groundwater levels to ensure that there will be no significant impact to troglofauna habitat from groundwater mounding. Prior to commencing groundwater injection or infiltration, Fortescue will apply for approval to discharge under Part V of the EP Act. The application will include a subterranean ecology risk assessment, targeted at the location of the activity, along with appropriate management measures (e.g groundwater level and quality triggers) to manage the risk of impact to priority subterranean fauna species.
28	**DWER (TEB)**	The information presented in the ERD for Subterranean Fauna contains significant errors and inconsistencies, which impeded accurate assessment of the impacts to individual species. There are inconsistencies between the information presented in the tables and figures, and there are differences in the results presented in the ERD and those presented in the technical report, Appendix 21, as listed below: **Troglofauna** 1. Several species listed in Table 45 & 46 not illustrated in Figure 32. 2. The species selected as biological surrogates are unsuitable i.e. *Nocticola* sp. and *Phaconeura* sp. cannot be surrogates as 'sp' indicates that the species is not known.	Each dot point in this comment is addressed below **Troglofauna** 1. Table 45 of the ERD lists potentially restricted troglofauna species by location i.e. pit name and corresponding cross section (cross sections indicated in Figure 32). Figure 32 in the ERD shows 16 potentially restricted troglofauna, this has been updated to include 17 (as per Appendix 21 -Table 7.1). Note, several species were found to occur at the one location and therefore may not have been visible in the figure (each species icon was placed on top of another). This may account for the disparity between the figure and the table. The amended figure displays all species with greater clarity. 2. The only species selected as a biological surrogate within Section 4.8.5.2 of the ERD, is Pauropodidae sp. B33 which Fortescue note the TEB has confirmed is acceptable. The same section of the ERD refers to Figure 47 – "Abundant troglofauna species" only for the

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		3. Paradraculoides sp. B12A – Table 46 states species known as a singleton, but is shown from two locations in Figure 32. **Stygofauna** 1. Pit outlines are not illustrated on Figure 42. 2. Boreholes included in Table 47 are not illustrated in Figure 42 e.g. EW0372, EW0352, EWD0017. 3. Figure 42 includes borehole locations not listed in Table 47 e.g. EW1437, EWMB009, EWPB006 (Map 1); EW1182 (Map 2); FFUNK02, Grunters Bore, FF020, FF0408, FF023 (Map 3). 4. *Brevisomabathynella* sp. B is listed as occurring in Talisman borehole TM0015 in Table 47, but is not illustrated in Figure 42 (Map 2). 5. *Brevisomabathynella* sp. A is included in the key, but not shown in Figure 42 (Map 1). 6. *Brevisomabathynella* sp. C is illustrated in Figure 42 (Map 2) but not included in Table 47. 7. Figure 48 illustrates the locations of widespread stygofauna species in relation to the geology, as per the troglofauna maps, rather than the groundwater drawdown, as per Figure 42 for potentially restricted stygofauna. 8. The species selected as biological surrogates are unsuitable i.e. species, such as *Nesida* sp. B04, recorded from a single location does not illustrate widespread distributions.	purposes of conveying the high degree of habitat connectivity across the Project area. The species *Nocticola* sp. and *Phaconeura* sp. are shown in Figure 47 as both animals were found to have a large linear range, thereby supporting the habitat connectivity statement. 3. Figure 32 has been revised to show *Paradraculoides* sp. B12A as a singleton. Table 46 of the ERD lists *Paradraculoides* sp. B12A as a singleton. **Stygofauna** 1. Figure 42 has been revised to include pit shells and cross sections. 2. & 3. The boreholes shown in Figure 42 represent the locations in which potentially restricted stygofauna were found. The boreholes listed in Table 47 represent the closest available boreholes which are discussed in tandem with the corresponding cross section for the purposes of displaying habitat connectivity. To be clear, cross sections are not available for all boreholes where subterranean fauna have been located. The cross sections are provided to demonstrate habitat connectivity (and extent) rather than the habitat at the precise location where the species was located. This accounts for the disparity between boreholes identified in the figures and boreholes listed in Table 47. 4. Table 48 of the ERD lists *Brevisomabathynella* sp. B as a singleton known from a single site south of Broadway pit. This animal is discussed further in the corresponding Section 4.8.5.3 Stygofauna – Broadway 1. Figure 42 (Map 2) of the ERD correctly shows *Brevisomabathynella* sp. B at EWPB006. Table 47 of the ERD has been amended to remove *Brevisomabathynella* sp. B from Talisman. 5. *Brevisomabathynella* sp. A is shown in one location only Figure 32 (Map 2) of the ERD. Figure 42 (Map 1) of the ERD has been amended to include the second location. Table 48 of the ERD lists *Brevisomabathynella* sp. A in 2 sites, Talisman and Eagles Nest. This animal is discussed further in the corresponding Section 4.8.5.3 Stygofauna – Talisman and Eagles Nest. 6. *Brevisomabathynella* sp. C is discussed in Table 48 of the ERD and the corresponding cross section 6 (Figure 38 of the ERD) shows high levels of habitat connectivity for this species. Table 47 of the ERD has been amended to include *Brevisomabathynella* sp. C.

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			7. Similar to Figure 47 (see Abundant Troglofauna) the Abundant Stygofauna species figure (Figure 48 of the ERD) includes the suitable habitat layer to convey the extent of suitable habitat. The drawdown layer is not required to convey habitat extent. As such Figure 48 has not been amended. 8. As discussed for the troglofauna comment above, stygofauna species with widespread distributions were used to demonstrate habitat connectivity, not as biological surrogates for potentially restricted species. Section 4.8.5.4 of the ERD uses Paramelitidae sp. B36 as a biological surrogate for Paramelitidae sp. B58.
29	**DWER (TEB)**	The maps and figures presented in Appendix 21 are of a better standard and more comprehensive than those presented in the ERD. However, there are differences between the information presented in the ERD, as below: • The locations and distributions of some subterranean fauna species as presented in the technical report are different to those shown in the ERD. For example, Paramelitidae sp. B58, *Lepidospera* sp. B10, *Paradraculoides* sp. new 2, *Paradraculoides* sp. B12A, *Troglarmadillo* sp. B46. • Figure 6.2 (Appendix 21) includes the locations of species that are not presented in the ERD e.g. stygofauna species: *Brevisomabathynella* sp. A and sp. B; troglofauna species: *Prethopalpus* sp. MW21, Campodeidae sp. EW, *Palpigradi* sp, Pauropodidae sp. B42 and 43 (see ERD Figure 42 – Map 1). • Appendix 21 includes an additional troglofauna species *Paradraculoides* sp. new3, recognised as being genetically distinct from *Paradraculoides* sp. new2. The ERD does not discuss the omission of this species from the assessment. The information presented in the ERD should be checked against the results presented in Appendix 21. The proponent should confirm whether the information presented in Appendix 21 is accurate to inform the assessment.	The purpose of the ERD is to present an environmental impact assessment of the Proposal for public review and assessment by the EPA. The ERD includes a detailed impact assessment and description of proposed mitigation and management measures for the environmental factors identified in the Environmental Scoping Document (ESD). • Figure 32 (sheet 1 and 2) has been amended with annotations showing each of the 16 potentially restricted troglofauna species. The five potentially restricted species found at bore (EW1061) inside Broadway pit are also listed in Table 45 of the ERD. • Figure 32 and 42 have been amended as discussed. • *Paradraculoides* sp. New3 is not listed in the ERD as the Eliwana mine footprint was reduced in size after the Biologic (2018) report was finalised (Appendix 21). *Paradraculoides* sp. New3 no longer occurs within the MDE. Therefore, the ERD discusses 16 potentially restricted troglofauna whilst Appendix 21 discussed 17 species.
Terrestrial Fauna			
30	**DWER (TEB)**	Based on the information in the ERD and the results of the surveys, the proponent's predictions that there will be no significant residual impacts	***Dampetrus* 1021DNA02**

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		to terrestrial vertebrate fauna is supported. The proposed mitigation and management actions are adequate to meet the EPA's objective for terrestrial vertebrate fauna. However, clarification is required to determine whether the impacts to short-range endemic (SRE) invertebrate fauna are significant. One confirmed SRE species (*Antichiriopus* 1021DNA02) is only known from the impact area, and one (*Dampetrus* 1021DNA02) has an uncertain distribution. The ERD states that '*Dampetrus* 1021DNA02 was recorded from within the mine development envelope (MDE) in 2012, but has since been recorded from two other locations outside of the MDE (WAMT128028 and WAMT128030)' (Page 280). Figure 30 illustrates the location of *Dampetrus* 1021DNA02 inside the MDE, and also *Dampetrus* sp. indet. at a single location outside of the MDE. However, this information does not concur with records at the WA Museum, which has records of the two *Dampetrus* sp. indet 'DNA02' (specimens listed above) and also *Dampetrus* sp. indet 'DNA03' (WAMT128027) from the survey area (WA Museum pers. Comm. 22 October 2018). *Dampetrus* sp. indet 'DNA03' is not listed in Appendix 19 (Phoenix 2018). To clarify the number and names of species that may be impacted by the proposal, the proponent should clarify how the specimens were determined to be *Dampetrus* sp. indet 'DNA02', and provide locality information for the 'two other locations outside of the MDE' (Page 280). *Antichiriopus* 1021DNA02 is currently only known from the MDE, in the area of the Tailings Storage Facility. Mitigation for the impacts to *Antichiriopus* 1021DNA02 include: undertake further surveys to determine if the species occurs outside of the disturbance footprint; and if unsuccessful, research to determine whether the species can be relocated; and if unsuccessful, the proponent has committed to redesigning the Tailings Storage Facility to avoid the species known location; as stated in Table 42 of the ERD. Additional surveys and avoidance are appropriate mitigation methods. However, translocation of an SRE species is not considered an appropriate mitigation option, in this instance, as no evidence has been provided to support the use of this method for a SRE millipede.	The information on this species in the ERD is taken from (Phoenix , 2018). To clarify: • Two individuals of *Dampetrus* sp. indet. were recorded from one site during a survey in 2012. This was reported in Phoenix (2012). • A follow-up survey undertaken in 2013 recorded a second *Dampetrus* individual. DNA studies concluded that they were two separate species, *Dampetrus* 1021DNA01 and *Dampetrus* 1021DNA02. *Dampetrus* 1021DNA01 had been recorded more widely outside the survey area. Given it had only been recorded from one site within the survey area, *Dampetrus* 1021DNA02 was considered a potential SRE. This was reported in Phoenix (2014), an updated version of the 2012 report. • The Phoenix (2018) report appended to the ERD notes that the taxonomic status of *Dampetrus* 1021DNA02 appeared to be unclear. The WA Museum had renamed Fortescue's record as *Dampetrus* sp. indet. However it was not certain at the time the ERD was prepared if this indeterminate specimen was the same as other *Dampetrus* sp. indet. records from elsewhere in the wider region outside the MDE. Fortescue has two other records of *Dampetrus* sp. 1021DNA02 with Museum lodgement IDs from outside the MDE as outlined on page 280 of the ERD. • Dampetrus 1021DNA02 has been found at two other locations outside the MDE (Phoenix, 2014b). In this report, the specimens are recorded as 1021DNA01 however, the WA Museum has since renamed these specimens Dampetrus DNA02. Figure 30 of the ERD shows the location of the two specimens of *Dampetrus* 1021DNA02 found within the MDE (found in one location) and the locality of the *Dampetrus* sp. indet. as provided by the WA Museum. Note, the location for *Dampetrus* 1021DNA02 (now *Dampetrus* sp. indet.) is not within the indicative footprint and has also been found outside the MDE as reported in Phoenix (2014b) and as shown on Figure 4 of this document (revised Figure 30). Fortescue now consider that *Dampetrus* DNA02 occurs more widely both within and outside the MDE and is not at risk from this Proposal.

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			Fortescue's records show that *Dampetrus* DNA03 does not occur within the MDE. ***Antichiropus* 1021DNA02** To clarify, the ERD discusses the intention, in the event that this species cannot be located outside of the disturbance footprint, to undertake further research to determine if it could be a candidate for translocation. Fortescue also considers the successful establishment of another population outside the disturbance footprint as a possible mitigation measure that could be an outcome of the research. If the research determines that the species cannot be re-located, the TSF will be designed to avoid the known location.
31	**DWER (TEB)**	As mitigation for the loss of SRE fauna habitat, the ERD proposes to 'undertake further surveys to locate additional specimens outside the disturbance footprint' (page 286), but the proposed surveys are only listed in regards to *Antichiropus* 1021DNA02 (Table 42). The proposed additional targeted SRE surveys should be extended to include searches for *Dampetrus* sp. indet 'DNA02' to confirm the distribution of this species outside of the MDE.	Fortescue notes that *Dampetrus* sp. 1021DNA02, otherwise known as *Dampetrus* sp. indet. does not occur within the indicative disturbance footprint and has been found outside the MDE. The risk to this species from the proposal is low.
32	**DoEE**	The Department notes Chapter 5 of the ERD provides concluding remarks on the requirement for offsets for MNES recorded in the mine development envelope. The Department is of the view that impacts resulting in the reduction or loss of core/suitable habitat is a significant impact and requires consideration as an offset under the Departments EPBC Act Environmental Offset Policy (2012). The nature and extent of the impact depends on information in publicly available recovery plans and conservation advices and relates to 'important population' and/or 'critical habitat' that will be affected. For the Northern Quoll, Pilbara Leaf-nosed Bat, Ghost Bat, Night Parrot and Pilbara Olive Python, the proponent should clearly detail the form and extent of the significant residual impact to critical and suitable habitat type and important populations. The DoEE considers that the information provided to assess the MNES species is insufficient and has provided the following comments:	Fortescue's offset proposal is for a payment to a monetary fund established by the WA Government for conservation initiatives in the Pilbara. Fortescue expects that the initiatives funded by the offset fund will address impacts to MNES by aligning with actions within national recovery plans for key MNES species, such as amelioration of threats to MNES species on a regional scale, or through more direct conservation actions. However, for this proposal, it is noted that Fortescue does not consider that the residual impacts to MNES species are so significant as to warrant an offset proposal. Nevertheless, Fortescue's offset proposal for the loss of vegetation in good to excellent vegetation includes vegetation within areas considered habitat for MNES species. **Northern Quoll** For the Northern Quoll: • 36 ha of Denning Habitat; • 1,034.7 ha of Foraging habitat; and

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		"For the section in the Environmental Review Document detailing impacts to MNES, the proponent has not clearly detailed the form and extent of impacts to the Northern Quoll, Pilbara Leaf-nosed Bat, Ghost Bat, Night Parrot and Pilbara Olive Python. The Department requires this information to be explicitly stated as part of considerations for the impact (i.e. potential for residual significant impacts) to MNES. Please provide statements for each MNES species as follows as follows: For species X: Y ha of Z habitat/value type (e.g. foraging, breeding, dispersal etc.) will be impacted (from clearing, water drawdown etc.) as part of the proposed action."	• 998.7 ha of dispersal habitat; will be directly impacted as part of the proposed action. **Pilbara Leaf-nosed Bat** For the Pilbara Leaf-nosed Bat: • 36 ha of Denning habitat; and • 1,034.7 ha of Foraging habitat; will be directly impacted as part of the proposed action. **Ghost Bat** For the Ghost Bat: • 36 ha of Denning habitat; and • 1,034.7 ha of Foraging habitat; will be directly impacted as part of the proposed action. **Pilbara Olive Python** • 1,034.7 ha of foraging habitat • 998.7 ha of dispersal habitat • 36 ha of shelter habitat Will be directly impacted as part of the proposed action. **Night Parrot** Terrestrial fauna surveys undertaken in 2011 and 2012 did not locate suitable habitat for the Night Parrot species and it was considered a very low possibility that the Night Parrot was present based on available habitat type. Whilst there are large areas of spinifex grasslands within the MDE, fire history in the area has resulted in few areas, if any, where spinifex has been left unburnt long enough to form the large dense hummocks the species appears to require for nesting and roosting (Ecoscape, 2017b). Fortescue considers that due to the lack of suitable areas of dense long-unburnt spinifex in the area, there is unlikely to be a local population of Night Parrot within the MDE. However, if it were to remain unburnt for long periods, the Stony Gibber plain habitat may provide suitable habitat for the Night Parrot. The proposed action will impact 2,336 ha of Stony Gibber Plain habitat. **Indirect impacts to fauna habitat**

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			The ERD has identified areas where changes to surface water flow may result in a decline in vegetation health within creeklines. It is also recognised that these creeklines may be habitat for MNES species. Therefore, as a result of changes to surface water flow, an area of 1,929 ha of creekline habitat may be indirectly impacted. These impacts would be limited to a decline in the health of the vegetation within the creeklines.
33	**DoEE**	The Department notes the indicative mine footprints (Figure 55 ERD Pg. 47), especially on the Western side of the Mine Development Envelope, are close to sightings of Northern Quoll (two sightings Pg. 413), Ghost Bat (one sighting, two recordings Pg. 434), Pilbara Leaf-nosed Bat (recorded at 8 locations Pg. 425) and Pilbara Olive Python (two sightings Pg 445). Noting the Conservation Significant Fauna Management Plan (Appendix 20) identified ongoing monitoring sites established "at locations where species have been previously recorded" (Pg. 31), please clarify why there appears to be no monitoring within the Eliwana Mine Development envelope. Please note that the DoEE considers that the specific locations and the type and frequency of monitoring will be required for the Commonwealth assessment under the EPBC Act.	Monitoring for these MNES species will be undertaken within the MDE. The specific locations for monitoring are yet to be allocated. Table 8 of the Conservation Significant Fauna Management Plan provides a summary of the conservation significant fauna monitoring program. The Table includes method, monitoring parameters, monitoring effort and timing/frequency. Figure 28 of the Conservation Significant Fauna Management Plan provides the Monitoring Sites for Eliwana Mine for the Ghost Bat, Pilbara Leaf Nosed Bat, Northern Quoll and Pilbara Olive Python. The Provisions table for Eliwana Mine (Appendix 9 of the Conservation Significant Fauna Management Plan) also clearly provides the requirements of the monitoring program and the locations of the monitoring sites as prescribed within the Instructions on how to prepare *Environmental Protection Act 1986* Part IV Environmental Management Plans.
34	**PKKP**	Figure 27 shows that the terrestrial fauna survey effort has been limited to the Mine Development Envelope and does not cover areas that are predicted to be affected by indirect impacts from hydrological changes. Therefore, the survey effort does not appear to have met ESD Required Work Item 37.	Figure 27 specifically shows the conservation significant fauna and fauna habitat within the Mine Development Envelope. It is not a representation of the entire survey effort conducted for the Proposal. The Eliwana Project Consolidated Fauna Report (Appendix 18 of the ERD) included the results of 41 previously conducted fauna surveys to inform the consolidated report and undertook additional survey work, including targeted surveys for MNES fauna species to ensure a complete survey effort. The potential impacts to fauna resulting from changes to surface water have been discussed in section 4.7.5.5 of the ERD.
35	**PKKP**	Table 41: the mitigation measures outlined in Table 41 are very general and do not outline specifically how the Proposal has been modified to avoid and minimise impacts on terrestrial fauna.	Fortescue will implement the Conservation Significant Fauna Management Plan for the Proposal. This Plan includes management actions to avoid and minimise the impact to terrestrial fauna from the

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			Proposal and the monitoring of those impacts to ensure they remain within threshold limits.
36	**PKKP**	Specific information is presented in section 5 for each MNES species. However, the size and importance of populations of conservation significant fauna that are not MNES species, and impacts (percentage loss) of species locally due to loss of habitat as required by ESD Item 43 is not presented in section 4.7.5 of the ERD.	The terrestrial fauna surveys undertaken over the MDE provide presence/absence data at point locations and Table 38 of the ERD lists these records for each conservation significant fauna species located within the MDE. The size of conservation significant fauna populations within the MDE cannot be provided as the fauna surveys undertaken do not provide population dynamics such as the size of a local population. Consequently, the ERD cannot provide a percentage loss of these species, but an estimate of the impact to these species is provided through the calculation of habitat loss and the importance of that habitat given the available fauna records. The importance of each conservation significant fauna species is considered through the identification of their conservation status (Table 38) and the ERD notes that impacts to conservation significant fauna species is not significant at a local or regional level (page 285).
37	**PKKP**	The occurrence data for Pilbara Leaf-nosed Bats and Ghost Bats and the nature of their habitat use within the Mine Development Envelope appears inconclusive. Due to the level of significance of these species, additional clarity on whether there are any nocturnal or diurnal roosts either within or near the MDE would be appropriate.	Section 5 provides a comprehensive assessment of the survey effort, habitat and roosts for both the Pilbara Leaf-nosed Bat (PLNB) and the Ghost Bat. Figures 58 and 59, specifically outlines PLNB and Ghost Bat roosts/potential roots and recorded locations. No diurnal roosts are considered to occur within the MDE for PLNB or the Ghost Bat. Section 5.2.2.2 identifies the habitat available to PLNB within the MDE and states that the Hills/Ranges/Plateaux habitat represents possible foraging and nocturnal roost areas. Section 5.2.2.3 identifies that PLNB are using this habitat type within the MDE for foraging purposes and Section 5.2.2.6 discusses the extent of foraging habitat within the MDE that may be disturbed. It is possible that nocturnal roosts (as defined by (Cramer, et al., 2015) occur within the Hills/Ranges/Plateaux habitat within the MDE and are used by PLNB for foraging, resting or avoiding predators during nightly movements within the MDE. There is no risk to the PLNB from disturbance to nocturnal roosts within the MDE. Fortescue considers the survey effort for both bat species is extensive and provides a high degree of certainty for an assessment of impacts to both species from the Proposal.

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38	PKKP	The discussion of the degradation of fauna habitat as a result of changes to surface water regime is very brief (s4.7.5.5). The significance of the listed potential impacts to Gane's Blind Snake and the Western Striped Snake-eyed Skink is not discussed in terms of local or regional population impacts.	Fortescue considers that changes to flora and vegetation resulting from changes to surface water flow regimes can be used as a surrogate for changes to fauna habitat. In this instance, the discussion in Section 4.3.6.5 centres around the impacts to sheetflow dependent mulga communities rather than riparian vegetation, which is likely to be habitat for Gane's Blind Snake and Western Striped Snake-eyed Skink. However, Section 4.3.6.5 does include the following statement: *Species such as Gane's Blind Snake and the Western Striped Snake-eyed Skink may be impacted by changes to vegetation health caused by reduced surface water flow as they are likely to have small home ranges and may not be able to relocate to alternative habitat.* Therefore, the ERD does recognise that there may be localised impacts to minor drainage lines downstream of the mine disturbance which may be habitat for both species. Fortescue notes that the Western Striped Snake-eyed Skink has been recorded from seven locations within the MDE, and immediately south of the MDE, including two locations that will not experience any impacts to surface water flow. Gane's Blind Snake has not been recorded from the MDE. The ERD has assessed the impacts to both species and identifies that these impacts are not significant.
39	PKKP	There is no discussion of the following potential indirect impacts that are listed in the ESD; artificial water bodies, modification of water quality and water regimes, modification of natural levels of light, noise and vibration, increased dust or attraction of feral species. Of particular concern to PKKP People is the potential impacts associated with permanent contaminated waterbodies in the mine pit voids. The potential for indirect impacts on fauna should be assessed and mitigation measures outlined. Management of feral animals is included in the Environmental Review Document (ERD) (However, the ERD has not adequately addressed indirect impacts e.g. (light, noise, dust) to Terrestrial Fauna in Sections 4.7.5 and 4.7.6. These impacts are mentioned under each species profile and management is addressed under other factors, for example, dust management is addressed under the factor Air Quality (page 399, 402). Dust and light are also addressed in the Fauna Management Plan (Table 4). Management of pit lakes and water quality have been addressed	**Light** Light spill can cause a delay in the exit time from a bat roost. Bats also congregate around light sources which attract insects. This may make bats more vulnerable to predation by Ghost Bat. Fortescue highlights that the ERD has identified that there are no Ghost Bat or Pilbara Leaf-nosed Bat (PLNB) diurnal roosts within the MDE. The impact of light spill to Ghost Bat and PLNB is identified as a threat to both species and the use of directional lighting is identified as a mitigation measure. **Noise and Vibration** Vibration may cause Pilbara Leaf-nosed Bat and Ghost Bat to evacuate their roosts during the day time. In particular, Pilbara Leaf-nosed Bat are very susceptible to desiccation if they are exposed to the hot dry climate outside their diurnal roost. Ghost Bat are more robust and can survive

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		under Section 4.5 of the ERD, but their impacts to terrestrial fauna are not discussed. Please provide a consolidated discussion to clarify impacts associated with light, dust, noise, pit lakes and water quality impacts on terrestrial fauna, with particular regard to pit lakes and water quality impacts. Please specify management actions to be implemented to address these impacts.	outside their diurnal roost if there are other roost caves that they can escape to within close proximity. Vibrations may also deter Pilbara Olive Python from remaining within close proximity to the mine area, although Fortescue has recorded this species in close proximity to its existing infrastructure. Similarly, Northern Quoll are sometimes located in close proximity to operating infrastructure. Noise may deter avian fauna species from remaining within area, although they can also become habituated to noise levels. Impacts from noise may be temporary for some fauna species. The management of noise and vibration is listed in Table 66 (PLNB) and Table 70 (Ghost Bat) identifying safe blast distances from known roost sites and the monitoring of vibration at recognised sensitive habitats. **Dust** Impacts to fauna from dust may be two-fold: • High levels of dust can smother vegetation leading to degradation of habitat, particularly herbivorous fauna or those that rely on vegetation for roosting or escaping from predators. • High levels of dust may cause respiratory issues for fauna. Dust is managed at Fortescue's sites through Fortescue's Mine and Rail Dust Management Plan the use of engineered design, sprays and water carts to minimise dust emissions. Section 4.10 discussed air quality, including impacts from dust as an emission to air. Impacts to terrestrial fauna from dust is unlikely to be a significant concern for this Proposal. **Feral Animals** It is well established that the presence of feral animals, particularly predator species such as cats, has a major impact on the health of terrestrial fauna populations. It is also understood that feral herbivores can also have a major impact on fauna habitat values, through grazing, erosion and sedimentation of water bodies. The impact of feral animals to fauna is discussed in Section 4.7.5 of the ERD as an indirect impact caused by habitat fragmentation. Feral animals are identified as a threat to each MNES species discussed in Section 5. Management measures

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			for feral animals is discussed in Table 41 and include the development and implementation of a Feral Animal Control Program. **Pit Lakes** The presence of water bodies within mine pit voids has the potential to impact on terrestrial or subterranean fauna including: • Entrapment of fauna species within pit voids • Poor quality water ingested by fauna may lead to fauna deaths • Water bodies may attract waterbird or migratory bird species, interrupting their life cycle. • Changes to groundwater quality may impact on stygofaunal species. The impacts to terrestrial fauna from pit lakes are considered under the Mine Closure Plan provided at Appendix 2 of the ERD. The closure objectives of the Eliwana Mine Closure Plan require that pit lakes do not present a significant risk to human health or significant ecological threat; and changes to hydrological regimes do not adversely impact downstream environmental or heritage values. Table 17 of the ERD outlines the mitigation strategies that are available for each pit lake category which include: • Avoid exposure of deleterious material if possible. • Remove deleterious material from pit walls. • Backfill, or partial backfill to cover deleterious materials. • Engineered design to increase surface water inflow to continually dilute mine void water. • Passive wetland treatments. The potential indirect impacts to fauna will be managed through the mine closure plan that will continually be updated over the project. **Water Quality** Poor surface water quality can have a significant impact on terrestrial fauna. Notably in the Pilbara, surface water is often ephemeral and the life cycle of many Pilbara fauna species is dependent on the temporary presence of good quality surface water. Where surface water is permanent (pools), fauna habitat values are increased and these water bodies often host a range of aquatic vertebrates and invertebrates. Water quality in the Pilbara may exceed ANZECC water quality threshold values

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			and fauna have adapted to these local conditions. If water quality were to deteriorate, this would likely have a negative effect on the health of the terrestrial and aquatic fauna species that rely on that water quality. Impacts could include: • Sedimentation, leading to a reduction of aquatic macrophytes. Water plants provide food for some species, as well as providing a substrate for fish and invertebrate eggs. • Increased levels of nutrients can cause algal blooms, resulting in decreased oxygen levels and fish deaths. Note, its is common for pools in the Pilbara to have high levels of algae. • Increased levels of toxins can lead to fish and invertebrate deaths or other terrestrial fauna that drink the surface water. Poor quality surface water may occur where storm water leaving a mine site carries increased sediments, or chemical and hydrocarbons. The PKKP are correct in their comment that changes to water quality is not discussed as an impact to terrestrial fauna, however, management and mitigation measures to prevent erosion and sedimentation are discussed in Table 41 of the ERD. These include: • Conduct a risk assessment to determine the likelihood of a change to the surface water regime that may lead to unacceptable environmental impacts. • Drainage infrastructure location, design, construction and operation to design specifications which reflect risk assessment outcomes in minimising interference and disruption of natural surface water flows and quality in accordance with the *Standard Engineering Specification for Drainage and Flood Protection 100-SP-CI-0004* and the *Standard Engineering Specification for Road Design for Projects 100-SP-CL-0002*. • Protect natural drainage lines from construction impacts where possible to minimise impacts to water quality. • To ensure erosion, water quality and surface water flow regimes achieve the closure objectives conduct rehabilitation in accordance with the *Eliwana Mine Closure Plan EW-PL-EN-0001.*
40	**PKKP**	The potential impacts on fauna are of great concern to PKKP and there is limited information presented on the monitoring and management of	The Conservation Significant Fauna Management Plan outlines Fortescues approach to monitoring and management of impacts to fauna.

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		those impacts. The PKKP People must continue to care for their country and assist in the monitoring and management of these potential impacts through an FMG funded ranger program.	In principle Fortescue supports the involvement of trained PKKP Rangers to conduct monitoring and management activities for fauna.
Hydrological Processes			
41	**DWER (RSD)**	The proponent has provided cross-sections from the Western Hub mining area only. There are none provided for the Flying Fish area.	Conceptual cross sections shown in the ERD were based on the Eliwana (western) area as these better illustrated the hydrogeological setting, applicable in both Eliwana and Flying Fish.
42	**DWER (RSD)**	RSD has previously requested that drawdown contours be provided on figures showing the groundwater dependent ecosystem. These figures have not been updated. This information is needed to enable visualisation and assessment of the extent of impact, relative to the receptors.	Updates to Figure 5a and 5d, from Golder (2017a) – Appendix 7, have been completed and provided with these comments (Appendix 1). The figures illustrate both maximum groundwater drawdown contours, and the location of groundwater dependent ecosystems.
43	**DWER (RSD)**	Appendix 7 references Figure 5a to 5d as the drawdown contours, however these Figures show groundwater levels not drawdowns. They are also mislabelled as Groundwater modelling locations – not drawdown contours.	See response to Comment 42.
44	**DWER (RSD)**	The proponent has undertaken groundwater modelling to predict drawdown impact, however, it appears that only the maximum drawdown (predicted at 2024) has been provided (Section 4.4.6.1). Drawdown at the end of Life of mine, as well as residual drawdown (after recovery) must be provided in the ERD to assess potential impacts post closure. FMG commits to updating their model and these figures as part of the mine closure plan revision process.	See response to Comment 45. A Mine Closure Plan will be approved by DMIRS as part of future Mining Proposals and is required to be re-approved every three years in accordance with the Mining Act 1978. As discussed in the MCP, groundwater impact assessments will be included in future Mining Proposals and supporting MCP(s) based on the application of location and stage specific mitigation measures, to ensure the residual drawdown does not exceed the drawdown at the end of the mine life. Fortescue will update the groundwater model for future iterations of the Mine Closure Plan.
45	**DWER (RSD)**	Aquifer rebound (Scenario 6) was modelled using water levels predicted in Scenario 4 (2018-2024) as the initial water levels. Water levels at the end LOM (2036) should be used instead unless FMG can justify	Aquifer rebound was modelled using water levels at the end of LOM, extended from the Scenario 4 abstraction 'schedule'. This is stated in Page 131 of the ERD (and Section 4.1.1 of Golder's report) as follows:

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		otherwise (Section 4.4.6.1.). Scenario 4 should therefore be run to end of LOM (2036).	"Scenario 6 – Groundwater Recovery Modelling. 1% specific yield, using groundwater levels at the end of mining (2036) as predicted by Scenario 4 as initial heads and is simulated out to 2136 (100 years post closure)."
46	**DWER (RSD)**	Modelling predicted a range of drawdowns across site with a max of approximately 166 m in 2024 and unmitigated permanent drawdown of about 1-37 m 100 years post closure (Appendix 7). The impacts of residual drawdown on GDEs has not been addressed in this report. RSD encourages the EPA needs to decide if this magnitude of residual drawdown is acceptable post closure. Please include a discussion of the residual drawdown within areas of GDE and potential GDE, to assist with assessment. Please also include figures with GDEs and drawdown contours.	The purpose of Appendix 7 is to model the predicted drawdown from mine dewatering during operations and determine the period of groundwater recovery post-closure under a number of scenarios. The report builds off other studies which form Appendix 4, 5 and 6 of the ERD. Appendix 7 includes a brief discussion on the location of GDEs identified within the extent of groundwater drawdown at the time the report was prepared. The report does not include an assessment of impacts to GDE's and this was not the purpose of the report. The figure provided in response to Item 10 (Figure 2 of this document), provides the residual drawdown 100 years after cessation of mining. It can be seen that there is a residual drawdown of between 1 and 37 m depending on the baseline groundwater depth, within each compartment. The depth to groundwater for each groundwater dependent species has been discussed both in this response to submissions document and in the ERD. Fortescue's proposal is that groundwater levels beneath GDE vegetation identified in Figure 26 of the ERD during operations will decline to a level that will not support GDE vegetation and there is an expectation that GDE vegetation will decline accordingly. This impact has been quantified (Table 30 of the ERD). The residual groundwater drawdown modelled in this figure suggests that it is possible that in some areas, groundwater levels may return to a point where they may again support GDE vegetation. Fortescue highlights that the groundwater model is an unmitigated drawdown and does not consider the impact of groundwater recharge from open pits, which will have the effect of improving the residual drawdown extent. However, the model cannot be created to include this as a mitigating factor and could therefore should be considered conservative. Fortescue considers the conservative estimate of groundwater recovery, demonstrating that groundwater levels may recover to a level that supports GDE vegetation means that the residual impact to GDE vegetation is acceptable.
47	**DWER (RSD)**	In addition, modelling shows that there will be permanent impact on three pools in the project area (Section 4.4.6.3). FMG considers these pools to	To clarify, Section 4.4.6.3 notes that three pools have been located within the MDE that occur within areas either subject to groundwater drawdown or changes to surface water flow. These pool locations are shown in

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		represent a localised impact which is not regionally significant. RSD seeks EPA guidance on whether this is an acceptable impact. FMG state that the loss of three pools within the MDE is not significant (in response to Item 47) however, the Pilbara leaf-nosed bat, Northern Quoll, Olive python and unidentified fish have been recorded at, or upstream of one of the pools. It is unclear why the loss the three pools within the MDE is not considered to be significant, please provide more details to justify this statement There is no full assessment of potential impacts to creeklines beyond the MDE. FMG has noted that 'surface water rarely flows into the MDE at any point' however the disruption of flow out of the MDE due to pit interception/capture needs to be addressed (it has been partially addressed in section 4.4.6.2). Please include an assessment to address these concerns.	Figure 10. Two pools occur within the modelled drawdown extent, now called Pool 1 and Pool 2. The pool located in Inset 3 of Figure 10 (now called Pool 5) is well beyond the groundwater drawdown extent and will not be impacted by groundwater drawdown. However, the area upstream of the pool has been identified as a potential site for a tailings storage facility and if constructed, this may cause a change in surface water flows to the pool. Figure 10 also demonstrates that there are many pools located outside the area of the drawdown extent, or that will not be impacted by changes to surface water flow. Fortescue highlights that there is extensive, high quality habitat for a range of terrestrial fauna species within Duck Creek to the North and West of the proposal, and Boolgeeda Creek to the south of the proposal, including larger permanent or semi-permanent pools. Fortescue also highlights the paucity of conservation significant fauna records within the MDE, despite the presence of these three small pools. It has been highlighted that there are records of conservation significant fauna in the vicinity of the pool located within Inset 2 of Figure 10 (now called Pool 2), however, Fortescue consider that these species are more likely using the gorge habitat for foraging and dispersal. In addition, it was identified in response to Item 11 that Pool 6 is likely to be ephemeral or at least only present during and immediately after the wet season and is likely to be completely dry by the end of the dry season in most years. **Pool 2 Hydrology** Considering the location of this pool within a gorge with significant heritage value, Fortescue has undertaken additional investigations into the hydrology of this pool since the release of the ERD. These investigations are summarised below: Pool 2 has been visited twice since investigations commenced. The following photographs demonstrate the variation in pool levels between August and December 2018. The photographs demonstrate a fall in water level of about 0.8m in that period. Groundwater abstraction activities in that period were consistent with historical exploration usage.

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			August 2018 

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			December 2018  Whilst the pool level itself hasn't been topographically surveyed, estimates from LiDAR data indicate an elevation of approximately 484 mAHD (for the December 2018 estimate). The water level in Pool 2 is about 26 m above regional groundwater levels in the valley and surrounding hills. For reference, whilst the pool level had dropped 0.8 m between August and December 2018, nearby groundwater levels declined 0.1 m in that same period. Physical and chemical characterisation work to date have identified Pool 2 as a Rock Pool with an outlying chemical signature. The interpretation of the pool chemistry is that evaporation and chemical reactions are the dominant processes, with little evidence of ongoing groundwater input. It is likely the pool is supported by surface water runoff and direct rainfall; with the deep, shaded nature of the pool reducing evaporative losses and sustaining water availability. The pool water is very low salinity (~50 mg/L

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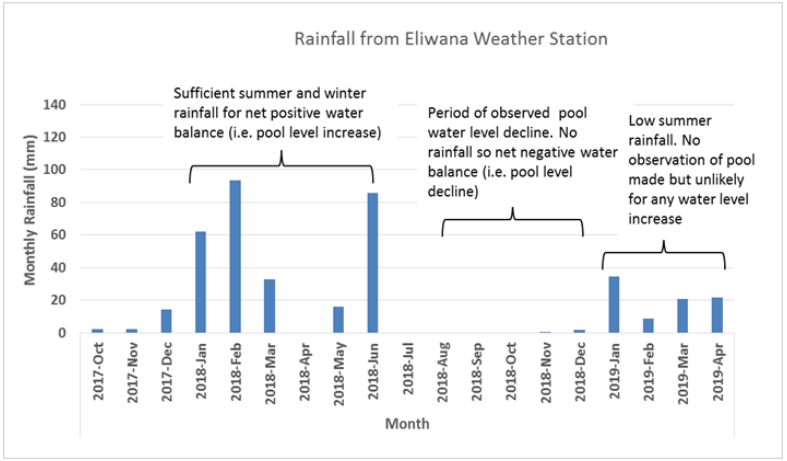
			TDS) but high pH (9.3) and high nutrient levels. Work to date has not resolved the pool aqueous chemistry; however high nutrient levels support the possibility of biological reactions which increase alkalinity and reduce dissolved solids content. The most likely cause for pool level decline is related to climate, as indicated in the rainfall hyetograph below. Prior to the first pool photograph in August 2018, there was a period of local rainfall considered sufficient enough to generate runoff and/or direct precipitation to Pool 2. Between August and December 2018, almost no rainfall was recorded in the area, and the pool water balance would have been dominated by evaporative losses. No recent observations have been made available of pool levels but the limited rainfall between January and April 2019 is unlikely to have increased water levels, and they may have continued to decline.  **Significance of impacts to pools** Fortescue considers that in the event that these three pools are lost, the extent of surface water pools to the north in proximity to Duck Creek, as well as the presence of permanent and semi-permanent pools in Duck

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			Creek and Boolgeeda Creek suggests that this loss of 3 small pools and the environmental values they support will not be significant. **Changes to Surface Water Flows** Appendix 3 of the ERD provides a detailed assessment of the changes to surface water flow that may eventuate from the implementation of the proposal. This assessment, which was discussed in Section 4.4.6.2 of the ERD focusses on four main creeks which flow out of the MDE: • West Creek • Pinarra Creek • Strike East Creek/Flying Fish 1 Creek • Flying Fish 2 Creek This assessment is summarised below: <u>West Creek</u> Modelling has shown that flows within this creek are intercepted by a large pit void upstream of the creek. During very large, rare rainfall events (at least 1 in 100 year event), this pit may fill and resume creek flow. Under normal rainfall conditions (a 1 in 2 year event), flood depths are significantly reduced immediately downstream of the pit. However, at the furthest extent of the model (where the creek enters Duck Creek), flood depths are reduced by less than 0.5m from the baseline flood depth. It can be said therefore that the mine will reduce the volume of water flowing through West Creek but by the time the creek enters Duck Creek, these changes are not significant. <u>Pinarra Creek</u> The Pinarra Creek Catchment will be the most altered by the Eliwana Mine and will experience the greatest change of the four creeks subject to the assessment. In particularly, several pits are located in the main channel of Pinarra Creek and this will have the effect of truncating surface water flows. This was discussed in Section 4.4.6.2 where it was highlighted that during operations, water captured in pits will be pumped back out into Pinarra Creek, thereby re-instating some surface flow. This section also recognised that post-closure, there may be permanent reduction in surface water flow through Pinarra Creek. The assessment did not consider any mitigation such as pit backfill (assumes a greatest

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			impact scenario). The model determined that at the end of mine life, surface water flows through Pinarra Creek are typically one third to a quarter of the baseline flows. However, the model also demonstrates that a tributary flowing into Pinarra Creek downstream of the disturbance has the effect of limiting changes to surface flows. In the final 1km of the model domain, flows are only slightly reduced from the baseline. Therefore, the model predicts that the greatest impacts are experienced immediately downstream of the mine footprint for a distance of approximately 4km before the tributary joins the creek. Strike East Creek/Flying Fish 1 Creek Several pits are located in the catchment for these creeks. Strike East Creek flows into Flying Fish 1 Creek (FF1), with this FF1 being the main outflow from the MDE in this area. Several pits are proposed in the catchment for these two creeks, including pits that intercept the main channel for both creeks. The pits within the Strike East Creek appear to have limited impact on surface flows with changes of less than 15cm flood depth at the boundary of the model during a 1 in 2 year event. Interestingly, changes are greater during a rare 1 in 100 year event as flood waters extend beyond the main channel and are intercepted by pits on the floodplain, which would normally not intercept surface flow. Within FF1 catchment, only one third of the catchment is impacted by pit voids. However, a number of these pits intercept the main FF1 channel and this significantly changes the flows in FF1. The remaining two thirds of the FF1 catchment are intercepted by a shallow pit, which will reduce surface flows in a 1 in 2 year event by up to half. Beyond the confluence of both creeks, flood depths will be reduced by approximately 0.5 m during a 1 in 2 year event. Flying Fish 2 Creek Two small pits near the southern end of this model domain intercept flows in the main channel of the creek. Flows through Flying Fish Creek 2 are reduced downstream of the pits until a tributary joins the creek. Beyond the tributary, changes to flood depth are relatively minor. The model also shows that during larger rainfall events, creek flows are likely to resume.

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			These modelled impact assessments were used to quantify impacts to riparian vegetation in these creeks (Comment No. 11).
48	**DWER (RSD)**	RSD seeks clarification on the western boundary of the model. Figure 10 – Appendix 5 suggests this to be a dyke, however geological structures have not been identified in this area (Section 3.4.1 – Appendix 5).	Although the western boundary was placed without reference to a specific structure, groundwater level data suggests another step down in groundwater elevation from the western most compartment (393 m AHD) to 315 mAHD, 4 km to the west. Furthermore, a review of aerial imagery shows a multitude of linear features cross cutting the valley west of the model boundary. This supports the conceptualisation presented, although not the specific location. Crucially, the western impacted pool and majority of the GDE in proximity to the boundary is within the model domain.
49	**DWER (RSD)**	Cumulative impact has been discussed (Section 4.4.6.2) but the extent and magnitude of impact has not been considered. This may be due to limited availability of data from other mining companies, however RSD recommends the proponent include any nearby projects data in their modelling where possible, to enable adequate consideration and assessment of cumulative impacts.	Section 5 of Appendix 7 considers the extent and magnitude of existing approved projects within the Brockman Syncline. These third-party activities lie well outside of the existing numerical model boundary and, owing to the compartmentalised nature of the aquifer, will not overlap with the Eliwana Project groundwater drawdown.
50	**DWER (RSD)**	There is uncertainty associated with the inflows and outflow of the water balance, given the coarse nature of the approach used (Appendix 4). Recharge and evapotranspiration need to be revisited/revised and future water balances and models refined.	Noted, the water balance will be revisited as more information is gathered once monitoring of abstraction activities commences. This is a typical approach to groundwater management in the Pilbara.
51	**DWER (RSD)**	The proponent has prepared site specific Eliwana surface water management plan, however the plan does not identify which surface water environmental receptors have been identified as potentially impacted by the project – rather the proponent has undertaken a risk assessment to determine a risk rating of the management actions. This process is confusing, and it is unclear what values the proponent is managing to protect. The risk assessment has not been provided for assessment/review. FMG note that 'surface water rarely flows into the MDE at any point' – although this is noted, it is the disruption of flow out of the MDE, due to pit interception/capture, that is of concern. FMG partially address this issue (section 4.4.6.2) however, there is no actual assessment of potential impacts to creeklines beyond the MDE. EPAS requests this is addressed.	Figure 2 of the Surface Water Management Plan identifies the potential surface water impact areas for the Eliwana Mine. The assessment referenced within Table 6 of the Plan is the *Eliwana Mine Proposal – Surface Water Impact Assessment* (Fortescue 2017a) which was attached as Appendix 3 of the Eliwana Mine Environmental review Document (ERD). Comment 47 above includes a summary of this assessment. Downstream receptors in these four creeks include the pools in West Creek, riparian vegetation within the creeks, priority flora species within this vegetation and the fauna species that occur within the creeklines, which may be impacted by a decline in vegetation health. The impact of reduced surface water flow on riparian vegetation is discussed at Comment 11 and Section 4.6.5.9 of the ERD. Impacts to pools is

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		Please include relevant information and justification to address the above concerns. The proponent asserts that impact areas have been identified, but does not clarify specific environmental receptors. Please provide further details within the RtS of the identified environmental receptors and how they will be directly and indirectly impacted.	discussed at Comment 11. Impacts to priority flora within these creeklines is quantified in Table 29 of the ERD. Table 6, Action 2.2 has now been updated to include a reference to this assessment to provide further clarity. The Surface Water Management Plan is provided as Appendix 2 of this document.
52	**DWER (RSD)**	It is predicted that there will be changes to surface flow volumes downstream of the disturbance as well as potential for in-pit capture within mine voids during operations and post closure. It is unclear where this risk has been addressed in the surface water management plan. The previous draft ERD stated that pit water would be released to creeks. RSD seeks clarification on whether pit-water release to creeks is still a proposed management option.	Rainfall runoff intercepted in pits will be discharge to creeks during operations provided water is of a suitable quality. This will not occur post closure and as such impact assessment has captured the closure scenario as it represents the maximum impact (since this operational discharge provides a limiting effect on impacts from intercepted rainfall runoff).
53	**DWER (RSD)**	The plan states that Table 6 contains the management actions, performance indicators, evidence, timing and responsibilities for each objective, however Table 6 contains monitoring parameters and methods. The table presented on Page 15 is not titled, and does not define what LUC refers to.	Table 6 titled 'Key Management Actions for Surface Water Management' contains the management actions, performance indicators, evidence, timing and responsibilities for each objective. There is no Table on page 15 as stated in the comment but following a search for the phrase LUC it has been identified that page 17, Table 6 may be what DWER is referring to. LUC is footnoted (Footnote 7) in this table and is included in Table 1 of the Plan which provides the acronyms used within the Plan.
54	**DWER (RSD)**	The Surface Water Management Plan states that if triggers aren't exceeded after three years, (referencing Table 9) the frequency of monitoring will be reduced to a frequency supported by review. Table 9 of this plan does not contain contingencies, rather it details stakeholder consultation. In addition, Table 8: Trigger criteria and associated contingency actions does not contain any trigger or threshold values. RSD does not consider one trigger for water quality and one trigger for water elevation is sufficient. The plan states that a minimum of two annual seasonal events will be required to revisit calibration for the site, and only events that have whole of catchment runoff will be considered as significant for modelling review to take place. Given the proponent proposes to review the frequency of monitoring after three years, it is unlikely there will be enough data to enable adequate representation and interpretation of surface flows.	The monitoring will require three years where sufficient rainfall occurs to provide data to demonstrate that triggers are not exceeded. This may require a longer period if insufficient rainfall occurs and as such three years is the minimum term. Section 5.4.2 of the Plan has been updated to now state "If no triggers are exceeded (detailed in Table 10) after three years (as a minimum) where sufficient rainfall occurs, the frequency of monitoring will be reduced to a frequency supported by the review."

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		RSD requests that the proponent remove the timeframe for review (three years) and reduction in monitoring frequency from the plan, until adequate data has been collected (e.g. once the mine is in full development and adequate seasonal data has been collected).	
55	DWER (RSD)	There still remains confusion regarding the amount and extent of proposed pits. The Surface water impact assessment (Appendix 3) states that 57 mine pits have been identified in the Pinarra Creek and Western Channel catchments – however the ERD refers generally to multiple above and below ground pits. The figures presented do not clarify the amount of pits.	Changes in market conditions and other factors will determine which pits will be mined within the MDE and in what sequence. This mining sequence will change over time and it is possible that some pits identified within the MDE may never be mined. Fortescue does not seek approval for any specific number of pit voids but has sought approval for the maximum disturbance if all pits are mined. Instead a categorised approach, as shown in table ES2 of the ERD has been used, with the individual assessments, namely the Surface Water Impact Assessment in Appendix 3 of ERD utilising a scenario to assess the maximum impact. Fortescue contends that the specific number of pits is not relevant as the associated surface water impacts have been adequately described in the ERD in line with requirements of the ESD.
56	DWER (RSD)	RSD previously noted that the Eliwana Mine Project Discharge Assessment stated that "Rainfall has not been considered in the water balance analysis as the modelling is based on dry weather conditions only. This assumption was necessary due to the variable nature of rainfall events, and because the discharge footprint would be highly diluted and would simply form rainfall runoff as per the existing hydrologic regime. As such, this analysis is only relevant for dry weather periods outside of rainfall events". Appendix 8 has not been revised and still states the above, including the statement that: "This method has not been calibrated or validated to real world results" (Page 13, Appendix 8). RSD reiterates this is not acceptable, and does not adequately describes the worst case extent of surplus discharge extent (wetting front).	Fortescue notes that it is not possible to calibrate the model prior to commencement of the activity, however this would be undertaken after commencement as part of normal operational due diligence. Fortescue is committed to managing its discharge within the extent modelled. It should be noted that during periods of streamflow, there is no wetting front as the entire creek bed becomes saturated, however when conditions return to dry conditions, Fortescue contends that the maximum discharge extent will be as modelled and notes that results have been cross checked and compare well against other publicly available data on surplus water discharge in the Duck Creek catchment.
57	DWER (RSD)	Pools (section 4.4.4.5 ERD) have been identified both inside and outside of the development area using comparison of end-of-wet and end-of-dry season aerial imagery. Although there was a limited number of appropriate images, this is a standard approach. It is noted however, that	Fortescue is not certain what the commentator refers to in this comment. Many figures in the ERD show GDE or Potential GDE vegetation and pools outside the MDE (for example, Figure 10).

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		creeklines/pools identified as groundwater-dependent (rather than potentially groundwater-dependent) do not flow into the development area, but terminate at its boundary. RSD requests that additional mapping be provided which shows the extent of streamflow beyond the MDE, and justifies the assertion that groundwater-dependent creeklines/ pools terminate at the boundary.	Note, the MDE sits over a catchment divide between Duck Creek to the north and Boolgeeda Creek to the south. Surface water rarely flows into the MDE at any point. Fortescue never asserts in the ERD that GDE vegetation terminates at the boundary of the ERD and highlights that there are several examples where Fortescue has assessed the impacts to riparian or GDE vegetation beyond the MDE. Where vegetation mapping ceases at some locations, this is the extent of Fortescue's vegetation mapping data and should not be taken as the extent of riparian vegetation.
58	**DWER (RSD)**	The title of section 4.4.5.5 'Surface water pools' is misleading as this section briefly discusses the potential impacts of groundwater-drawdown on groundwater-fed pools, with no mention of surface water pools. Although numerous pools are mapped as occurring in association with potential groundwater dependent ecosystems (Section 4.4.5.5, Figure 10 excerpt below) this is not discussed further. In addition only 3 pools (inserts 1, 2 and 3) between Duck and Pinarra creeks, are considered as within an area of potential disturbance. It is unclear if these pools and pools in the surrounding area of the MDE will be further investigated. To clarify, please include a discussion on Surface Water Pools and any proposed survey work or management actions. Include a discussion on how Surface Water Pools will be managed and clear management actions to be implemented, or justify why management is not required.	Pools identified within the study area (shown in SWMP Rev 0F Figure 3: Groundwater and Surface Water Monitoring Locations) are located on lower order creeks which are associated with localised surface water/ ground water system, as opposed to higher order creeks which are more likely to be associated with regional scale systems (e.g. Duck Creek) . Survey work to date has suggested that wetting and drying of the pools (to the extent that they are completely dry) is common on these lower order creek pools within the study area. Because of the localised nature of these systems containing smaller volumes of water than regional systems, the pool levels and volumes are heavily dependent on seasonal rainfall events. It is these events and their contribution on creek flow, vadose zone/facture flow and localised groundwater recharge that cumulatively drive pool inflow. The high spatial and temporal variability of seasonal rainfall events in the Pilbara, due to the occurrence of localised diurnal thunderstorms, will result in significant differences in recharge between pool systems and significant seasonal variation in pool depth. Consequently, caution must be exercised with absolute measures of physical pool parameters (e.g. depth) and/or comparing pool systems (e.g. comparing water level decline in two separate pool systems) to draw conclusions on whether changes are related to project disturbance or natural variations. Instead it is proposed that impact to pools should be inferred from the physical disruption to hydrologic regime within the likely area of influence of the pools (e.g. measurement of changes catchments contributing to pools).

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			In order to ensure that the monitoring associated with these pool systems is appropriate to the nature of the hydrologic systems described above, the following approach will be undertaken: • Continue baseline survey work undertaken to date, which has focused on developing an understanding of the behaviour of the pools as part of a hydrologic system, rather than monitoring changes in a specific part of the system. In tandem, progress pool census studies to refine understanding of ecological values of pools where offsets are required. • The baseline survey work includes a focus on developing understanding of the range of water quality in the pool systems, how it varies between dry and wet seasons and using analysis of water samples to enhance understanding of hydrological processes associated with pools • The refined understanding of the pools developed through baseline survey work will be used to ensure that the planning and design of the project is focused on minimising the extent of impacts to the potentially impacted pools (as discussed further below), where is it practicable to do so. • Ongoing monitoring will be undertaken for a number of pools below in accordance with objectives set out below. Fortescue will continue a pool baseline survey study, which currently includes two rounds of sampling and will be extended to include two wet seasons of data. This study will be used to refine relevant monitoring and management actions around pools in an updated revision of the Surface Water Management Plan, to be submitted 3 months after collection of second round of wet season samples (end of July 2020). The baseline survey study will have its scope refined to focus the second wet season of monitoring on pools of highest significance for the project as outlined below: • Pool 2 • Pools 3 and 4 • Pool 5

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			Details of the proposed ongoing monitoring will be defined in the revised Surface Water Management Plant however will be focused on the following objectives: • Pool 2 – This pool may be impacted by changes to surface water flow. Due to its presence within an important heritage site (Kangaroo Gorge), the pools water levels and/or surface water contributing catchment area will be monitored. • Pools 3 and 4 – Pools are not proposed to be impacted by the proposal, monitoring to help understand regional trends and in order to validate that heritage values of pools are not impacted • Pool 6 – Impact will occur to creek upstream of these pools and monitoring is required to ensure that impact is minimised and ecological value of pools is not adversely affected. Proposed monitoring and management of the pools is described below: • Pool 1 – these pools are located immediately downstream of a pit which truncates flow in the upstream creek, as such it is not possible to provide management measures to avoid this impact due to the location of the ore body under the creek bed. Impacts will be minimised as Creek flow intercepted during operations will be discharged following an event. The creek system will continue to be monitored for water quality following a discharge event to ensure trigger or threshold criteria are not exceeded. • Pool 2 – This pool will be monitored due to its location within an important heritage area. The pool also has some fauna values. Management is discussed at Item 6. • Pools 3 and 4 – There is no proposed impacts to these pools as a result of the proposal and as such no management measures are required, however they are proposed to be monitored to providing ongoing understanding of local trends as well as providing verification that there are no impacts to these pools with heritage values. • Pool 5 may be impacted by a reduced catchment size from the potential construction of a tailings storage facility upstream of the pool. As discussed at Item 11, this pool has not been identified as having significant habitat or ecological values as the pool is highly

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			unlikely to be groundwater dependent and is dry for extended periods after the wet season. As such is not proposed to be monitored or managed due to the extremely close proximity of the proposed disturbance. • Pool 6 – Impacts to surface water flows may occur within the creek upstream of these pools, due to potential construction of a tailings storage facility. As a tailings dam has a fixed impact on the catchment area, it is not possible to provide active management, however any tailings dam needs to be managed appropriately to minimise water quality impacts. As such this pool will be monitored to verify that impacts ecological values of this pool are minimised and not significant.
59	**DWER (RSD)**	In section 4.4.6.3 it is stated that '...it is likely that these pools will dry up during operation' and result '…in a loss of ecological function…' including '…habitat for a range of aquatic fauna and maintenance of groundwater-dependent vegetation'. The significance of these impacts are then dismissed as a 'desktop review of surface water features….noted there were more pools…outside the area impacted….'. RSD requests the following information be provided to enable further assessment of the impacts: • Provide further details on groundwater fed pools that are likely to be impacted including; • the number and location of all pools; • surveys of dependent aquatic fauna; • survey of dependent vegetation; and • surveys of pools beyond the development are to ensure they are of equal ecological values (i.e. support the same function). Conceptual models should show: • Indicative water table depths to conceptual models • Consider/ describe groundwater discharge back into creek alluvium • Consider cyclonic recharge events in a conceptual model	Two pools that may be groundwater dependent are located within the area subject to groundwater drawdown (Pools 1 and 2). Pool 5 is not located within the predicted drawdown extent, but may be impacted by surface water flows. As discussed at Item 47, Pool 2 is unlikely to be groundwater fed. No surveys of aquatic fauna have been undertaken within any pools within the MDE or immediately downstream. Fish have been observed in Pool 1. Note, there was no requirement to undertake aquatic fauna surveys within the ERD. Section 4.6.4.7 and 4.6.5.10 discuss GDE and potentially GDE vegetation within the MDE and the likely impacts to the vegetation from groundwater drawdown. Given the prevalence of pools located outside the predicted groundwater drawdown (see Figure 5 of this document) Fortescue consider that the impacts to two pools within the MDE to groundwater drawdown is not significant. It is acknowledged that Pilbara Leaf-nosed Bat have been recorded foraging at Pool 2 and a Pilbara Olive Python has been recorded upstream of this pool at the end of the wet season. One record of a Northern Quoll also occurs further upstream. Fortescue consider that the gully in which the pool is located may be used as a conduit for foraging and dispersal between Duck and Boolgeeda Creeks by fauna and the presence of the pool may encourage the use of the gully.

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		• Clarify representativeness of Pinarra Creek. • Consider that deep-rooted vegetation is likely to occur on the creeklines and provide indication of depths of the alluvium or the water table to better conceptualise potential connectivity.	
60	**DWER (RSD)**	Models of surface and groundwater systems (plates 4 and 5) show basic recharge of alluvium (creek beds) and potentially shallow groundwater, in response to a low and high rainfall periods (wet season). RSD requests confirmation/clarification of the following: • FMG state that during high rainfall periods the underlying groundwater is recharged, however there is no consideration of groundwater discharge back into the alluvium. This seems to contradict an earlier statement that "Groundwater is discharged from the sub-catchments through minor internal transfer through the aquitards, through saturated alluvium or through evapotranspiration by GDE". • Cyclonic events have not been considered despite the recognition that they "…generate very large volumes or recharge that impact on groundwater levels"' • FMG seems to have limited comments/ consideration of surface and groundwater connectivity and recharge to Pinarra Creek. Although this appears to be the creek that will experience the greatest impacts, DWER questions whether this is representative of all creeklines within the proposal area.	• No contradiction is intended as the earlier statement refers to groundwater flow in alluvial (Quaternary aged) material at depth, rather than at/near surface. The DWER is correct, however that Fortescue have only presented the connectivity in the region of the numerical groundwater model, which is characterised by the absence of pools within established alluvial channels (which may conceptually receive discharge from bank storage). • Cyclonic events have been considered conceptually. However, the statement the DWER is referencing relates to the inclusion of cyclonic events in groundwater and surface water models. A conservative approach was taken in omitting cyclone-scale infiltration, as the intermittent frequency of cyclones cannot be depended on as source of recharge. • The DWER is correct in stating the impact assessment has focussed on the creek within the area of impact, which coincides with the numerical model area. Pinarra Creek is representative of drainage channels in areas where groundwater drawdown will occur, as indicated by the geomorphological assessment (included within Appendix 3)
61	**DWER (RSD)**	Generally, the majority of mitigation/management measures proposed in Table ES 3 are not really mitigation measures to impacts on hydrological regimes, rather they are statements of work completed. The mitigation or management measures not clear, please provide details of any possible management actions currently proposed or likely to be implemented for the proposal.	Fortescue highlights that the management of surface and groundwater is contingent of a sound understanding of the hydrological processes present. Fortescue also highlights that Table ES 3 contains many activity-based actions to mitigate against impacts associated with changes to hydrological processes, mostly around engineering design during operations and into closure. Provisions tables have been developed in accordance with the *Instructions on how to prepare Environmental Protection Act 1986* Part IV Environmental Management Plans. The Provisions tables have been developed to align with an Outcomes Based Condition and as a result

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			management actions have only been provided to demonstrate how the outcome will be achieved. Management actions have been clearly outlined in both Provisions tables developed in support of the Surface Water Management Plan and the Groundwater Management Plan respectively. Management actions have been developed to meet the following outcomes: *(1) No adverse impacts to downstream surface water quality outside of assessed impact areas as a result of implementing the proposal* *(2) No adverse impacts to groundwater quality outside of assessed impacts areas as a result of implementing the proposal* *(3) Groundwater management infrastructure operates as per design to minimise adverse impacts to groundwater dependent vegetation and/or potentially restricted stygofauna habitat outside of assessed impact areas* **Surface Water Management Actions** • Ensure drainage infrastructure location and design aligns with the assessment outcomes to minimise impacts to surface water flows, quality and associated surface water dependent systems with reference to the *Standard Engineering Specification for Drainage and Flood Protection* (100-SP-CI-0004). For the Eliwana Mine Project, the assessment outcomes are provided in the *Eliwana Mine Proposal – Surface Water Impact Assessment* (750EW-5700-AS-HY-0001). • Avoid interaction with major drainage lines where practicable to minimise impacts on downstream surface water flows and quality. • 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. • 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 *Water Quality Protection Guidelines for Mining and Mineral Processing.* • Chemical and hydrocarbon storage areas will be designed, constructed and operated in accordance with the requirements

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			outlined in the Chemical and Hydrocarbon Management Plan (100-PL-EN- 0011) and a Licence issued under Part V of the *Environmental Protection Act 1986*.
			• 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 *Strategic Policy 2.09: Use of mine dewatering surplus* (DoW, 2013). Effective erosion control measures will be implemented to ensure downstream water quality is not impacted.
			• Where post closure mine voids are present within the project boundary and impacts to surface water dependent systems are expected, the requirements of the *Eliwana Mine Closure Plan* (EW-PL-EN-0001) will be adhered to.
			• Conduct progressive rehabilitation of disturbed areas no longer required for operations in accordance with the *Eliwana Mine Closure Plan* (EW-PL-EN-0001) developed in accordance with the Guidelines for Preparing Mine Closure Plans.
			Groundwater Management Actions
			• Ensure baseline monitoring and groundwater sampling are undertaken to:
			  ○ Document groundwater levels and quality within impact and reference sites
			  ○ Identify baseline monitoring and groundwater quality at impact and reference sites
			  ○ Compare data across impact and reference sites (and/or regional monitoring sites where available).
			• Conduct a desktop assessment for all LUC applications to ensure groundwater dependent systems within high risk areas are identified prior to ground disturbance. Where the works have the potential to impact on groundwater and any associated water dependent systems, apply relevant management measures to the LUC prior to approval.
			• Ensure groundwater management infrastructure location and design aligns with the assessment outcomes identified in *Groundwater Impact Assessment: Eliwana Mining Project* to minimise impacts to

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			groundwater levels, quality and associated groundwater dependent systems where possible. • When injecting or infiltrating excess dewater into a compatible aquifer utilise methods outlined in the applicable and approved Groundwater Operating Strategy as required under a 5C Licence. • Implement a groundwater monitoring program in areas identified as high-risk areas where groundwater dependent systems have been identified and potential impacts are significant. • Where a stygofauna survey identifies a risk of loss of stygofauna species or communities, and those species or communities are deemed significant due to their restricted distribution within the project area, manage groundwater abstraction and injection regimes to minimise impacts on those restricted stygofauna species.
62	**DWER (RSD)**	The groundwater regime in the project area is controlled by dolerite dykes. FMG should make a commitment not to mine theses dolerite dykes, especially the sections below the water table, in order to maintain the groundwater regime. Uncertainty remains regarding the potential impacts to groundwater in the event that Dolerite dykes are mined, it appears several proposed pits in the western section of the MDE intersect dolerite dykes. Please provide details of whether this was factored in the current models and to what extent. Please provide a discussion demonstrating that any mining of the dolerite dykes would not result in unacceptable impacts to groundwater flows to significant environmental receptors, or alternatively, provide a commitment to avoid mining of the Dolerite dykes. Please note that EPAS considers that this is critical information for the finalisation of the assessment.	Information presented in Figure 5A – 5D of Appendix 7 illustrates that dolerite dykes intersect the preliminary pit shells illustrated. Fortescue will therefore need to mine out these dykes to achieve the mine plan. However, any portions of dykes mined out above water table will not result in an impact to groundwater flow as only the below water table portion of a dyke acts to compartmentalise the aquifer. Furthermore, Fortescue's assessment of the area was conservative, simplifying the number of potential dyke occurrences to only those where a groundwater level offset was observed in baseline data. Anecdotal evidence from other mining operations in the region is that, upon commencement of abstraction, additional compartments are commonly found to exist, implying the existence of more dykes than originally assumed. Of the dykes shown in Figure 5A – 5D, only one below water table intersection has been shown to occur (Figure 5C). Modelling simulations presented in Appendix 7 assumed an absence of this dyke, effectively simulating the outcome of its removal via mining.
63	**DWER (RSD)**	There is potential for groundwater drawdown from dewatering and water supply abstraction and groundwater mounding from re-injection to impact on subterranean Fauna. RSD recommends the Terrestrial fauna branch provide specific comment on impacts to these species.	Fortescue notes that the DWER (TEB) have provided comments on Subterranean Fauna.

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64	DWER (RSD)	Section 1.5 of the plan references Table 3 for the management of weeds. This is incorrect – Table 3 lists the Environmental outcomes and measures/targets.	Section 1.5 now refers to Table 4 for legislation directly relevant to the management of groundwater.
65	DWER (RSD)	Table 3 refers the reader to Table 8 for groundwater quality guideline values. Table 8 does not contain guideline values, it details types and associated parameters and site locations. Additionally, Table 8 and Table 10 appear to contain the same information.	Table 3 correctly refers to Table 8 which outlines the parameters to be monitored. Where a guideline value is available it has been footnoted against that parameter, see Footnote 10, 11 and 12. Table 10 is a summary table of the monitoring program proposed so it does include the content from Table 8 in addition to location and collection method outlined in other parts of the monitoring section.
66	DWER (RSD)	Table 6 – reference 3.1 states that baseline modelling will be conducted to obtain a representative baseline dataset of the site hydrogeology. RSD advises that this should be collection of baseline data through measurement and monitoring, not modelling. This collection of baseline data should be conducted for at least two years prior to mine dewatering/abstraction.	The DWER is correct that the table should read baseline monitoring; this has been corrected. Obtaining 2 years of baseline data is not possible in all circumstances; however, Fortescue intends to maximise baseline data where possible prior to commencing abstraction activities.
67	DWER (RSD)	Table 6 – reference 2.4 states that a subterranean fauna management plan will be developed as a management action, when surveys indicates risk of a loss of species or communities. RSD does not consider the "development of a plan" as an appropriate management action, rather implementation of that plan is more appropriate.	Table 6, Action 2.4 has been revised to state "Where a stygofauna survey indicates a risk of loss of stygofauna species or communities, and those species or communities are deemed significant due to their restricted distribution within the project area, manage groundwater abstraction regimes to minimise impacts on those restricted stygofauna species."
68	DoEE	Please clarify in the surface water management plan how much excess water will be required to be discharged into the surface water systems, and the source of this water(to the extent this is known/ expected). Furthermore, the Department notes that: • The surface water impact assessment (Appendix 3) has assessed the impacts of the mine pits and infrastructure on the hydrology and water quality of the surface water catchments. However, there is no indication of the impacts of the discharges from water that needs to be disposed from the pits. • The discharge assessment (Appendix 8) discusses options for "surplus dewatering and as such, surface water discharges to local creek systems"	Excess water discharge will be via a single point into Pinarra Creek, at the location shown in Figure 12 of the ERD with an Excess Water Discharge Extent footprint. The timing of excess water discharge will vary throughout the mine life depending on the sequence of pits being mined to achieve a given mine plan. However, noting that discharge is likely to be periodic and not constant over a given year. Notwithstanding, the indirect impacts associated with periodic excess water discharge on the receiving environment from the change in flow regime were assessed in Section 4.6.5, and 4.7.7.5 for a maximum annual volume of discharge and at a maximum instantaneous discharge rate. It was considered that the change in flow regime is unlikely to have a significant negative impact on riparian vegetation health or alter vegetation downstream, as riparian vegetation is adapted to the

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		• The need for, and requirements of, excess water discharge as well as other changes to the flora regime are discussed in Table 6 (and other areas) in the surface water management plan (Appendix 10). In considering the information across all three reports the Department cannot find reference of expected volumes of the predicted discharge (nor changes in quality). If this information is not available for decision making later, it may delay progress towards a decision on whether the proposal can be approved. Information is still required as to the location of the discharge points (single or multiple) and the timing of these discharges. 4GL/a represents just under 11ML/d (for 365 days per year) which would locally change flow regimes downstream of the discharge points depending on the timing of the release given that discharges are likely to be time specific rather than a constant over a given year. Information is also required on the quality of the water to be discharged and any toxicity impacts, particularly to the Pilbara Olive Python.	ephemeral nature and annual inundation from surface water flows. Adaptive management of excess water discharge for changes to flow regime and indirect impacts on the receiving environment is proposed and described in the Surface Water Management Plan (SWMP) and Vegetation Health Monitoring and Management Plan of the ERD, which includes performing risk assessment of surface water dependent ecosystems within the expected footprint of excess water discharge impact zone, monitoring of vegetation health for response and undertake contingency actions as required. Quality of the excess water to be discharged is described in Section 4.5.6.5 and of the ERD, and expected to reflect the groundwater quality observed through the baseline monitoring of groundwater bores within the mining areas as described in Section 4.5.4.1 of the ERD. The water quality is expected to be fresh to brackish, with a calcium/magnesium-bicarbonate type in the Eliwana area, and sodium/magnesium-chloride type in the Flying Fish area. Alkalinity is expected to be abundant with pH in the alkaline range and elevated hardness. The SWMP of the ERD sets a management measure for excess water discharge to occur within a set of site specific water quality trigger values. The water quality trigger values will be established with the objective of being outcome based, following a risk evaluation of receptors within the receiving environment or the expected footprint of excess water discharge impact zone, and to be informed by the ANZECC water quality guidelines for inland waters, the Water Quality Protection Guidelines for Mining and Mineral Processing – Mine Dewatering, and water quality monitoring. This management measure is intended to mitigate any potential toxicity impacts on the receiving environment, including on the Pilbara Olive Python. As discussed in the ERD, discharge of surplus dewatering at surface has been included in the proposal as a contingency measure, which follows the hierarchy of disposal options in the Water and Rivers Commission 1999, Water Quality Protection Guidelines (Nos. 1 – 11), Mining and Mineral Processing, Water and Rivers Commission. In line with this hierarchy, Fortescue will use abstracted groundwater for on-site use as a first preference, followed by aquifer recharge (infiltration or injection), and

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			with discharge to surface water only being used once alternative options have been exhausted. Excess water discharge will total no more than 4 GL/a, with a likely maximum instantaneous rate of 350 L/s. The source of this surplus water is from mine dewatering, nominally from all pits at varying times within the mine life. Separately, rainfall runoff that is intercepted in pits during operations may be discharged to creeks following rainfall events, however this will only be undertaken if the water is of a suitable quality to avoid impacts to receiving watercourses. It is not possible to estimate the volume of water as it will be based on rainfall which cannot be accurately predicted over the life of the project. The source of this water will be rainfall.
69	**DoEE**	The Department notes in the ERD (Pg.288) "changes in surface water flows may cause changes to fauna habitat values". It is also noted on Pg. 441, the Pilbara Olive Python "inhabits watercourses" and "is an excellent swimmer". Furthermore Figure 60 (Pg. 433) shows a sighting within a water course. Given there is evidence of the Pilbara Olive Python in the area, the Department is concerned that any changes to flow regime, and potentially water quality, could impact this species. Therefore please provide further detail as to how impacts to the Pilbara Olive Python from flow regimes changes will be mitigated. Please provide evidence that the change in flow regime will not impact on the ability of the Pilbara Olive python to disperse to other suitable areas, particularly during the mating season.	As discussed in Section 4.4.5.5, three pools have been identified within the area impacted either by groundwater abstraction or surface water flows (Figure 10 of the ERD). Impacts to these pools has been discussed at Comment 47 and 57-59. In the event of a loss of any of these pools, there will be a loss of the ecological function these pools perform, for instance, as habitat for a range of fauna species including aquatic invertebrates or for the maintenance of groundwater dependent vegetation (impacts to GDE vegetation from groundwater and surface water impacts discussed in Sections 4.6.5.9 and 4.6.5.10). The desktop review of surface water features across the MDE and surrounding areas noted that there were more pools and pool systems outside the area impacted by changes to groundwater Eliwana Iron Ore Mine Page 150 of 494 EW-RP-EN-0003_0 and surface water processes and these became more persistent (more likely to be permanent) further north near Duck Creek. Therefore, whilst the loss of these pools may represent a localised impact, there are no impacts to surface water pools more regionally from the proposal. Two individual Pilbara Olive Pythons were sighted within the MDE in 2012 (Ecologia Environment, 2015). No Olive Pythons were sighted during targeted surveys in 2017. The low number of sightings of this species is not unexpected given there is only approximately 591 ha of habitat considered critical habitat within the 43,804 ha envelope.

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			However, as male pythons are very mobile during the spring season it is possible that further Pythons could be encountered at any time. When on the move, pythons are not restricted to riparian and gorge habitat and are often encountered randomly throughout the landscape. For instance, Fortescue has records of Olive Pythons being located on haul roads within mining areas at some distance from what would be considered suitable habitat for the Python (creeks and gorges). Therefore, changes to surface flow regimes are unlikely to impact on the ability of pythons to migrate and disperse. Larger areas of critical habitat for the Python occurs in Boolgeeda Creek, Duck Creek and Caves Creek to the south and north of the MDE. Fortescue consider that Pilbara Olive Python occurs in low numbers within the MDE and that individuals are likely using habitat within the area to disperse between the major creeks in the region during the mating season.
70	**PKKP**	S4.4.6.3 describes that three pools have been identified that will be permanently lost due to groundwater drawdown and/or surface water shadowing. The mechanisms of the drying out have not specifically been identified. The depth of these pools, the hydrogeological regime or the water quality of these pools is not presented. It is stated that there are "more pools and pool systems outside the area impacted by changes to groundwater and surface water processes…". However, this is not sufficient information on which to base an assessment of the significance of the pools and associated values to be lost.	To clarify, Section 4.4.6.3 notes that three pools have been located within the MDE that occur within areas either subject to groundwater drawdown or changes to surface water flow. The mechanism of a decline in pool water level is either: • groundwater drawdown of the natural water table by water abstraction for mine use or mine void dewatering to support mineral extraction; or • surface water changes through infrastructure placement affecting natural surface water flows. Two pools occur within the modelled drawdown extent. As discussed at Item 47, Pool 2 is unlikely to be groundwater fed and it is therefore unlikely that this pool will be impacted by groundwater drawdown. The pool located in Inset 3 of Figure 10 is well beyond the groundwater drawdown extent and will not be impacted by groundwater drawdown. However, the area upstream of the pool has been identified as a potential site for a tailings storage facility and if constructed, this may cause a change in surface water flows to the pool. Figure 10 also demonstrates that there are many pools located outside the area of the drawdown extent, or that will not be impacted by changes to surface water flow.

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			A decline or loss of any of these pools from drawdown or reduced surface water flow will result in a loss of the ecological function these pools perform, for instance, as habitat for a range of fauna species including aquatic invertebrates or for the maintenance of groundwater dependent vegetation (impacts to GDE vegetation from groundwater and surface water impacts discussed in Sections 4.6.5.9 and 4.6.5.10). As discussed, the desktop review of surface water features across the MDE and surrounding areas noted that there were more pools and pool systems outside the area impacted by changes to groundwater Eliwana Iron Ore Mine Page 150 of 494 EW-RP-EN-0003_0 and surface water processes and these became more persistent (more likely to be permanent) further north near Duck Creek. Therefore, whilst the loss of these pools may represent a localised impact, there is unlikely to be a significant regional impact. Given the prevalence of pools located outside the predicted groundwater drawdown (see Figure 10 of the ERD), Fortescue consider that the impacts to two pools within the MDE to groundwater drawdown is not significant.
71	**PKKP**	Page 135 notes that surface water discharge up to 49 GL may need to be managed throughout the initial 5 years of mining and will be minimised. Injection or infiltration into other groundwater sub-catchments is listed as a potential option. However, it is not clarified where this would occur or for how much water.	Table 12 of the ERD demonstrates the water balance for the Proposal and determines when the project is likely to be in water surplus or deficit. Appendix 7 of the ERD, Eliwana Groundwater Impact Assessment (Golder 2017) outlines the scenarios for groundwater injection. Depending on varying scenarios a maximum of 69 GL could be potentially be injected into groundwater sub-catchment 519 and 8 GL into groundwater sub-catchment 502. However, this could be as low as 10 GL and 1 GL respectively if the receiving conditions are not favourable. The locations of sub-catchments 502 and 519 are provided in figure 5C of the Golder 2017 report. At this stage of planning there is no specific volume of how much water would be injected, it is an option that may be considered if necessary. As was outlined, sub-catchments 502 and 519 provide the most logical locations for water injection should that option be utilised. Aquifer re-injection would be managed under Part V of the EP Act and under the RIWI Act. The ERD identifies that infiltration is via water stored in open pits.
Inland Waters Environmental Quality			

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72	DWER (RSD)	RSD considers there has been insufficient sampling undertaken to enable geochemical characterisation of tailings (4 samples only). The proponent commits to undertaking additional testing during operations – RSD recommends this additional work is included as a ministerial requirement. FMG asserts that once the OPF is operational, further characterisation work will be undertaken. Please provide further information to justify the delay in characterising work to the post-assessment phase.	All available tailings material from the pilot plant was tested. Once the OPF is operational, characterisation of the material will be conducted in proportion to the volume of tailings produced. At this time, there are no tailings material available to conduct further testing. As the planned processing will comprise of mechanical milling (on a coarser scale than that conducted in the laboratory) and separation, the tailings will closely resemble the rock material and leaching results.
73	DWER (RSD)	Kinetic testing has not been undertaken, as required in the scoping requirement for Eliwana. Instead, sequential leach testing (a new, unpublished & non-validated method) has been conducted. The results of kinetic testing are required in order to validate the sequential leach testing results and assumptions – therefore it is difficult to properly assess the potential impacts on inland waters environmental quality prior to this information being available.	Section 4.5.4.3 of ERD states that Kinetic testing is currently being conducted. This work will be completed in Mar-20 prior to the start of mining and compared to the Sequential Leaching results as stated in Section 8.3 of Appendix 13. Sequential extraction procedures are commonly used to provide information on the leachability/ solubility, mobility, and bioavailability of metals and this eight-stage sequential extraction procedure represents the combination of several individually validated methods: the five-stage procedure by Tessier (1979) the three-step BCR (Ure et al 1992) and the seven-stage DD2005-03 sequential extraction method (Hanzhou et al, 2009). Additional, low-ratio, medium-term, leach tests have been conducted since the completion of the Material Characterisation study, which will be updated with the additional testing when completed. Ongoing characterisation of all waste material will continue through the life of the mine to inform Closure options. As per the ESD all test results available were supplied, and they indicated a risk of metalliferous drainage. The waste material posing this risk will be segregated and managed in the WRD.
74	DWER (RSD)	Geochemical testing data provided shows there is potential for elevated concentrations of aluminium, beryllium, cobalt, iron, manganese, thallium and zinc from waste rock drainage. However, the impact of elevated concentrations of these elements in water, on fauna/flora and vegetation has not been assessed. This omission is acknowledged by the proponent. (Section 8.3 Appendix 13). RSD considers this should form part of the impact assessment, however further impact assessment and	The risk to water resources, to which fauna and flora would have access, was evaluated and determined to be serious, requiring mitigation. Fortescue will employ the following contingency actions to mitigate risks associated with water containing elevated elements of concern: • During operation of the mine, if all water management measures are exhausted, water with elevated elements of concern could be contained then treated on site using portable water treatment plants.

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		management could be undertaken as a condition of approval (e.g. condition environment management plan). Please provide details of contingency actions that could be implemented to mitigate risks to water resources, flora, fauna and vegetation in the event that impacts associated with elevated elements of concern are detected.	• On temporary suspension of operations all PAF materials on waste dumps, stockpiles and pit walls will be covered to minimise the potential for the production of AMD. If all water management measures are exhausted, water with elevated elements of concern will be contained and treated on site using portable water treatment plants. • On closure, in the event that impacts associated with elevated elements of concern are detected associated with pit lakes, the lake water will be treated and / or the pit backfilled to mitigate the risk. Fortescue notes these matters are managed under the *Mining Act 1978* and Part V of the EP Act.
75	**DWER (RSD)**	Some X-sections show some pits intersecting the Mt McRae, Dales Gorge and West Angelas units (Figure 9 –Appendix 4 & Figure 65-75, Appendix 13). Mine pit designs should be optimised to avoid deleterious wall rock where possible.	Noted. The list of available mitigation strategies available for the management of deleterious material in the pits is given in Section 4.4.7.3, Table 17.
76	**DWER (RSD)**	The western-end void is the only pit lake that has been explicitly discussed in the document.	Pit lakes are discussed in Section 4.5.6.4. and in Appendix 15 (in particular, refer to Table 7 of Appendix 15). Section 4.5.6.4 discusses pit lakes for a number of pits in relation to their position in the landscape, the source of pit water and the risk they pose to the environment.
77	**DWER (RSD)**	It is indicated that there will be (metalliferous) seepage from the Broadway west mine void, with outflow almost certain every year. This outflow will migrate to Duck Creek. RSD does not consider the “dilution solution” an acceptable management strategy for this pit, and recommends the pit lake modelling be reviewed and reassessed at regular intervals throughout the life of mine. At present, it is not clear that the proponent will be able to manage the post closure impact of pit lakes on inland waters environmental quality.	The unmitigated risk of contamination to Duck Creek from the Broadway West pit lake has been deemed High (Table 8 Appendix 15). The assessment states: *High Risk of surface water outflow from the Broadway West 3 mine void with both surface and groundwater inflows. It is estimated that the quality of this water will not be highly evapoconcentrated as a result of the throughflow but some West Angela wall rock may cause AMD. The likelihood is almost certain and duration will be centuries, with a possible extent offsite for 10-20 km. This risk could be reduced to Moderate by greater certainty that the water quality will not have a negative impact, and potentially controlling the volume of the out flow by changing the shape of the mine void to reduce the extent.* Fortescue asserts that a reliance on dilution is not proposed as a management strategy. The assessment identifies that regular surface

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			water inflows into the pit will occur and that this may have a positive outcome for pit water quality. The outcomes based Eliwana Surface Water Management Plan, includes the outcome: “no adverse impacts to downstream surface water quality outside of assessed impact areas as a result of implementing the proposal”. The suite of available management measures, given in Section 4.4.7.3 Table 17 (which includes potential utilisation of several partial backfill options) will be used to achieve this outcome, which will be supported by modelling relevant to the stage of the project to verify that this outcome can be achieved.
78	**DWER (RSD)**	The management plan does not contain any water quality triggers, thresholds or contingencies. Trigger Criteria and Threshold Criteria have been set with reference to the modelled groundwater levels approved by DWER as part of the Groundwater operating strategy (GWOS) for the proposal. RSD therefore considers that these proposed triggers can be considered as preliminary only, given the GWOS cannot be approved prior to Ministerial approval of the project. In the absence of Site Specific Trigger Values the proponent should at least propose triggers for a range of readings which prompt action e.g. % above/below the applicable guideline value. Please provide a discussion of proposed monitoring and management actions with trigger values included.	Ground water and surface water samples will continue to be collected to establish baseline concentrations up until mining begins, and from these Trigger Values will be established. Preliminary water quality is given in Sections 4.5.4.1 and 4.5.4.2
79	**DWER (RSD)**	Table 8 and 10 propose quarterly monitoring – RSD requests that this timeframe be amended to monthly. RSD also recommends that Lab pH and bicarbonate are added to the suite of hydrochemistry analytes.	Laboratory pH is included in Table 8 of the Plan. “Alkalinity” is a major anion and is listed in Table 9 of the Plan. The determination includes bicarbonate, carbonate and hydroxide titration end-points. Fortescue proposes to maintain quarterly hydro-chemical analysis, with an increase to monthly for at least 2 months following a trigger level exceedance.
80	**DWER (RSD)**	The plan does not detail proposed monitoring locations. The proponent commits to finalising this once the plan is approved. Whilst RSD recognises it is difficult to assign specific sites in the preliminary stages, the baseline monitoring data gathered to date should be used to set at	Indicative monitoring locations have now been provided in Figure 2 of the Groundwater Management Plan and the supporting Provisions Table (Appendix 2 of the Plan).

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		least preliminary (estimated) monitoring sites and monitoring frequency – specifically where pools and groundwater dependent ecosystems have been identified. In the absence of this information, RSW finds it difficult to assess the suitability of the plan to manage water related impacts of the proposal.	
81	**PKKP**	S4.5.6.4 describes that at least four permanent pit lakes with poor surface water quality and underlying groundwater quality will be created by mining. It is understood that these pit lakes and the underlying groundwater systems are predicted to act as closed systems due to the isolated hydrogeology and that the lakes act as evaporative sinks. However, the creation of new water features in the landscape with high salinity and toxic levels of dissolved metals is considered a significant impact to the nature of the landscape and the heritage and ecological values it supports. In addition, there are another three pit lakes that are likely to form with poor water quality and some risk to the downstream environment (albeit low). Given the highly significant nature of the predicted changes and the level of uncertainty regarding the environmental outcomes, PKKP request ongoing involvement in the management planning and the environmental and heritage monitoring of this significant environmental change. This could be undertaken through a collaborative land management approach with trained PKKP rangers working on country with FMG to implement the required monitoring and management programs.	The ERD identifies those pit voids where pit lakes will form and makes an assessment of the impacts of those pit lakes to the receiving environment. The assessment assumes a maximum impact scenario, where no management or mitigation is employed. The Eliwana Mine Closure Plan outlines the environmental outcomes for closure including pit lake water quality. The closure plan identifies that there is a range of potential management strategies to meet the closure outcomes with regards to pit lake water quality.
Social Surroundings			
82	**Department of Planning, Lands Heritage (DPLH)**	The Department of Planning Lands and Heritage (DPLH) has reviewed the ERD and notes that Aboriginal heritage is addressed in the Social Surrounds section (4.9) of the ERD. It is noted that the ERD acknowledges Aboriginal heritage and contains the following information The proponent has and will continue to conduct consultation and heritage surveys with the traditional owners (Puutu Kunti Kurrama Pinikura People) (PKKP). Based on the information provided by the proponent, a majority of the Eliwana mine indicative disturbance area has been archaeologically and ethnographically surveyed. The proponent states that identified Aboriginal heritage will be avoided where practicable. Where Aboriginal heritages is not able to be avoided	Comment noted

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		application will be made through section 18 of the Aboriginal Heritage Act 1972.	
83	**DPLH**	DPLH is aware of 184 reported Aboriginal heritage places within the Eliwana Mine Development Envelope. Of these places, 19 are registered Aboriginal sites, 137 are lodged Aboriginal heritage places to which the Aboriginal Heritage Act 1972 (AHA) may apply, and 28 do not meet section 5 of the AHA.	Comment noted
84	**DPLH**	The proponent states that, through consultation with the PKKP, significant Aboriginal sites have been identified including Duck Creek and Eagles Nest. The Proponent indicates that, as part of the proposal, a creek crossing may be required through Duck Creek and the relevant approvals will be applied for through the AHA processes but that otherwise there are no indirect impacts to Duck Creek from light, noise, dust, changes to surface water flows or groundwater extraction. Eagles Nest will not be impacted by the Proposal.	Comment noted
85	**DPLH**	DPLH is aware of three applications submitted by the proponent under section 18 of the AHA to use portion of the land associated with the Proposal that will impact Aboriginal heritage. Is considered that potential impacts to Aboriginal sites, as defined by section 5 of the AHA, are able to be managed through the AHA processes.	Comment noted
86	**PKKP**	The ERD for the MDE is currently unclear how many heritage surveys have been undertaken in relation to the project area. On page 348 section 4.9.3 of the document “studies and surveys” FMG state that there have been in excess of 60 archaeological and 35 ethnographic surveys undertaken in the MDE. On page 369 in the “social surroundings” section FMG state that there have been 17 archaeological or ethnographic heritage surveys undertaken in the project area. FMG were contacted for clarification and having checked against our own records of the surveys undertaken we can confirm that the correct figures are 75 archaeological and 33 ethnographic surveys undertaken to date in the MDE. The information regarding these surveys as presented in the social surroundings review of the PER are cursory and do not provide any specific or relevant information concerning the types of surveys and how they inform the analysis that is presented. While understandably, these surveys are not attached to the ERD, there is no information presented	Fortescue can confirm that a total of 45 Archaeological and 11 Ethnographical surveys have been undertaken within the MDE. A complete list of these surveys is provided within Appendix 5 of this document, including the detail requested for each survey undertaken within the MDE up to and including December 2018. This reporting is also held in trust by Yamatji Marlpa Aboriginal Corporation (**YMAC**), whom currently act for PKKP and review and release all reporting drafted pursuant to survey requests and surveys completed by PKKP and their heritage consultants. In Fortescue’s experience, early commissioning and completion of ‘broad scale’ ethnographic survey affords Traditional Owners the greatest opportunity to confirm and identify the location and extent of heritage places that are most significant to them, and, in turn, inform Fortescue’s project planning to maximise the protection of significant heritage places.

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		regarding when these surveys were conducted, the scope of the surveys or evidence of engagement with Native Title holders with the requisite cultural authority for the areas in question. The information presented is therefore not sufficient to demonstrate that Item 65 of the ESD requirements has been adequately addressed. The ERD states that the surveys are consistent with EPA Act Guidance Statement Number 41, however without dates, areas and methodologies of the surveys, PKKP AC cannot determine whether this guidance is current or not. To date, these surveys have identified 642 archaeological sites and five ethnographic places. It is important to note that this distinction can be somewhat problematic. It is possible for a primarily ethnographic place to also have archaeological values associated and vice versa. Broad scale ethnographic surveys are necessary to inform early planning, but additional ethnographic recording of archaeological sites is required if requested by PKKP. As part of the section 18 collaboration process FMG have been providing PKKP Elders with the opportunity to revisit and provide additional comment on places that will be impacted. PKKP request that FMG continue to provide this opportunity as part of all future section 18 and section 16 applications relating to the project area. Ideally, the PKKP People would have a right of veto over decisions made by third parties to destroy PKKP People's culture. PKKP note that in the document, of the 647 (total) places currently identified, FMG address two in detail Duck Creek and Eagle's Nest. These sites were identified as being of particular cultural significance during an Elder's site visit to discuss the public environmental review (PER) undertaken at Eliwana in late May 2018. Appendix 5 will remain confidential. However, if requested by the relevant Traditional Owners it may be made public.	Fortescue agrees that certain heritage places can have both ethnographic and archaeological values and, accordingly has facilitated and funded opportunities for the PKKP Traditional Owners and heritage professionals engaged by them to revisit and provide additional comment on those places as part of section 18 and section 16 consultations. Additionally, Fortescue has and continues to facilitate this when it is requested by Traditional Owners and not part of an approval consultation. **Fortescue requests that Appendix 5 remain confidential as it contains cultural information that may be considered sensitive to Traditional Owners.**
87	**PKKP**	**Kartajirri (Duck Creek)** Duck Creek is of paramount importance to PKKP and has been a focus of recommendations and concerns raised by the group since the beginning of exploration works at Eliwana. In regard to Kartajirri, PKKP request: • FMG understand that PKKP's responsibility to care for and protect Duck Creek extends beyond the boundary of their own	Fortescue is aware of and acknowledges the importance and significance of Kartajirri (Duck Creek) to the PKKP people. At PKKP's request, Fortescue implemented and have continued to manage the boundary defined by PKKP and heritage professionals engaged by them. Fortescue is committed to continuing to manage that boundary and ongoing collaboration with PKKP.

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		country. They have a responsibility to protect the waters that flow through their country, both for themselves and for the neighbouring groups who also care for sections of Duck Creek; • That FMG, in partnership with PKKP, continue to manage PKKP's preferred boundary for Duck Creek; • FMG engage PKKP rangers to assist in water quality and flow monitoring; and • FMG maintain proper and safe access to Duck Creek so that PKKP People can continue to visit this site to monitor associate heritage sites, camp, fish, gather medicinal plants, practise intergenerational knowledge transfer, and continue to exercise their native title rights. Please provide a discussion on how Kartajirri (Duck Creek) will be managed, including specific management actions.	The Land Access Agreement between FMG and PKKP People dated 10 May 2010, provides for the PKKP People to access Project areas subject to reasonable safety restrictions. Fortescue highlight that there are no direct impacts proposed to Duck Creek. Specific monitoring or management actions for social or cultural values in Duck Creek would be captured within the Cultural Heritage Management Plan discussed at Comment 88, 89 and 91. Fortescue will manage this area by implementing the following specific management actions: 1. Kartajirri (Duck Creek) will be managed in accordance with Fortescue's Land Management System (LMS). The LMS is in place to ensure Fortescue undertakes its work program in compliance with regulatory and contractual obligations, including Fortescue's Land Access Agreement (LAA) with PKKP and the Western Australia Aboriginal Heritage Act (AHA). 2. Fortescue will facilitate access by PKKP to Kartajirri (Duck Creek) to assist the PKKP people to monitor this area, as may be reasonably requested by the PKKP from time to time. 3. Kartajirri (Duck Creek) is now a registered heritage site under the AHA. As such Fortescue will not undertake any activity that may impact upon that site without complying with the AHA. Fortescue is also required to, and is committed to, following the prescribed heritage avoidance, minimisation and mitigation processes set out in the LAA. 4. Fortescue would be pleased to engage PKKP rangers to assist in water quality and flow monitoring of Kartajirri (Duck Creek) subject to agreeing the necessary commercial arrangements. To confirm, Fortescue does not anticipate any indirect impacts to Duck Creek as a result of the proposal, due to its remote proximity to the Proposal. Whilst there is predicted to be some reduction in surface water flow in West Creek, this reduction is dwarfed by the vast amount of surface water flowing in Duck Creek during flood events. Fortescue does not anticipate any indirect impacts from surface water quality post-closure. The final Mine Closure Plan will include strategies to manage water quality based on final landform and pit voids.

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88	PKKP	**Eagles Nest** Eagle's Nest was first identified as a restricted ethnographic site in early 2011. Since then, the PKKP People have been consistent and emphatic in their concerns that this place should never be disturbed as a result of development in the area. In regard to Eagle's Nest PKKP: • Request that FMG make a legally binding commitment to never disturb Eagle's Nest; • Ask FMG to respect that PKKP have clearly stated that they have consulted many times regarding Eagle's Nest and their views will not change. PKKP will object strenuously to any attempts by FMG to secure a section 18 permit to disturb this place; and • PKKP wish to reiterate that Eagle's Nest is a very dangerous place. As the traditional custodians of this country PKKP have a cultural responsibility to protect both the physical and spiritual health and safety of visitors to their country. PKKP assert that any disturbance to Eagle's Nest risks significant spiritual and physical impacts to PKKP people as well as Fortescue's employees and their families. Please provide a discussion on how access to and disturbance of Eagles Nest would be managed, including any agreed measures or boundaries to protect the site.	Fortescue acknowledges and respects that Eagles Nest is a significant ethnographic heritage place for PKKP people. Fortescue is committed to working closely with PKKP to manage this place in accordance with Fortescue's Land Access Agreement (LAA) with PKKP. The LAA outlines how Fortescue notifies the FMG PKKP Heritage Sub-Committee about proposed ground disturbing and non-ground disturbing activities, how archaeological and ethnographic surveys are arranged, heritage places identified and the process by which Fortescue and PKKP seek to agree measures to avoid, minimise and otherwise mitigate impacts to heritage places. The boundary of Eagles Nest has been identified by PKKP Traditional Owners during the conduct of heritage surveys and has been amended (extended) at PKKP's request from time to time. The boundary of Eagles Nest has been provided to Fortescue by PKKP. With the exception of operating and maintaining critical communications infrastructure at the top of Eagles Nest, which was installed after heritage surveys had been conducted by PKKP and with the agreement of PKKP, Fortescue does not allow any unapproved ground disturbance to be undertaken within the boundary of Eagles Nest. Future access to Eagles Nest, with the exception of operating and maintaining the communications infrastructure, will continue to be managed in accordance with the LAA and the AHA. As discussed at Item 6, Fortescue has stated its commitment in the ERD: "*… that there will be no disturbance from mining to this area until the heritage or other values of this area are fully understood and further consultation on this area has been undertaken."*
89	PKKP	**Rock Art** The majority of the rock-art places that have been recorded within the MDE and PKKP country generally are engraving sites. These range from single engraved motifs to complex galleries. Within broader PKKP country rock-art sites are comparatively rare when compared to other types of sites such as artefact scatter and quarries. All rock-art sites are of high cultural significance to the PKKP people and they strongly request that Fortescue make a commitment to avoid these places.	Fortescue is aware of and continues to manage PK10-004 in close consultation with PKPP. Fortescue proposed, and the PKKP Heritage Sub Committee (**HSC**) agreed, that PK10-004 would be an excellent place to undertake investigative works including excavations as part of a section 16 program. Fortescue and the PKKP HSC subsequently and collaboratively developed, applied for and received a Permit from the Registrar of Aboriginal Sites to undertake those works. Fortescue is aware of and continues to manage PK12-076 in collaboration with PKPP.

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		In addition to the impressive collection of engraving sites, two painted rock-art sites have also been identified within the MDE (PK10-004 and PK12-076). As far as we are aware, these are the only two painted rock-art sites currently recorded on PKKP country. Painted rock-art does not preserve as well in the archaeological record due to the friable nature of the pigments and exposure to the elements over time. These paintings are exceptionally rare on PKKP country and in the Pilbara more broadly and are of the highest level of cultural importance and significance to the PKKP people. These sites were first identified in 2010 and 2012 respectively. In discussions over some years concerning these sites, PKKP have been consistent in expressing the rarity, importance, and significance of these places. They have also been consistent in their concern that these paintings may be impacted indirectly by the MDE proposal. PK10-004 was re-discovered in 2010 and PKKP have been consistent in their recommendation that this place is culturally important and significant and should be avoided entirely and adequate protections enacted to ensure that this place is not impacted by the proposed works. In regards to PK10-004 PKKP request: • Further investigation of this place which FMG has committed to as part of their PLH0230-2018/01 section 16 application; • FMG make a legally binding commitment to protecting this place for the life of the mine; • FMG install vibration monitors; and • FMG engage PKKP rangers to conduct regular monitoring visits to this site to ensure the paintings are not being impacted by the mine activities. PK12-076 was first identified in 2012 and PKKP have been consistent in their recommendation that this place is culturally important and significant and should be avoided entirely and adequate protections enacted to ensure that this place is not impacted by the proposed works. In regard to PK12-076 PKKP request: • FMG make a legally binding commitment to protecting this place for the life of the mine; • FMG install vibration monitors; and	As at March 2019, the rock art that has been identified during heritage surveys with PKKP will be avoided by the proposal. Fortescue understands the significance of the Rock Art to the PKKP and commits to the development of a Cultural Heritage Management Plan in collaboration with the PKKP to manage indirect impacts such as dust, vibration, changes to hydrological regimes and access. The Plan would detail overarching social, cultural and heritage management principles and detail specific management measures to be implemented for specific places. Should any other rock art be identified prior to or during the proposal it will be managed in accordance with Fortescue's Land Access Agreement (LAA) with PKKP. The LAA is predicated on what is commonly termed the 'avoidance' principle to the management of Aboriginal cultural heritage. That is, in the first instance Fortescue will seek to avoid impacting Aboriginal cultural heritage material, including rock art, and will otherwise minimise and mitigate impacts to these places. Importantly the LAA prescribes a process by which Fortescue and PKKP will work collaboratively to discuss and address these matters. Discussion on impacts to PK10-004 and PK12-076 are provided at Item 6.

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		• FMG engage PKKP rangers to conduct regular monitoring visits to this site to ensure the paintings are not being impacted by the mine activities. Please provide discussion on how rock-art and specifically painted rock-art would be managed	
90	**PKKP**	The ERD briefly outlines FMG's management strategies concerning the potential impacts of dust emissions, noise, and vibration on heritage sites and the enjoyment of the cultural landscape. The document does not address other concerns raised by PKKP such as the management of access to heritage places within the MDE by non-PKKP people. PKKP request that FMG work with PKKP to develop a cultural heritage management plan (CHMP) specific to the Eliwana MDE and RDE project areas that will outline in detail a framework for the ongoing management of heritage places and the cultural landscape. PKKP also request that FMG continue to discuss the management of specific sites located within the MDE to identify the best ways to manage access and protect these places such as signage, fencing, and cultural awareness training.	Fortescue is committed to working with PKKP to manage access to heritage places by non PKKP people. Fortescue is committed to the development of a Cultural Heritage Management Plan (CHMP) which applies to operations in the Pilbara, with a specific addenda to manage PKKP matters (this addenda would only be accessible by FMG and PKKP).
91	**PKKP**	In the document FMG state that they will "facilitate access to country for traditional owners within safety and operational constraints" (p: 28). PKKP request that FMG collaborate with the group to develop a culturally appropriate access protocol which will allow PKKP to visit the MDE to practise their native title rights and their obligations as the traditional custodians of this country. Please provide a discussion of culturally appropriate access protocol for the PKKP to visit designated areas of the MDE to undertake traditional activities such as gathering, fishing and ceremonies.	Access by PKKP people to the project area is governed by the Land Access Agreement (LAA) between Fortescue and PKKP. The LAA allows for PKKP people to enter the project area at any time subject to restrictions that Fortescue may need to reasonably put in place to manage health, safety and operational requirements and risks. The LAA also contemplates that on the request of PKKP, Fortescue and PKKP will work together to develop an access protocol for any part of the project area.
92	**PKKP**	The document discusses the ethnobotanical species present within the MDE. As per the response to the RDE PKKP have not been consulted regarding the culturally significant flora (or fauna) in the MDE. This information has been collated by and environmental firm using desktop research methods. Page 369 of the ERD phrases this work in such a way that it sounds like a detailed and collaborative consultation has occurred. The only direct consultation undertaken was by an FMG botanist during an on-country Elder's site visit. PKKP do not believe this constitutes adequate consultation and request that FMG commit to undertaking an	Fortescue is committed to assisting the PKKP to undertake further ethnobotanical and ethnozoological studies for inclusion in the CHMP. Fortescue acknowledge that the PKKP Elders have provided a list of local plants and their names in their traditional language. This list was provided in-confidence for Fortescue's internal reference and will only be used for purposes as agreed in collaboration with PKKP AC. Fortescue will further consult with PKKP AC to correctly identify these native species for inclusion in the CHMP.

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		ethnobotanical consultation with PKKP Elders to assist in the identification of ethnobotanical species and the management strategies to be employed to ensure that FMG meet their environmental mitigation objectives as outlined in the document.	
93	**PKKP**	The ERD contains a detailed section concerning the identification and management of threatened and priority ecological communities and significant flora. All flora and fauna species on their country are of importance and significance to the PKKP People and we welcome FMG's commitments to protect and manage these threatened species. We ask that FMG collaborate with PKKP to ensure that PKKP People can take an active role in the management of these species. However, the threatened species are not the only species of cultural significance to the PKKP People. PKKP People continue to utilise this land to hunt, fish and gather a range of ethnobotanical species. PKKP are concerned that impacts to surface water flow and ground clearing impacting floral and faunal communities might drive away the species that they most often hunt for subsistence and ceremonial purposes such as kangaroos, emus, bush turkeys, and bilbies.	Fortescue notes the comments provided and considers that the CHMP is the appropriate tool for maintaining access for cultural activities including hunting, fishing or gathering flora and fauna species.
Mine Closure			
94	**DWER (RSD)**	The proponent has submitted a mine closure plan (MCP), in addition to a mine closure related plan (Appendix 6 of the MCP). The proponent has requested that the closure related plan be approved as is, and states it will not be updated. RSD considers this a risk, and to be in contradiction to the Guidelines for preparing mine closure plans (EPA 2015), which state that mine closure plans are to be "living documents that should undergo review, development and continuous improvement throughout the life of mine". Although the proponent states that the overall closure plan will be reviewed on an ongoing basis, RSD considers it a risk to endorse part of (an appendix) the MCP which should be regularly reviewed over the life of mine. It is unclear how or why this closure related plan has been submitted with the Eliwana Mine closure plan. The conceptual mine void closure	Not all stakeholders are familiar with adaptive management processes. As discussed in the Mine Closure Plan (MCP), the Closure-Related Management Plan Appendix 5 (there is no Appendix 6) describes the adaptive-management processes that Fortescue use to reduce uncertainty in the knowledge base for the key closure-related disciplines of rehabilitation, surface water management and landform management; Those are disciplines where data collected for operational management can also inform closure planning. As stated within the Closure-Related Management Plan an update to that plan will not be required as the relevant information, derived from the processes, will be integrated directly into the main body of the MCP in future updates.

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		categories cannot be endorsed when they are based on a conceptual mine plan.	MCPs (including appendices) will be approved by DMIRS as part of future Mining Proposal and are required to be re-approved every three years in accordance with the *Mining Act 1978*.
95	**DWER (RSD)**	The proponent is seeking approval to dispose of up to 1.2 Gt of waste rock to temporary and permanent waste dumps, in addition to ~84 Mt of tailings material. RSD considers this a significant volume of waste that may be stored ex-pit, within a development envelope situated within the Duck Creek sub-catchment. This sub-catchment contains major rivers and creeks which support several river pools of varying permanence. RSD has previously requested clarification/justification for seeking the approval of open pit voids, ex-pit waste dumps and above/below water table tailings storage facilities, as opposed to backfill of the open pit voids. The ERD does not appear to provide updated information as requested. It is therefore difficult to assess the potential contamination threat to surface and groundwater quality, or the impact on hydrological regimes (surface, sheet flow) of the catchment – both during operations and post closure. As noted previously, due to the lack of information provided, it is difficult to assess the potential contamination risk following mitigation and management actions to surface and groundwater quality or the hydrological regimes (surface, sheet flow) of the catchment during operations and post closure from the pit voids, ex-pit waste dumps and above/below water table tailings storage facilities. It is unclear how the management actions proposed would mitigate the risk to surface and groundwater quality. For example: • Table 8 of Appendix 15 provides a Summary of conceptual site model post-closure. The table identifies several receptors as having unmitigated Serious Risk (Shallow Tertiary Detritial Aquifer from WRL seepage) or unmitigated High Risk (e.g.Duck Creek from surface water and run off from a mine void) with non-specific mitigation measures. Specific mitigation measures are required. • With regard to Duck Creek: “High Risk of surface water outflow from the Broadway West 3 mine void with both surface and groundwater inflows. It is estimated that the quality of this water will not be highly	Waste rock and mine voids will be managed using an adaptive management framework (refer to MCP Appendix 5 *Closure-related management plan*). Prior to the development of each pit, site specific MCPs will be developed and approved in accordance with the Mining Act. Included within those MCPs will be specific management plans for the management of waste rock and pit voids. For each waste rock dump (WRD) site specific detail will be provided: • Describing the proposed Post-mining Land Use (PMLU), closure objectives and completion criteria relevant to the location of the proposed WRD. • Listing key physical and geochemical characteristics of the waste rock to be stored in the WRD. • Describing the site selection process, including an overview of preferred WRD location(s), its environmental setting, local receptors, pathways to receptors and other non-environmental considerations (i.e. heritage). • Listing key operational and closure design aspects required to achieve the closure objectives, in consideration of the environmental setting. • Reviewing design options, then evaluating geotechnical, hydrological and geochemical outcomes of the preferred closure design. • An environmental risk assessment of the preferred WRD closure design, considering design control, additional management, maintenance and contingency measures to minimise risk to as low as reasonably practicable (ALARP), including a description of residual risk, if present. • Outlining monitoring or other requirements required to demonstrate progress towards achieving the completion criteria (performance indicators). For each pit void the inherent environmental risk will be determined to establish whether further detailed management is required. Where the inherent environmental risk is defined as Moderate or higher (e.g. where

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		evapoconcentrated as a result of the throughflow but some West Angela wall rock may cause AMD. The likelihood is almost certain and duration will be centuries, with a possible extent offsite for 10-20 km. This risk could be reduced to Moderate by greater certainty that the water quality will not have a negative impact, and potentially controlling the volume of the out flow by changing the shape of the mine void to reduce the extent." It is unclear from this example whether impacts to Duck Creek can or would be managed to meet the EPA's objectives for this factor. • Table 12 of Appendix 14 contains a similar summary as Table 8 of Appendix 15, for risk during operations. It also contains non-specific mitigation measures eg. For Pinarra Creek and other minor onsite tribulations "High Risk that the Pinarra Creek, which is situated in the centre of the mining footprint, will be heavily impacted by either runoff or flow interruption. The consequence of this impact can be reduced to insignificant with properly managed WRLs and because the Pinarra Creek is not of specific ecological importance. The risk can be reduced to Minor Risk". Please provide further explanation on how Waste Rock and Pit Voids will be managed, including detailing the contamination pathways and sensitive environmental receptors with a discussion on residual risk. Please ensure that specific management measures are provided to demonstrate that the EPA's objectives for this factor can be met. Note: "Runoff" is listed as a receptor in Table 8. This is not a receptor – rather a pathway to other receptors such as creeks, vegetation etc.	acid generating material is present on the final pit wall or the pit extends below the water table), site specific detail will be provided: • Describing the proposed Post-mining Land Use (PMLU), closure objectives and completion criteria relevant to the location of the proposed pit. • Listing inherent key physical, hydrological and geochemical characteristics of the void, including an overview of its environmental setting, local receptors, pathways to receptors and other non-environmental considerations (i.e. heritage). • Listing key operational and closure design and/or management aspects required to achieve the closure objectives, in consideration of the environmental setting. • Reviewing closure management options, then evaluating geotechnical, hydrological and geochemical outcomes of the preferred closure design. • An environmental risk assessment of the preferred pit void closure design, considering management controls and contingency measures specific to the pit to minimise risk to as low as reasonably practicable (ALARP), including a description of residual risk, if present. • Outlining monitoring or other requirements required to demonstrate progress towards achieving the completion criteria (performance indicators). Contamination pathways are described in detail in the Operational and Closure Contamination risk assessments under the column Transport which aligns with the language used in the risk assessment guidelines. Runoff is listed as a Receptor only in the discussion of Aboveground Waste Rock Landforms where it is both Transport pathway *and* Receptor. This is because natural runoff is a vital water source for some ecosystem functions reliant on ponding. This water is not solely a pathway as then there would be no connection with a sensitive receptor as ultimately the water evaluated for risk in this instance ponds, and evaporates.
96	**DWER (RSD)**	The indicative completion criteria generally refer to a time frame of "at least five years after closure implementation. This timeframe is not measurable (e.g. how many years after five years?).	Guidelines for preparing mine closure plans (EPA 2015) recommends that at the Environmental Assessment Stage completion criteria are qualitative, to be updated and refined to quantitative criteria during

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			operations. As described in the MCP, the supplied qualitative completion criteria will be reviewed and refined over the life of the operation.
97	DWER (RSD)	There is no proposed ground or surface water monitoring to verify water quality and hydrological regime closure objectives.	As above, the supplied qualitative completion criteria will be reviewed and refined over the life of the operation.
98	DWER (RSD)	The MCP proposes to measure changes to hydrological regimes and the impact on downstream environmental or heritage values through an environmental report. RSD does not consider this an appropriate management tool for such a broad closure objective.	As above, the supplied qualitative completion criteria will be reviewed and refined over the life of the operation.
99	Department of Mines, Industry Regulation and Safety (DMIRS)	Section 4.4.4.3 of the ERD indicates that 50%, 10% and 1% Annual Exceedance Probability (AEP) events have been modelled. In terms of closure, DMIRS expects more extreme events to be modelled and considered in closure designs, such as Probable Maximum Precipitation/Probable Maximum Flood events.	Noted. Fortescue notes that the ERD (including Appendix 3) includes development of a conceptual model of the surface water system, which was used to help characterise the hydrologic regime and to analyse and assess surface water impacts, as required by the ESD. This peer reviewed conceptual modelling included sufficient detail to address the requirements of the ESD described above, based on consideration of guidance in Australian Rainfall and Runoff (ARR) 2016 and information provided in the ARR 2016 training by authors. Development of detailed infrastructure designs (including closure designs), and associated modelling will be undertaken progressively throughout the project, to enable assessment of Mining Proposal's submitted under the Mining Act 1978. This modelling will include appropriate consideration of floods classified in ARR 2016 as very rare to extreme events (which includes the Probable Maximum Precipitation event), taking into account guidance in ARR 2016, and information provided in the ARR 2016 training by authors on the appropriate application of extreme flood hydrology.
100	DMIRS	Section 6.1 of the MCP outlines potential closure options however, it states that the final land use will be determined towards the end of mine life. DMIRS expects that final post mining land use will be investigated and negotiated with key stakeholders throughout the life of mine, and the agreed final land use be determined as early as possible during the mine's life.	Fortescue will investigate and negotiate post mining land use with key stakeholder throughout the mine life. Section 5 of the MCP discusses the process for consultation with key stakeholders during operations.
101	DMIRS	Section 6.2:	Fortescue acknowledges that surface water and groundwater, including any pit lakes left in the environment post closure, are fundamental environmental features in their own right. The conceptual site model

<table>
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Objective 2 states ‘waste rock landforms are safe to people and animals and geotechnically stable’. DMIRS expects that the entire site be left in a safe state (e.g. open pits should also be left in a safe state).
Objective 5 states ‘water quality does not adversely impact downstream environmental or heritage values’. DMIRS expects that mining be conducted in a manner to also not significantly impact upon the quality of ground or surface water.

It is noted that key risks for water contamination would still be present (e.g. permanent pit lakes and extraction of PAF material) at the conclusion of mine closure, and that the proponent has still identified that “water quality does not adversely impact downstream environmental or heritage values” is a relevant objective in the MCP.

DMIRS and the EPAS consider that surface water and groundwater are receptors in their own right, regardless of the environmental and heritage values identified downstream. (Please see item 95).

Please provide a brief discussion within the RtS of the closure objectives for the proposal.
</td><td>
specifically lists Surface Water and Groundwater as Transport pathways connected to Creeks and Aquifers as Receptors; they are part of the local ecosystem post-closure, and as part of the ecosystem they will have an environmental value. The environmental and heritage values, such as local ecosystem services, will be retained post-closure.

The rationale behind the closure objectives was discussed in Section 6.2 of the MCP. These closure objectives were established based on an assessment of Project risk, whereby closure objectives were developed for aspects of the mine closure that could prevent Fortescue from achieving safe, stable and non-polluting landforms which support self-sustaining ecosystems.

<table>
<tr><th>Eliwana Closure Objectives</th><th>Rationale Risks</th></tr>
<tr><td>Infrastructure is removed or retained in line with agreements reached with future land users and managing authorities.</td><td>Some infrastructure may be retained at the request of the next land-users. For example, roads may be retained to facilitate ongoing land management (e.g. for monitoring access) or to replace roads / access removed during mining (e.g. for cultural land access).

Transfer of the liability and accountability for managing retained infrastructure requires a legal agreement between parties.</td></tr>
<tr><td>Waste rock landforms are safe to people and animals and geotechnically stable.</td><td>Numerous landforms will be constructed from waste rock and borrow materials over the life of the mine. These landforms will remain post-closure and will need to be suitably stable for a future land use.</td></tr>
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				The waste rock may also contain fibrous and / or deleterious materials, which must be contained so as not to negatively impact the health of people and animals.
			Rehabilitated areas support local native, self-sustaining vegetation and native fauna foraging.	In lieu of an agreed post-mining land use, self-sustaining ecosystems will be established in order to minimise ongoing management. Native vegetation is required as the impact of introducing non-native species is unknown. The use of native species of local prevenance is preferred to maintain the local gene pool. While the vegetation may not necessarily replicate pre-mining vegetation communities, the rehabilitated vegetation should not inhibit native fauna foraging activities. Where possible, the rehabilitation should also seek to reconnect habitat that has been disconnected during mining.
			Sediment movement within and downstream of rehabilitated areas does not adversely impact environmental or heritage values.	There is the potential for sediment to impact environmental and heritage values if: - Sediment movement increases erosion rates within drainage lines adjacent to valued sites / places, potentially

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				undermining or flooding the site / place (depending on the substrate conditions), or - Erosion rates are too low and cause excessive siltation of pools or smother valued vegetation, or - Sediment contains deleterious materials that impact plant or fauna health. In the Pilbara, vegetation cannot be used as a reliable means of erosion control, due to the naturally sparse vegetation density and propensity for bush fires to burn vegetation. Constructed landforms and disturbed ground will need to be constructed or shaped as part of rehabilitation activities to maintain erosion rates comparable to Pilbara norms.
			Water quality does not adversely impact downstream environmental or heritage values.	Deleterious materials found in waste rock or eroded from pit walls have the potential to impact water quality if they are left in contact with water and oxygen, and if the water / materials interact with the environment. (Note, the volume of deleterious material that may be encountered is relatively low (<8% of total waste rock) and geochemical analysis suggests there is a low potential for acid and / or metalliferous drainage to occur.)

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				If pit lakes remain on closure, the effects of evaporation, biological and biological-geochemical processes may also influence water quality. This could also impact local values. Compartmentalisation of the groundwater system suggests there are limited opportunities for water to move through the ground to interact with the environment. However, creek flow may need to be re-established via some pits (which may also host pit lakes), providing a pathway for the transfer of problematic water.
			Changes to hydrological regimes do not adversely impact downstream environmental or heritage values	Duck Creek and Boolgeeda Creek have environmental and heritage values that must be maintained post-closure. Pits will be developed within a narrow valley with limited or no room for local tributaries to the major creeks to be diverted around the pits. During mining creek flow within the tributaries may be reduced or terminated. Termination of the tributaries is not predicted to impact the hydrological regime or ecological function of Duck Creek and Boolgeeda Creek. On closure the extensive changes to the topography associated with mining may prevent the creeks

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				from being restored or the regularity of flows maintained over the long term. Changes in flows may alter water availability within the tributaries and in the subsurface (surficial) aquifers. These changes may in turn influence vegetation species abundance and structure of riparian vegetation.
			Pit lakes do not present a significant risk to human health or a significant ecological threat.	There is the potential for pit lakes to remain / develop in some pits post-closure, if all other closure objectives can also be achieved. Retention of pit lakes will be discussed and negotiated with key stakeholders on a pit by pit basis, in consideration of impacts to local values and post-closure land use. Permanent pit lakes can be attractive to fauna and people alike; providing opportunities for increased breeding habitat (changed migratory paths) and increased predation for fauna, and sites for recreation, fishing and hunting for humans if safe egress is available. Where the pit lake is connected to a creek system, the creek can supply the pit lake with sediment laden nutrients, seeds and aquatic fauna to sustain an aquatic ecosystem.

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			However, the water body may also attract waterborne pests, algae or bacteria that may pose a risk to public health.
102	**DMIRS**	Section 7.1: • Completion criteria for objective 2, relating to management of PAF material, states 'independent review confirms that materials likely to generate acid or metalliferous drainage are absent from the upper 10m of each WRL'. DMIRS expects further criteria be included to demonstrate that acid mine drainage (AMD) is not being generated and reporting to any receptors (e.g. groundwater). • Completion criteria for objective 4 refers to average erosion rates being below 6 t/Ha/yr, while performance indicators in Table 10 refer to 5 t/Ha/yr. It is unclear how these erosion rates have been determined. Baseline data for the surrounding un-disturbed (pre-disturbance) areas should be presented to demonstrate that the proposed erosion rate is appropriate. Please note, the qualitative completion criteria presented is considered acceptable at this stage however, it is expected that completion criteria will be further developed to become quantitative as operations progress. Please note, while DMIRS agrees that the strategies used to obtain erosion rate information are appropriate, DMIRS has not provided endorsement that "6t/Ha/yr" is an acceptable erosion rate for all rehabilitation areas in the Pilbara. Please provide further justification for this erosion rate. DMIRS notes that section 3.9 of the Landloch (2018) report states that based on the information presented, identification of a single value or range of "acceptable" erosion rate will clearly be a matter of judgement. In addition, section 6 of the Landloch report outlines a number of limitations and further works required, including the requirement for more comprehensive information on natural erosion rates across the Pilbara region.	As described in MCP Section 7 all of the completion criteria referenced in the MCP are indicative and will be reviewed and refined over the life of the operation, following feedback from key stakeholders and to reflect improvements in the knowledge base The threshold erosion rates of 6t/Ha/yr is a qualitative, indicative completion criteria that is only applied to closure domains containing waste rock landforms. This threshold will not be applied to, and it would not be appropriate to apply to, all areas that will be rehabilitated. As part of the waste rock dump (WRD) site specific detail design (refer to Item 95), location specific thresholds for acceptable rates of erosion will be developed based on the waste material properties, local environmental setting and risks to downstream receptors. The further work planned to close knowledge gaps prior to closure include, but are not limited to: • Development of site specific waste dump designs in consideration of local environmental setting and risk (refer to Item 95) • Complete characterisation of waste rock presenting on the waste dumps. • Undertake erosion modelling to predict landform performance in the environmental setting. • Undertake field trials to confirm design performance.

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		As such, DMIRS expects that site specific data be used to determine acceptable erosion rates for rehabilitation at the Eliwana site. Please provide a discussion regarding this knowledge gap, identifying further works that will be conducted to close this knowledge gap.	
103	**DMIRS**	Section 8.3, Figure 9 shows areas of vegetation likely to be impacted downstream of creek truncation have been indicated on a map however, the extent of the local impacts has not been quantified in detail. This information should be provided to enable a determination on the acceptability of this indirect disturbance. Backfilling of pits within drainage lines to re-instate surface water flows should also be included for consideration.	Impacts to drainage line vegetation within the mining area will have already been realised at end of mine life and these impacts are quantified and discussed in Section 4.6.5.9 of the ERD. The drainage areas identified in Figure 9 of the MCP (and Figure 12 of the ERD) is the predicted maximum extent of impacts to surface water flow in an un-mitigated scenario. Table 10 of the MCP outlines the objective for surface hydrology and the completion criteria by which success will be measured. Backfill of pits is a possible management option to prevent the generation of poor quality water where AMD material is exposed in pit walls. At this time, backfill of pits to re-instate surface water flow has not been excluded as a closure scenario.
104	**DMIRS**	A number of mine pit closure strategies have been presented in section 10 of the Mine Closure Plan (MCP). The majority of the options presented indicate that impacts to ground and/or surface water quality is likely. While the MCP indicates that the closure strategy to be implemented will consider impacts to downstream groundwater dependant environmental or heritage values, DMIRS considers significant long-term impact to local groundwater quality as unacceptable. DMIRS therefore recommends that appropriate management measures be developed to ensure that there are no long-term impacts to ground or surface water quality (e.g. deleterious material exposed in the mine pits is appropriately encapsulated). DMIRS expects that anticipated available, and required, volumes of benign material, along with appropriate encapsulation material (i.e. low permeability) for deleterious materials, be presented within the MCP to demonstrate that an appropriate outcome can be achieved should Acid Metalliferous Drainage (AMD) from pit wall exposures be a risk at closure.	Figure 14 option D) illustrates how deleterious material exposed in the mine pits will be encapsulated with benign waste rock to minimise AMD generation. Table 18 in the MCP lists the waste rock volumes by geology that are expected to be excavated. Table 33 in the MCP lists the percentage of potentially deleterious (AMD producing) materials that are expected to report to the waste dumps. The percentage of deleterious material is generally <10% of the waste dump volume. The percentage of acid generating, acid consuming and non-acid forming waste rock from each pit is provided Table 34 in the MCP. This table shows that 43% of waste rock is likely to be acid consuming (capable of neutralising acids) and 23% is non-acid forming, with 14% expected to be classified as AMD. Thus 66-86% of the waste rock will be suitable for encapsulation purposes. Potentially deleterious material exposed on the final pit walls will be mapped and tested to verify the AMD potential. AMD risk will be established in consideration of the AMD classification using site specific source-pathway-receptor models and appropriate mitigation measures

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			will be employed to ensure there are no long-term impacts to ground or surface water quality.
105	**DMIRS**	Section 10.2.1 of the MCP discusses encapsulation of PAF with 10m of highly permeable Non Acid Forming (NAF) material. As ingress of water into PAF material has the potential to create AMD, DMIRS requests further information regarding the suitability of the proposed design. Should 10m of high permeability NAF material not be adequate for limiting water ingress, DMIRS requests further information on the presence of low permeability material on site that can be placed between the PAF and NAF material. Figure 4 in the MCP relates to the Closure Planning Consultation Cycle and does not outline the water balance outcomes associated with a waste dump constructed to the proposed design under average rainfall conditions. Please correct the RtS accordingly.	Figure 6 of this document illustrates the water balance outcomes associated with a waste dump constructed to the proposed design under average rainfall condition of 391 mm/yr. As discussed in the MCP the physical characteristics of the waste rock dump are influenced by blasting and construction activities; thus, waste dump parameters for the water balance model including infiltration and permeability were extrapolated from similar geological units mined at Fortescue's Solomon mine (Solomon Frederick MCP approved by DMIRS in June 2018, Reg ID 71131). When water ponds on the surface of the waste dump following rainfall, infiltration was assumed to be 18 mm/hr, which is considered to be relatively high and therefore conservative. Using an equally conservative estimate of evaporation of 0.49 mm/day from the ponded water (equating to 180 mm/yr) the average volume of water expected to infiltrate into the waste dump was 211 mm/yr. If the waste rock is assumed to have a permeability similar to other waste rock materials in the Pilbara of 7 x 10^{-7} m/s it will take 1.5 years for the 211 mm/yr infiltration to travel 2 m down into the waste dump and 7.5 years before the infiltration encounters the PAF material. As this water travels through the benign waste rock it will encounter the root zone of revegetated plants. Again, if we assume the soil and plants to have a very conservative evapotranspiration rate of 200 mm/yr (Bureau of Meteorology report average evapotranspiration rates for the Pilbara of ~300 mm/yr), only 11 mm/yr of the initial rainfall infiltration is likely to travel beyond the root zone. The resulting 11 mm/yr of water not utilised in the 'store and release' cover equates to <1 mm/day (0.03 mm/day) of net percolation. Seepage will occur when the storage capacity within the waste dump is reached. With a net percolation rate of 11 mm/yr it is expected to take thousands of years for the dump to reach capacity. The 10 m of benign waste rock provides an opportunity for deep rooted plant species to be used in the 'store and release' cover. Deep rooted plant species may be able to access water stored deeper within the waste

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			dump – without encountering PAF due to the 10 m benign cover – and therefore sustain higher transpiration rates for longer periods. These conditions in turn may increase the waste dump evapotranspiration rates. If achieved, the increased evapotranspiration rates would further reduce the net percolation and thus retard seepage. The waste dump water balance suggests the 10 m benign 'store and release' cover will adequately limit water ingress into the PAF material. Waste dump characteristics will be verified during construction of the waste dump. Section 8.2.2 of the MCP identifies the fine valley loam sub-soils located in the mine area as a supplementary source of low permeability material, if required.
106	**DMIRS**	It is difficult to determine the proposed location of waste dumps in relation to drainage lines. Where waste dumps are to be located within extreme event flood zones (e.g. Probable Maximum Flood), appropriate armouring of waste dumps is to be included in the design to ensure the waste dumps remain stable. Given the limited amount of low erodibility material present at the site, as indicated in Table 33 of the MCP, further information needs to be provided to demonstrate that adequate volumes of competent armouring material will be available should waste dumps be located within flood zones. Confirmation that Waste Dumps will be located outside of 1:100yr ARI floodplains is acceptable at this stage as it demonstrates that the risk of erosion as a result of surface water flows is reduced. However, it is noted that while the proponent has indicated that 20% of waste rock to be extracted is considered likely to be of low erodibility, this material is often used in the construction of site infrastructure. This has been an issue at the proponent's Solomon mine, which has resulted in the company proposing to quarry additional rock (creating additional disturbance) in order to meet closure requirements. Please provide clarification on the amount of competent rock anticipated to be available for use in closure is provided.	The waste dumps presented in the MCP assume all waste rock is stored outside the pits (ex-pit), to facilitate assessment of the maximum potential contamination risk. Where practical and where required to mitigate in-pit AMD issues, waste rock will be stored / backfilled or moved inside the pits. As discussed in the MCP, waste dumps will generally be constructed to fill in the small, isolated valleys associated with the rugged hills adjacent to the pits. Those valleys are not part of the creek floodplain which runs through the centre of the mine area. As such the waste dumps are located outside the '100-year' floodplain. Waste dumps will not be constructed within flood zones. Section 8.2.4 of the MCP discusses the management of erodible material and rock armour. Around 20% of the waste rock will be suitable for use as rock armour, if required. While competent rock may be used in the construction of site infrastructure, that rock may be reclaimed to be used in closure activities where required. During the construction phase of the mine, for example, screening plants are being used to generate component rock. That additional component rock source will also be available for use on closure. Thus, the volume of competent rock anticipated to be available for use remains at 20%. Please note, in accordance with continuous improvement review and update to the Solomon MCP, further detailed physical testing and design activities have identified new sources of competent rock within that site's existing waste rock products, but more importantly, it has identified new

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			closure designs that can achieve the closure objectives without the need for rock to armour the landforms.
107	**DWER (EPAS)**	Please provide a table to quantify the impacts to GDE and Riparian Vegetation. Provide information demonstrating how impacts to Vegetation Type EvAcCcERIt have been minimised. Provide a discussion regarding the significance of predicted impacts to this vegetation type. *This item was added following a request from DWER. The comment relates to Flora and Vegetation, not Mine Closure.*	The Table requested is located at Attachment 3 of this document. The majority of EvAcCcERIt occurs within Pinarra Creek, which runs through the middle of the valley in which the majority of the mining proposed for Eliwana occurs. Some of the areas proposed to be mined intercept with Pinarra Creek and for this reason, the vegetation within Pinarra Creek will either be cleared for mining (154.5 ha) or impacted by changes to surface water flow. Some areas of EvAcCcERIt also occur within area subject to a decline in groundwater level, although Fortescue consider it unlikely that this vegetation is dependent on groundwater. Consequently, a total of 206 ha is likely to be impacted by changes to surface water flow (Attachment 1), noting that the highest impact will of course occur within the mining footprint area. Impacts to surface water flow lessen with distance away from the area of disturbance. With regards to minimising impacts to the vegetation community, Fortescue has avoided placing infrastructure within Pinarra Creek, with all waste rock dumps other stockpiles located away from the creek. However, the location of the pits within the creek is unavoidable. Mine closure objectives for hydrological regimes also considers that these impacts are unavoidable. Closure criteria within Pinarra Creek refer to the adaptation of downstream environments to these changes to surface water flow. Fortescue highlights that vegetation communities in Pinarra Creek that have been mapped downstream of the Biota 2018 survey area are analogous to EvAcCcERIt. The table at Attachment 1 of this document includes vegetation community EvAcCc, which was mapped by Ecoscape in 2013 (Appendix 8 of Biota, 2018). Over 5,000 ha of this community has been mapped in creeklines downstream of the Eliwana MDE. Fortescue considers that the direct disturbance of 154.5 ha and indirect impacts to 206 ha of EvAcCcERIt will not threaten its conservation given there is likely to be over 5,000 ha of EvAcCcERIt/EvAcCc in the area surrounding Eliwana.

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3. REFERENCES

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Figure 1: Groundwater Drawdown and Groundwater Dependent Vegetation (maximum drawdown)

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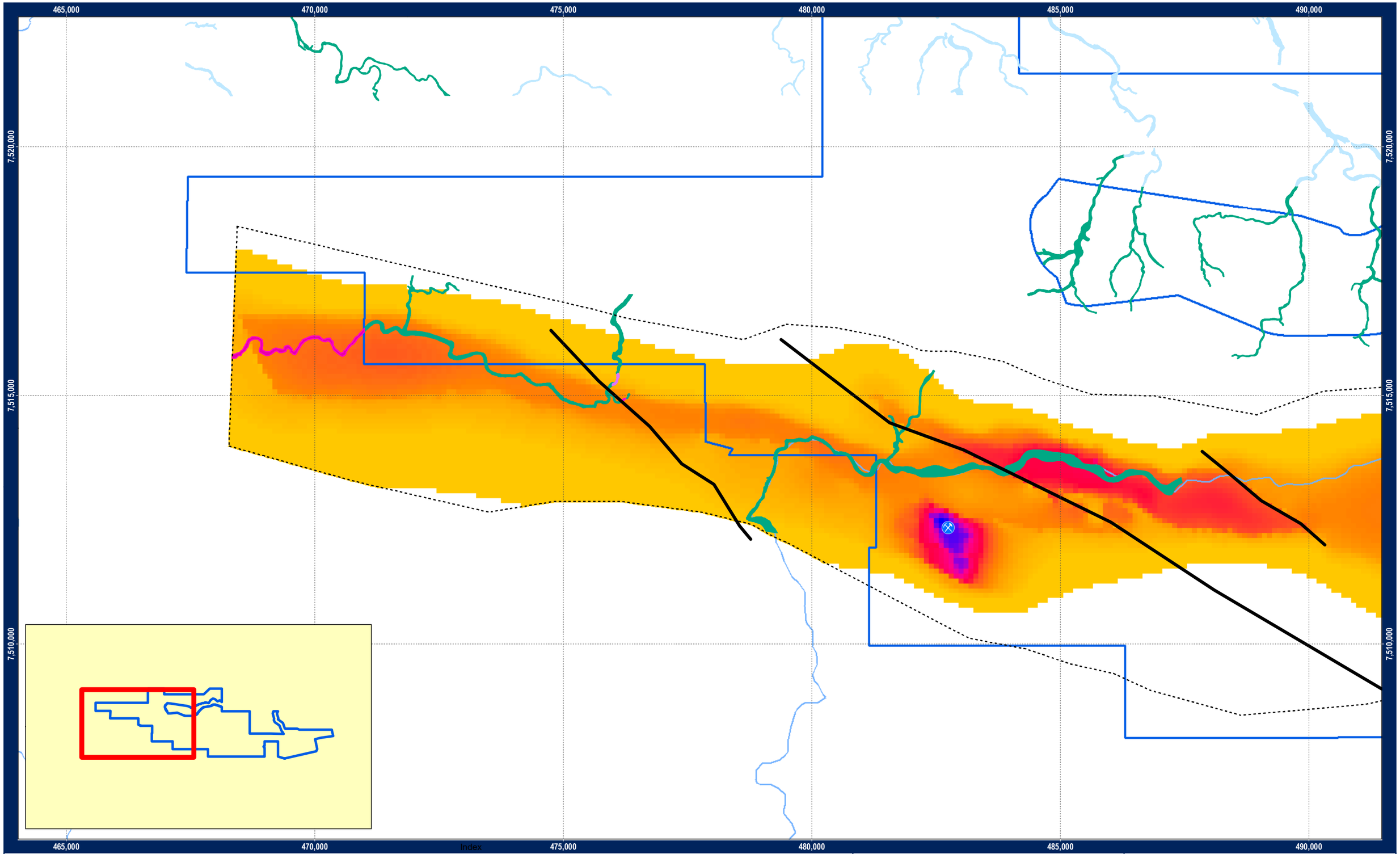


LEGEND

- Fortescue Projects
- Dyke
- Major Drainage
- Mine Development Envelope
- Eliwana Model

Potential Groundwater Dependent Ecosystems

- EvAcCcERlt
- EvAcMgERlt

Groundwater Dependent Ecosystems

- EcAcEUaTe
- MaMgCYPv

High : 166.667

Low : 0

Data Sources:

Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

N

0 1,000 2,000 3,000 4,000
Meters

Requested By: M.Dowling
Drawn By: S. Costello
Revised By: sroestenburg
Approved By: P. Mastalir
Scale: 1:70,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.006_r1

Date: 20/03/2019
Size: A3L
Revision: 1
Confidentiality: 1

Impacts from Maximum Groundwater Drawdown on Groundwater Dependent Vegetation

Map 1 of 3

Fortescue Metals Group Ltd
The New Force in Iron Ore

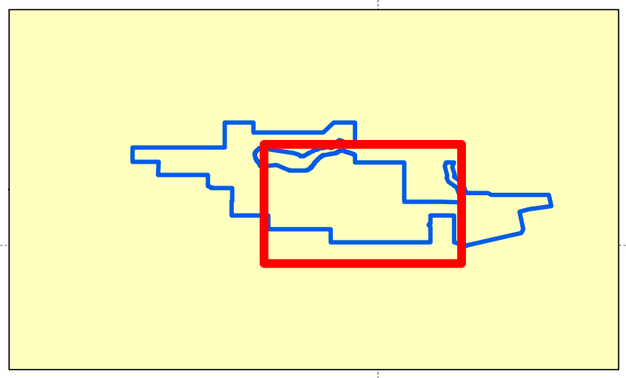
490,000 495,000 500,000 505,000 510,000

7,515,000

7,510,000

7,505,000

PINARRA CREEK



LEGEND

- Dyke
- Major Drainage
- Mine Development Envelope
- Eliwana Model

Potential Groundwater Dependent Ecosystems

- EvAcCcERlt
- EvAcMgERlt

High : 166.667

Low : 0

Data Sources:

Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

N

0 1,000 2,000 3,000 4,000

Meters

Requested By: M.Dowling
Drawn By: S. Costello
Revised By: sroestenburg
Approved By: P. Mastalir
Scale: 1:70,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.006_r1

Date: 20/03/2019
Size: A3L
Revision: 1
Confidentiality: 1

Impacts from Maximum Groundwater Drawdown on Groundwater Dependent Vegetation

Map 2 of 3

Fortescue Metals Group Ltd
The New Force in Iron Ore

7,515,000

7,510,000

7,505,000

510,000

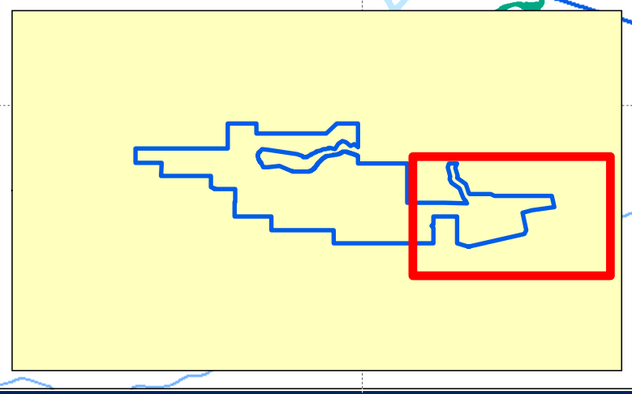
515,000

520,000

525,000

530,000

BOOLGEEDA CREEK



LEGEND

- Dyke
- Mine Development Envelope
- Eliwana Model

Potential Groundwater Dependent Ecosystems

- EvAcCcERlt
- EvAcMgERlt

High : 166.667

Low : 0

Data Sources:

Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

N

0 1,000 2,000 3,000 4,000

Meters

Requested By: M.Dowling
Drawn By: S. Costello
Revised By: sroestenburg
Approved By: P. Mastalir
Scale: 1:70,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.006_r1

Date: 20/03/2019
Size: A3L
Revision: 1
Confidentiality: 1

Impacts from Maximum Groundwater Drawdown on Groundwater Dependent Vegetation

Map 3 of 3

Fortescue Metals Group Ltd
The New Force in Iron Ore

Figure 2: Groundwater Drawdown and Groundwater Dependent Vegetation (residual drawdown)

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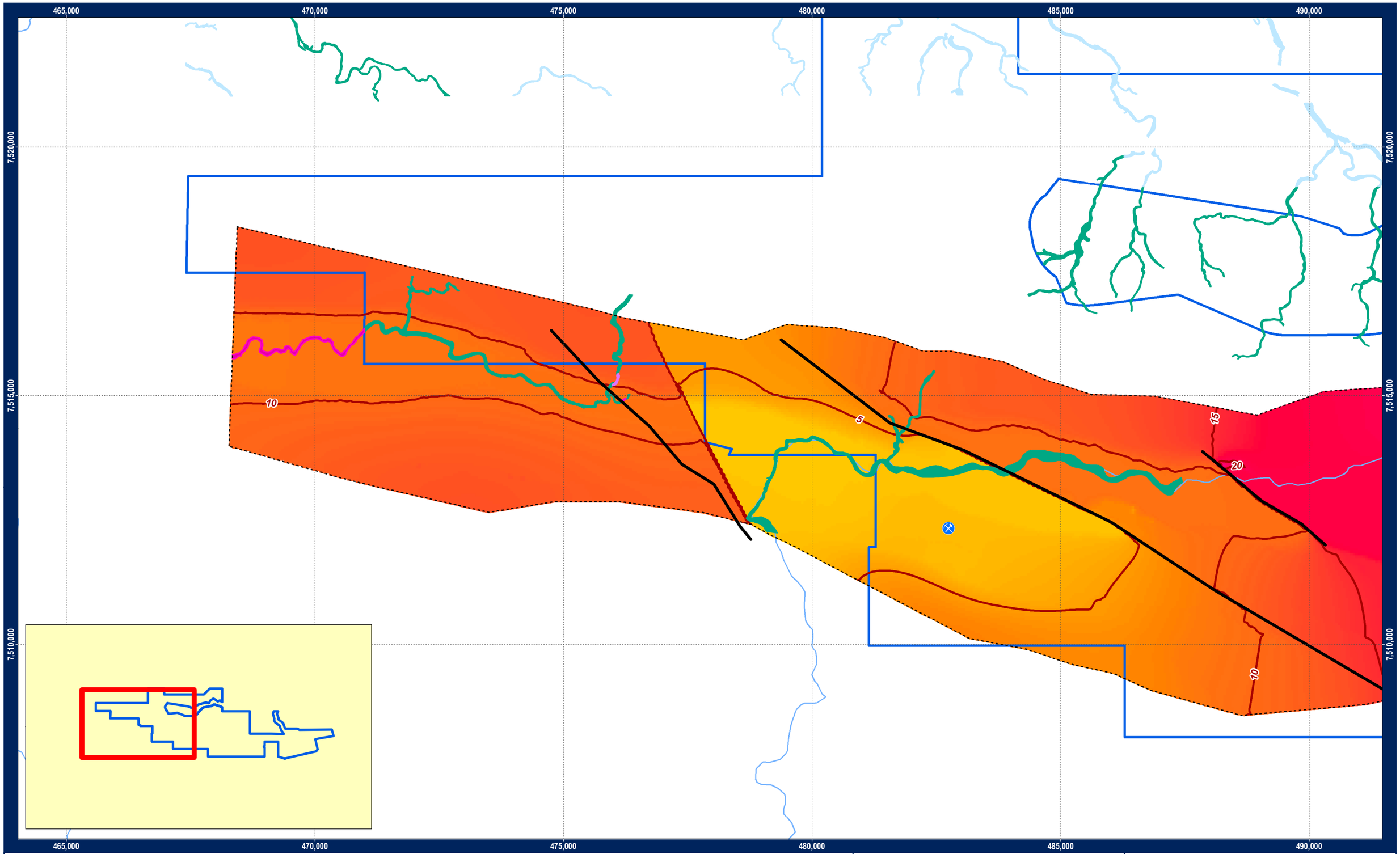


LEGEND

- Fortescue Projects
- Dyke
- Major Drainage
- Mine Development Envelope
- Eliwana Model

Potential Groundwater Dependent Ecosystems

- EvAcCcERlt
- EvAcMgERlt

Groundwater Dependent Ecosystems

- EcAcEUaTe
- MaMgCYPv

100 Years Post Closure Contours

High : 39.9875

Low : 0.0595786

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

N

0 1,000 2,000 3,000 4,000
Meters

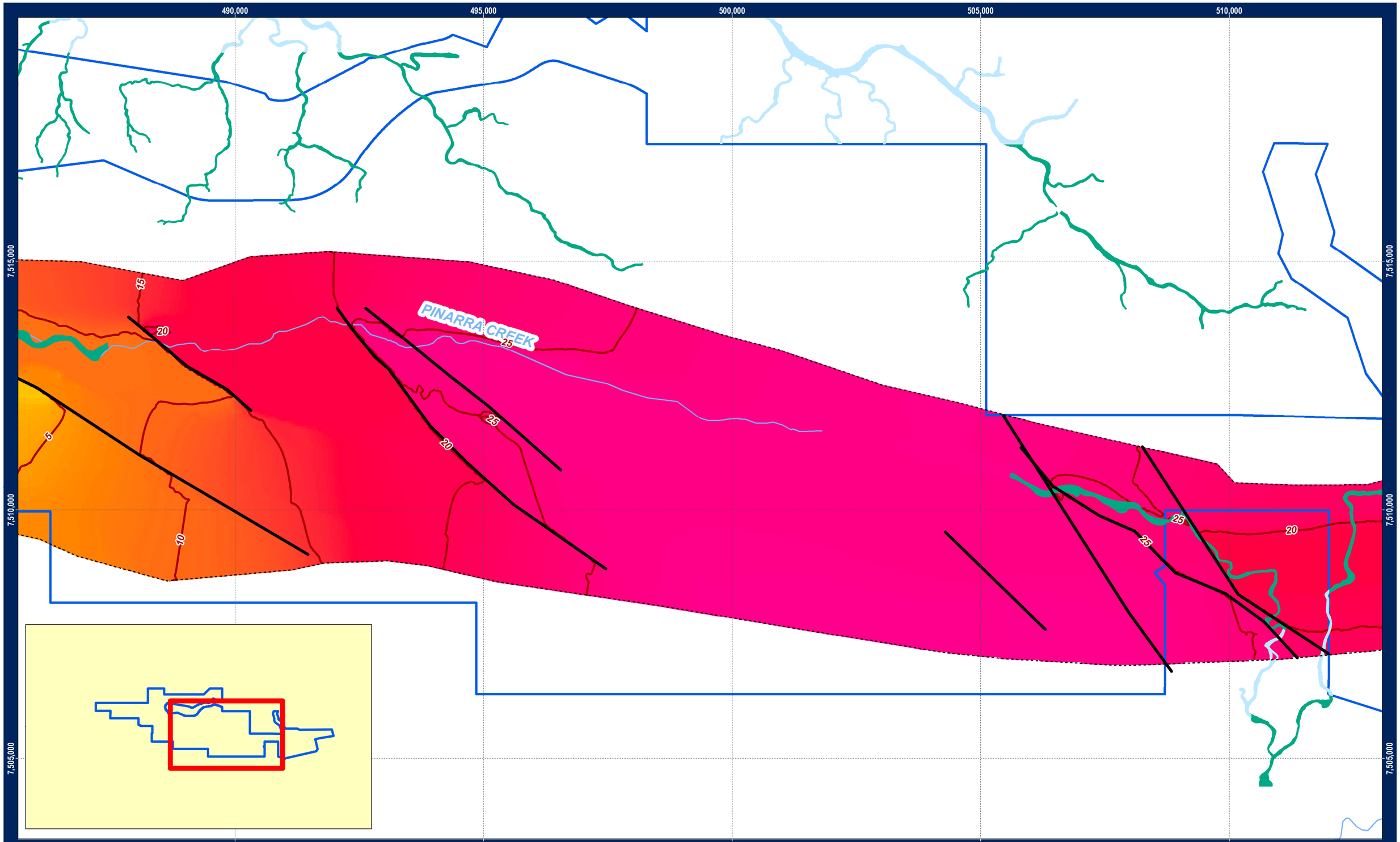
Requested By: M.Dowling
Drawn By: S. Costello
Revised By: jburke
Approved By: P. Mastalir
Scale: 1:70,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.006_r2

Date: 3/25/2019
Size: A3L
Revision: 1
Confidentiality: 1

Impacts from Maximum Groundwater Drawdown on Groundwater Dependent Vegetation

Map 1 of 3

Fortescue Metals Group Ltd
The New Force in Iron Ore



LEGEND

- Dyke
- Major Drainage
- Mine Development Envelope
- Eliwana Model

Potential Groundwater Dependent Ecosystems

- EvAcCcERIt
- EvAcMgERIt

100 Years Post Closure Contours

High : 39.9875

Low : 0.0595786

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

N

0 1,000 2,000 3,000 4,000
Meters

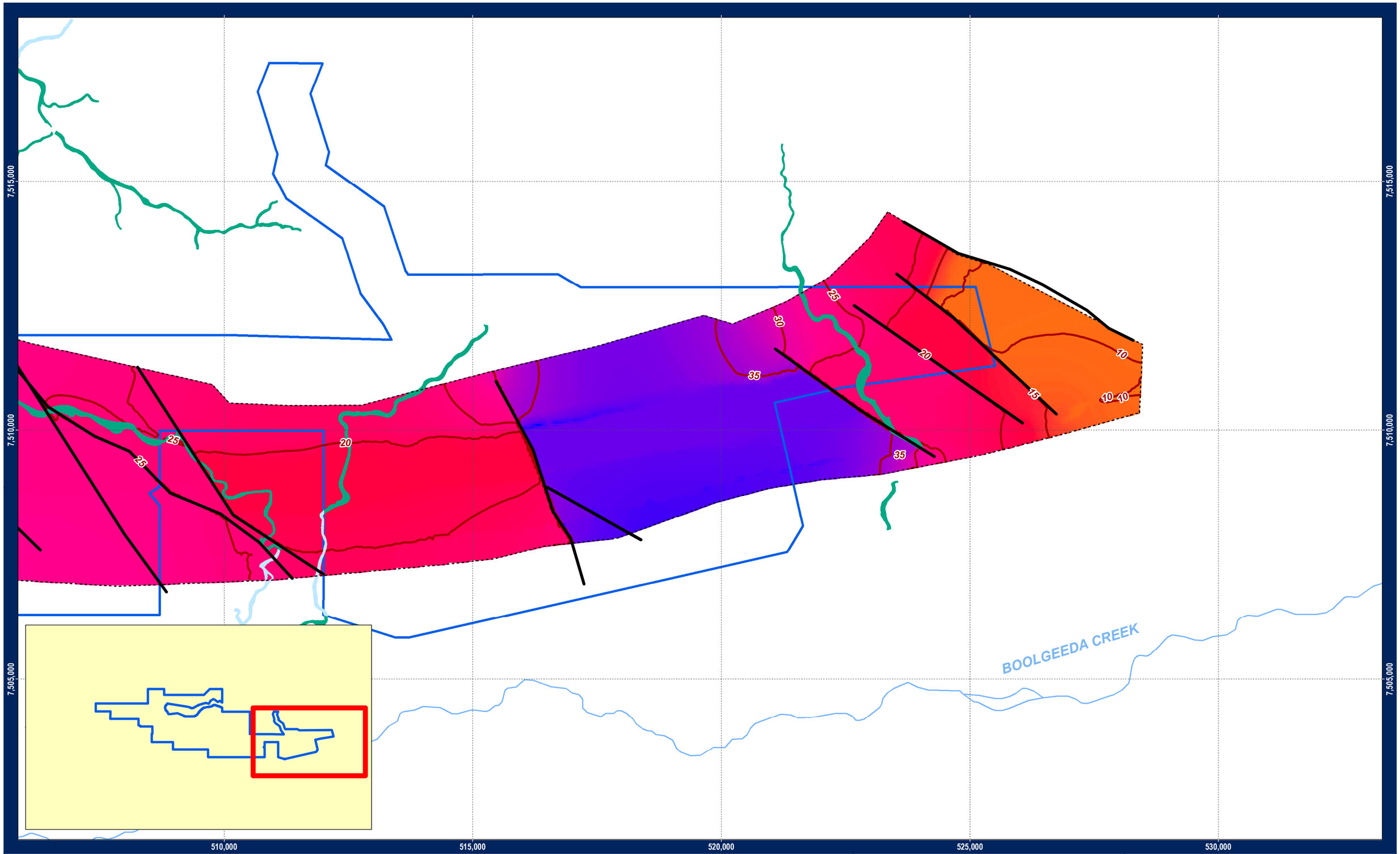
Requested By: M.Dowling
Drawn By: S. Costello
Revised By: jburke
Approved By: P. Mastalir
Scale: 1:70,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.006_r2

Date: 3/25/2019
Size: A3L
Revision: 1
Confidentiality: 1

Impacts from Maximum Groundwater Drawdown on Groundwater Dependent Vegetation

Map 2 of 3

Fortescue Metals Group Ltd
The New Force in Iron Ore



LEGEND

- Dyke
- Mine Development Envelope
- Eliwana Model

Potential Groundwater Dependent Ecosystems

- EvAcCcERIt
- EvAcMgERIt

100 Years Post Closure Contours

High : 39.9875

Low : 0.0595786

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

N

0 1,000 2,000 3,000 4,000
Meters

Requested By: M.Dowling
Drawn By: S. Costello
Revised By: jburke
Approved By: P. Mastalir
Scale: 1:70,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.006_r2

Date: 3/25/2019
Size: A3L
Revision: 1
Confidentiality: 1

Impacts from Maximum Groundwater Drawdown on Groundwater Dependent Vegetation

Map 3 of 3

Fortescue Metals Group Ltd
The New Force in Iron Ore

Figure 3: Updated Figure 25 (Map A to E)

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462,000 464,000 466,000 468,000 470,000 472,000

7,518,000

7,516,000

7,514,000

EcAcEUaTe
ElAarTwTspr
ElAbTw
ElAcTwTspr
ElAmTw/ElAarTwTspr
EvAcCcERIt
ExEsAbTw
ExEsAbTw/ElTa
MaMgCYPv
AaTREl
AaTw
AcTe
ChPlTw
EcAcEw
ElTw

West Creek

Area A

462,000 464,000 466,000 468,000 470,000 472,000

Shadow Areas
Mine Development Envelope

N

Data Sources:
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

0 500 1,000 1,500
Metres

Requested By: B. Nicholson
Drawn By: S. Roestenburg
Revised By: sroestenburg
Approved By: P. Mastalir
Scale: 1:30,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.001_r0

Date: 20/03/2019
Size: A3L
Revision: 0
Confidentiality: 1

Figure 25
Impacts to Surface Water Flows
Area A

Fortescue Metals Group Ltd
The New Force in Iron Ore

476,000 478,000 480,000 482,000 484,000

7,514,000

7,512,000

7,510,000

ChAbTw
ChAiTw/ElAbTlo
ElAarTwTspr
ElAmTw
ElAmTw/ElAarTwTspr
EvAcCcERlt
ChAmTe
EcrAcPr
ElAcTw
EvAcCc

Pinarra Creek

Eliwana

Area B

Shadow Areas
Mine Development Envelope

N

Data Sources:
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019.

0 500 1,000 1,500
Metres

Requested By: B. Nicholson
Drawn By: S. Roestenburg
Revised By: sroestenburg
Approved By: P. Mastalir
Scale: 1:25,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.002_r0

Date: 20/03/2019
Size: A3L
Revision: 0
Confidentiality: 1

Figure 25
Impacts to Surface Water Flow
Area B

Fortescue Metals Group Ltd
The New Force in Iron Ore

504,000 506,000 508,000 510,000 512,000 514,000 516,000

7,510,000 7,508,000 7,506,000 7,504,000

AcApyTErCcTe
AeTwTe
AxAanAtERcTw
ChAiTw/ElAbTlo
EgAatTe
ElAanAteSENsTe
ElAmTw
ElTa
EvAcCcERIt
EvAcMgERIt
ExAcTHtTe
ExEsAbTw

Strike East Creek

Flying Fish Creek 1

Area C

Shadow Areas
Mine Development Envelope

N

Data Sources:
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

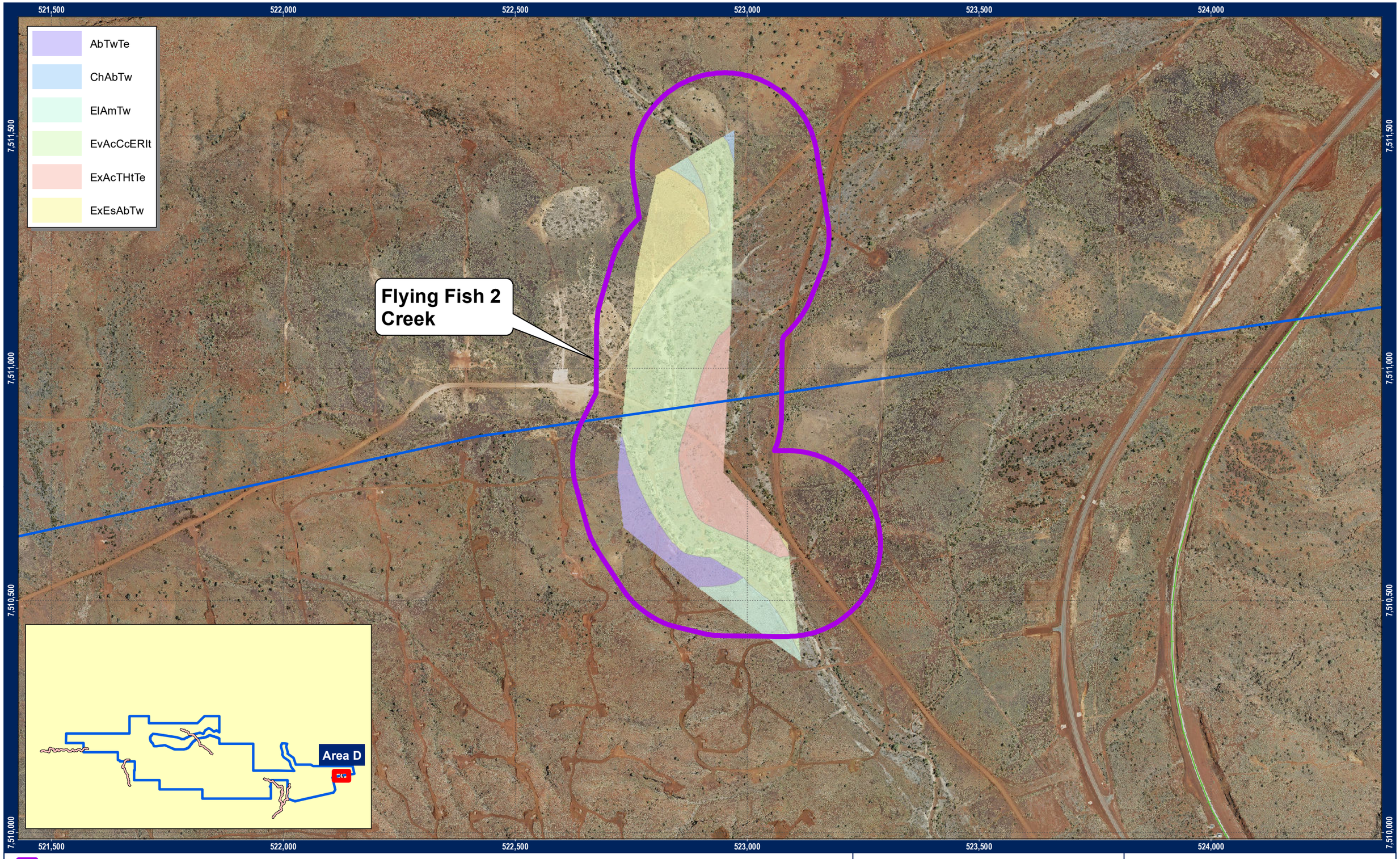
0 500 1,000 1,500
Metres

Requested By: B. Nicholson
Drawn By: S. Roestenburg
Revised By: sroestenburg
Approved By: P. Mastalir
Scale: 1:35,890
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.003_r0

Date: 20/03/2019
Size: A3L
Revision: 0
Confidentiality: 1

Figure 25
Impacts to Surface Water Flow
Area C

Fortescue Metals Group Ltd
The New Force in Iron Ore



Shadow Areas

Mine Development Envelope

Data Sources:
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

N

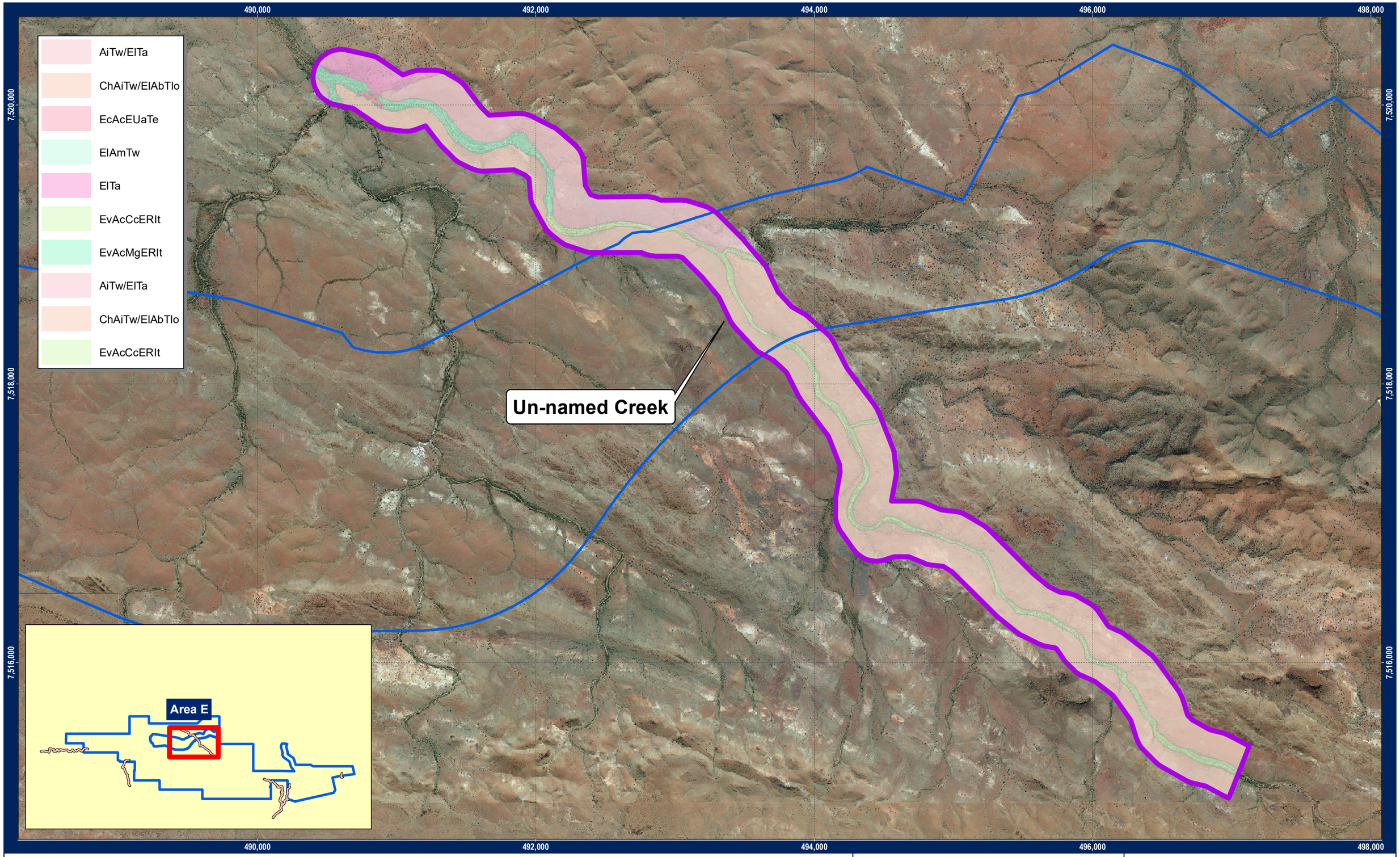
0 50 100 150 200 250
Metres

Requested By: B. Nicholson
Drawn By: S. Roestenburg
Revised By: sroestenburg
Approved By: P. Mastalir
Scale: 1:7,500
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.004_r0

Date: 20/03/2019
Size: A3L
Revision: 0
Confidentiality: 1

Figure 25
Impacts to Surface Water Flow
Area D

Fortescue Metals Group Ltd
The New Force in Iron Ore



Shadow Areas
Mine Development Envelope

N

Data Sources:
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2019

0 500 1,000 1,500
Metres

Requested By: M. Dowling
Drawn By: C. Whyte
Revised By: sroestenburg
Approved By: P. Mastalir
Scale: 1:25,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 751ES_MP_EN_0004.005_r0

Date: 20/03/2019
Size: A3L
Revision: 0
Confidentiality: 1

Figure 25
Impacts to Surface Water Flow
Area E

Fortescue Metals Group Ltd
The New Force in Iron Ore

Figure 4: Dampetrus DNA02 locations

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480,000 500,000 520,000

7,520,000

Dampetrus sp. indet.

SERPENTINE CREEK

DUCK CREEK

Antichiropus '1021DNA02'

Eliwana

PINARRA CREEK

Dampetrus, 1021DNA02 (Dampetrus sp. indet.)

Dampetrus 1021DNA02

Dampetrus 1021DNA02

Dampetrus 1021DNA02

BOOLGEEDA CREEK

7,500,000

480,000 500,000 520,000

Fauna Mapping

- Drainage Line/River/Creek (Major)
- Drainage Line/River/Creek (Minor)
- Gorges/Gullys
- Hills/Ranges/Plateaux
- Lower slopes/hillslopes
- Plain (shrubland)
- Plain (stony/gibber)

LEGEND

- FMG SRE Fauna Significant
- Fortescue Projects
- Major Drainage
- Mine Development Envelope
- Indicative Mine Footprints

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

0 2 4 6 8 10
Kilometres

Requested By: M.Dowling
Drawn By: S. Costello
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:175,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.053_r2

Date: 06-Dec-18
Size: A3L
Revision: 2
Confidentiality: 1

Figure 30
SRE and Potential SRE Locations

Fortescue Metals Group Ltd
The New Force in Iron Ore

Figure 5: Pools in relation to groundwater drawdown

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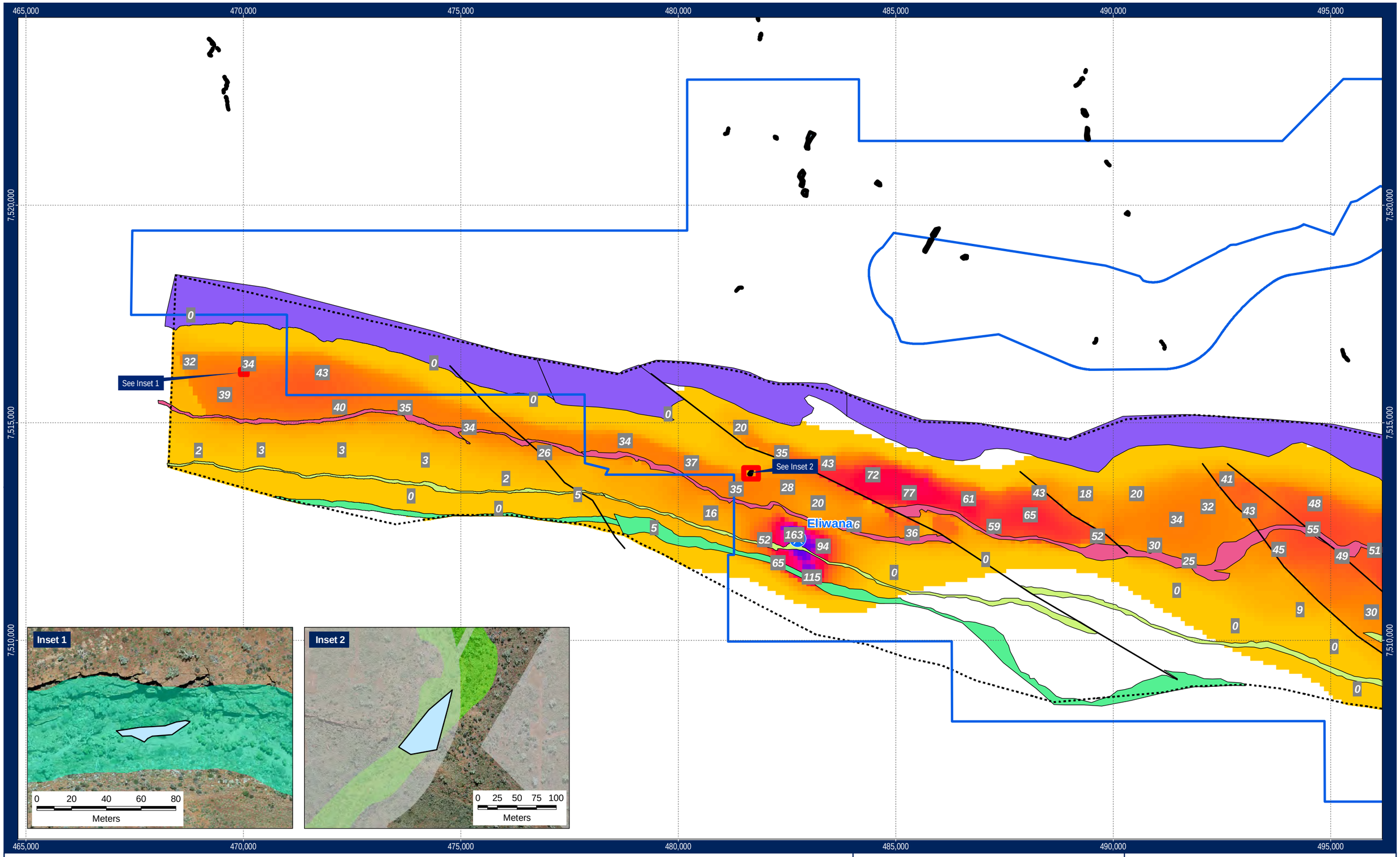


Fortescue Projects
Mine Development Envelope
Dolerite Dykes
Eliwana Model
Pools

Geology
Dolerite Sill
Jeerinah Formation
Mount McCrae Shale
Yandicoogina Shale

High : 166.667
Low : 0

Data Sources:
SRTM, GA.
All other data, FMG, 2017.

N

0 1 2 3 4 5
Kilometres

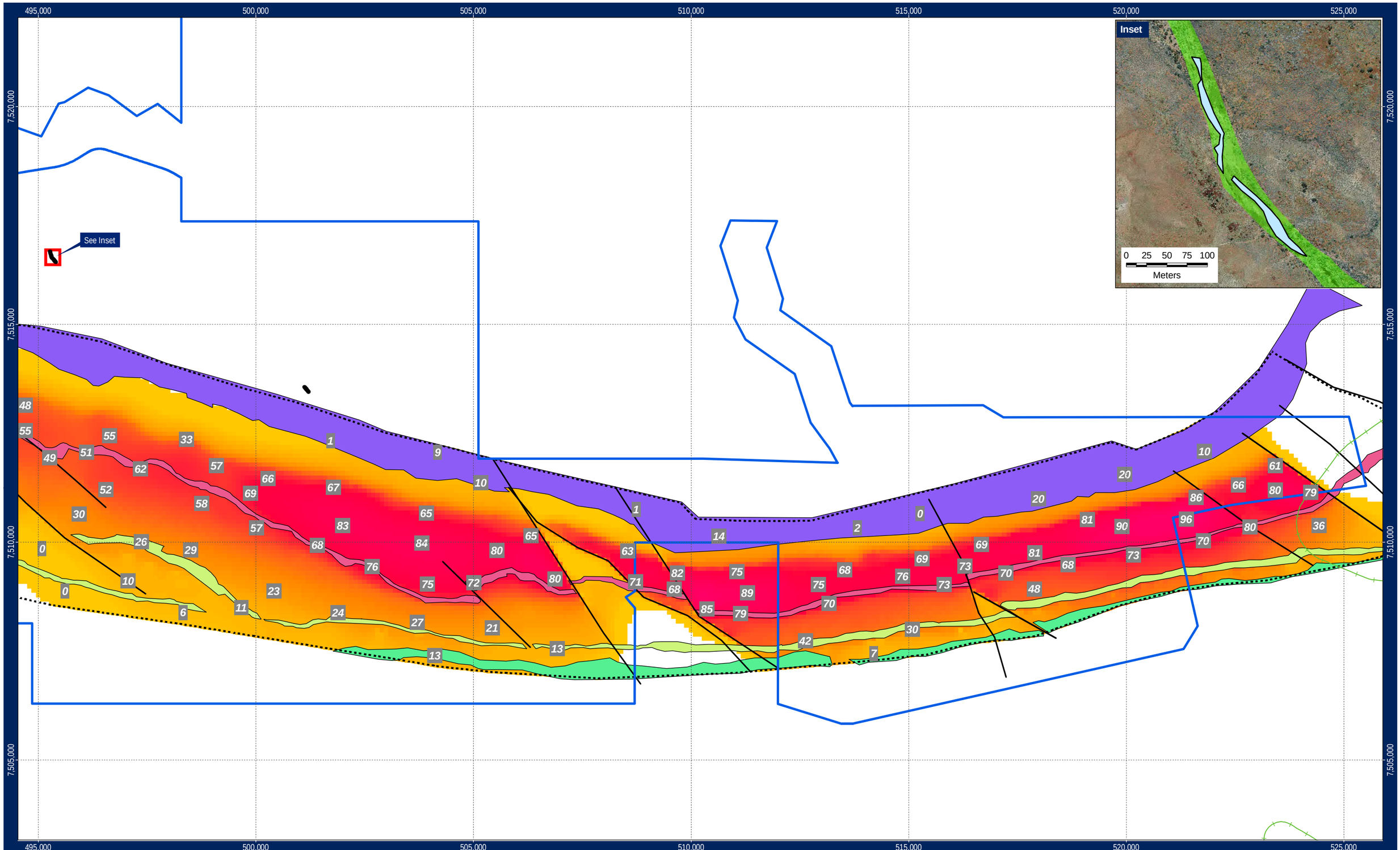
Requested By: J. Levett
Drawn By: J. Burke
Revised By: jburke
Approved By: P. Mastalir
Scale: 1:80,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0031.001_r0

Date: 07-Dec-18
Size: A3L
Revision: 0
Confidentiality: 0

Groundwater Drawdown and Pools

Sheet 1 of 2

Fortescue Metals Group Ltd
The New Force in Iron Ore



Rio Tinto Rail
Mine Development Envelope
Dolerite Dykes
Eliwana Model
Pools

Geology
Dolerite Sill
Jeerinah Formation
Mount McCrae Shale
Yandicoogina Shale

High : 166.667
Low : 0

Data Sources:
Rio Rail, RTIO.
SRTM, GA.
All other data, FMG, 2017.

N

0 1 2 3 4 5
Kilometres

Requested By: J. Levett
Drawn By: J. Burke
Revised By: jburke
Approved By: P. Mastalir
Scale: 1:80,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0031.002_r0

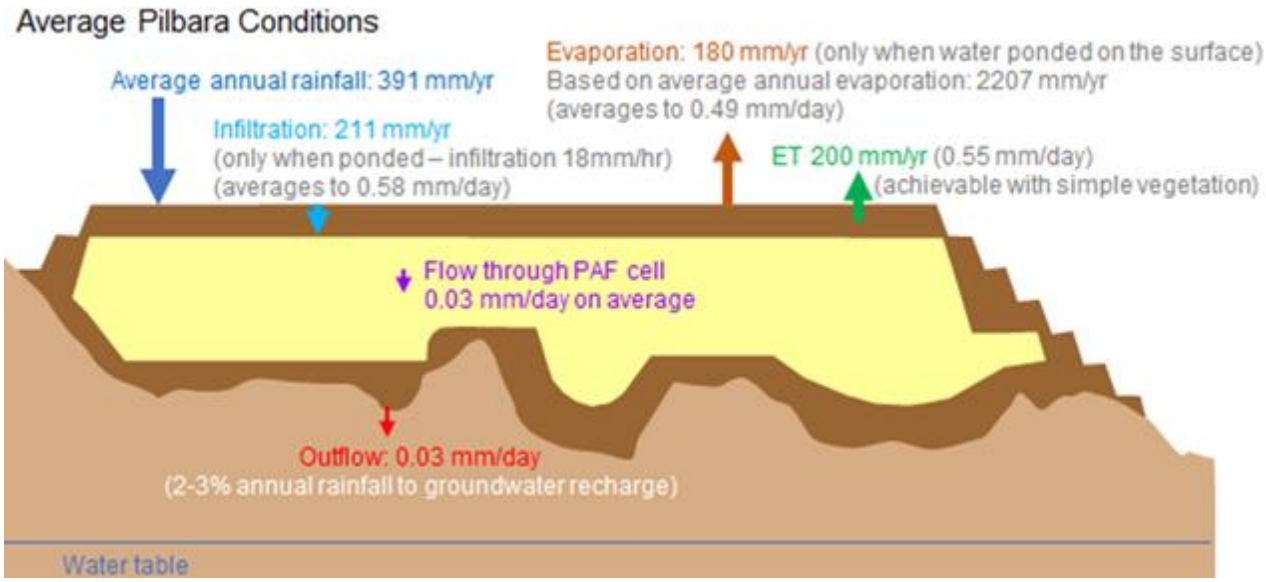
Date: 06-Dec-18
Size: A3L
Revision: 0
Confidentiality: 0

Groundwater Drawdown and Pools

Sheet 2 of 2

Fortescue Metals Group Ltd
The New Force in Iron Ore

Figure 6: Infiltration Rates through Waste Dump



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Attachment 1: Amended Troglofauna and Stygofauna figures

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470,000
480,000
490,000
7,520,000
7,510,000

Broadway West
Broadway
Talisman
West End
Eagles Nest
East 1

INDEX MAP
Map 1
Map 2

Mine Development Envelope
Indicative Mine Footprint
Major Drainage
Stygofauna
Troglofauna

Data Sources:
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

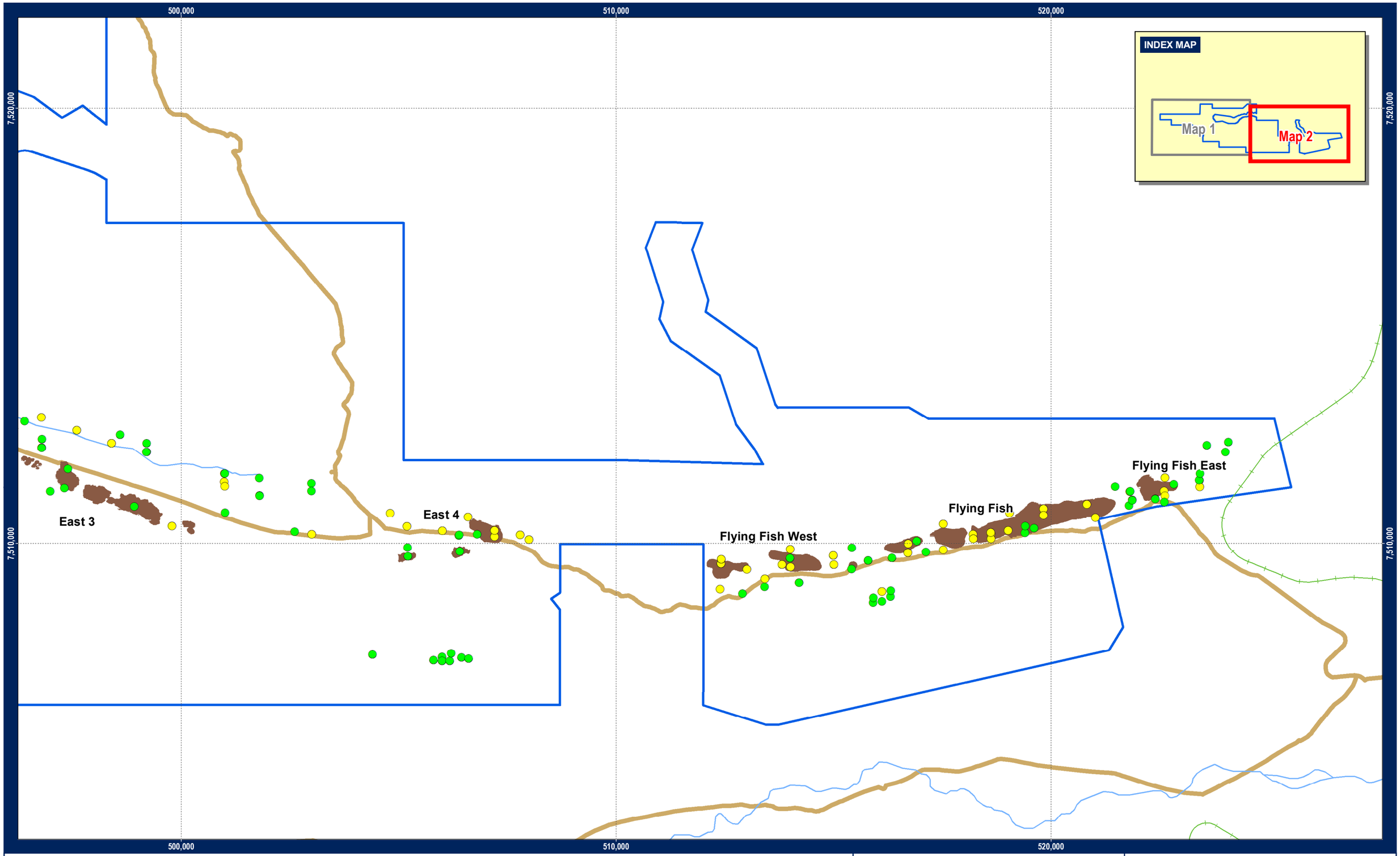
0 1 2 3 4 5
Kilometres

Requested By: A. Winzer
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:80,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.016a_r3

Date: 30-Nov-18
Size: A3L
Revision: 3
Confidentiality: 0

Figure 31
Subterranean Fauna Survey Effort
(Map 1 of 2)

Fortescue Metals Group Ltd
The New Force in Iron Ore



Mine Development Envelope
Indicative Mine Footprint
Major Drainage
Rio Tinto Rail
Stygofauna
Troglofauna

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

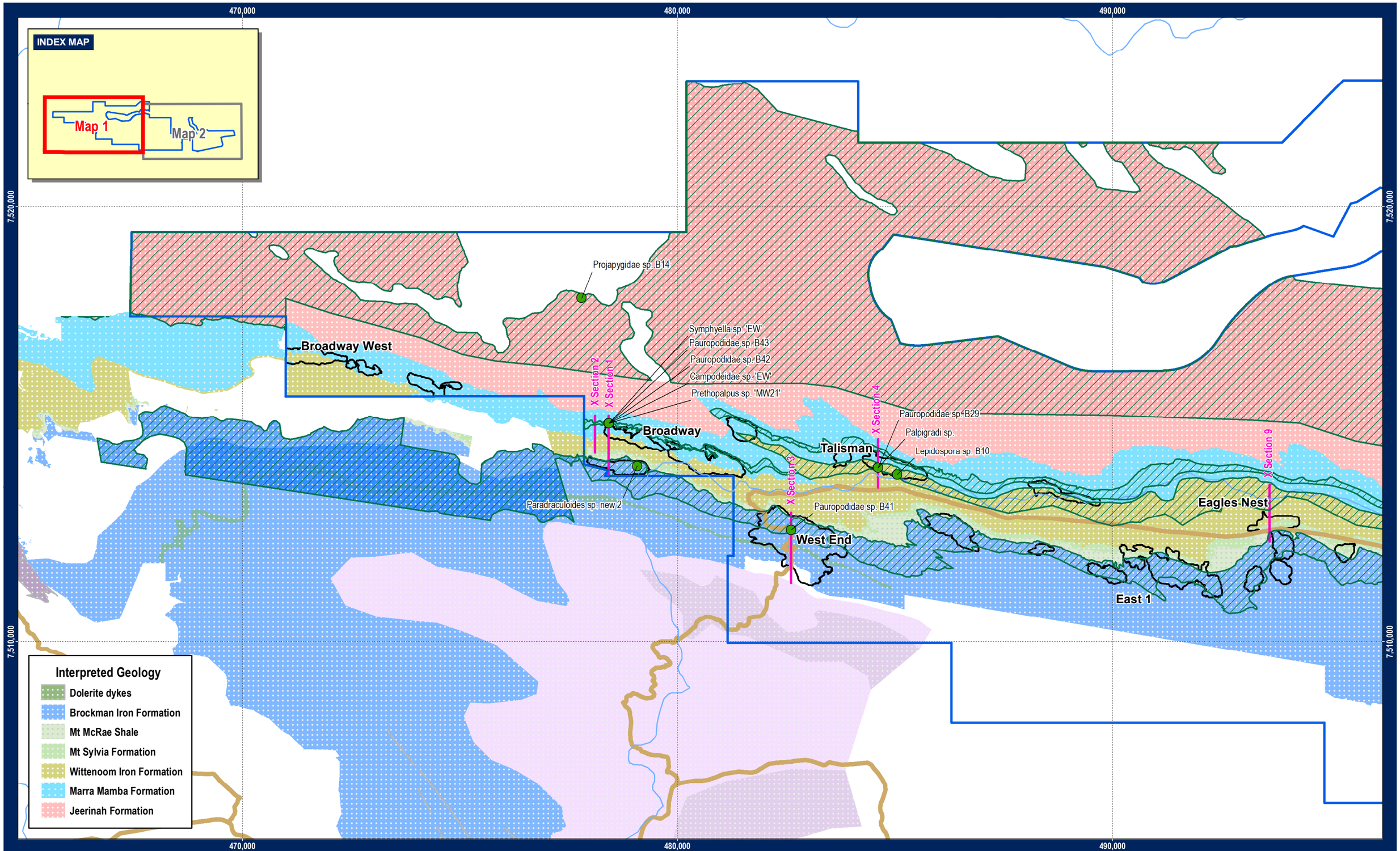
0 1 2 3 4 5
Kilometres

Requested By: A. Winzer
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:80,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.016b_r3

Date: 05-Dec-18
Size: A3L
Revision: 3
Confidentiality: 0

Figure 31
Subterranean Fauna Survey Effort
(Map 2 of 2)

Fortescue Metals Group Ltd
The New Force in Iron Ore



Troglofauna
Cross Section
Major Drainage
Indicative Mine Footprint
Mine Development Envelope
Troglofauna Habitat

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

0 1 2 3 4 5
Kilometres

Requested By: A. Winzer
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:80,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.012a_r4

Date: 05-Dec-18
Size: A3L
Revision: 4
Confidentiality: 1

Figure 32
Troglofauna - Restricted Species
(Sheet 1 of 2)

Fortescue Metals Group Ltd
The New Force in Iron Ore

500,000 510,000 520,000

7,520,000

7,510,000

Interpreted Geology

- Dolerite dykes
- Brockman Iron Formation
- Mt McRae Shale
- Mt Sylvia Formation
- Wittenoom Iron Formation
- Marra Mamba Formation
- Jeerinah Formation

X Section 5

X Section 6

X Section 7

X Section 8

X Section 10

X Section 11

X Section 12

Macranillus sp. 'EW'

Paradraculoides sp. B12A

Anapistula sp. 'EW'

Troglarmadillo sp. B46

Projapygidae sp. B17

East 3

East 4

Flying Fish West

Flying Fish

Flying Fish East

INDEX MAP

Map 1

Map 2

Troglofauna

Cross Section

Major Drainage

Rio Tinto Rail

Indicative Mine Footprint

Mine Development Envelope

Troglofauna Habitat

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

0 1 2 3 4 5

Kilometres

Requested By: A. Winzer
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:80,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.012b_r4

Date: 05-Dec-18
Size: A3L
Revision: 4
Confidentiality: 1

Figure 32

Troglofauna - Restricted Species

(Sheet 2 of 2)

Fortescue Metals Group Ltd
The New Force in Iron Ore

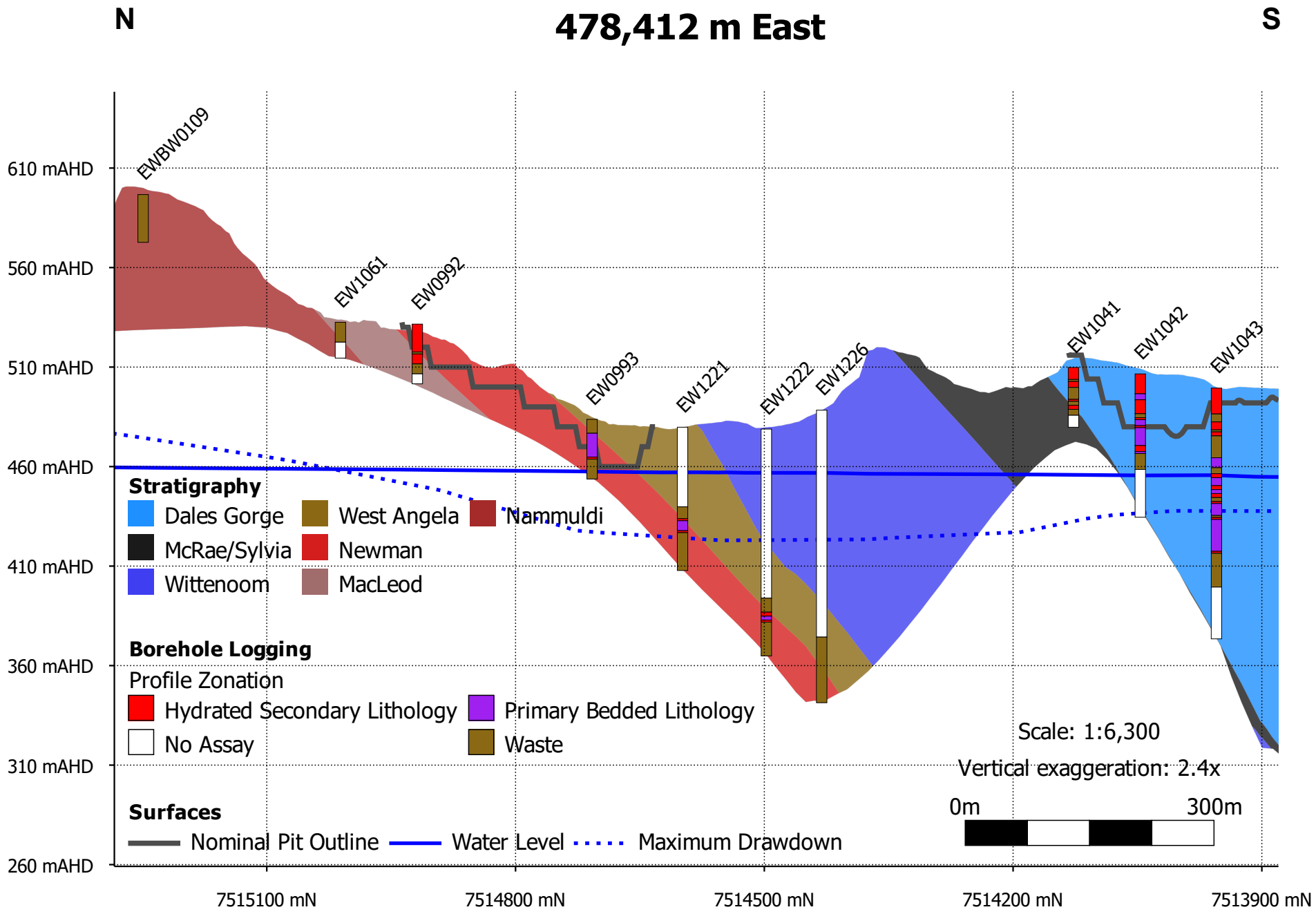


Figure 33: Cross Section 1: Broadway Pit

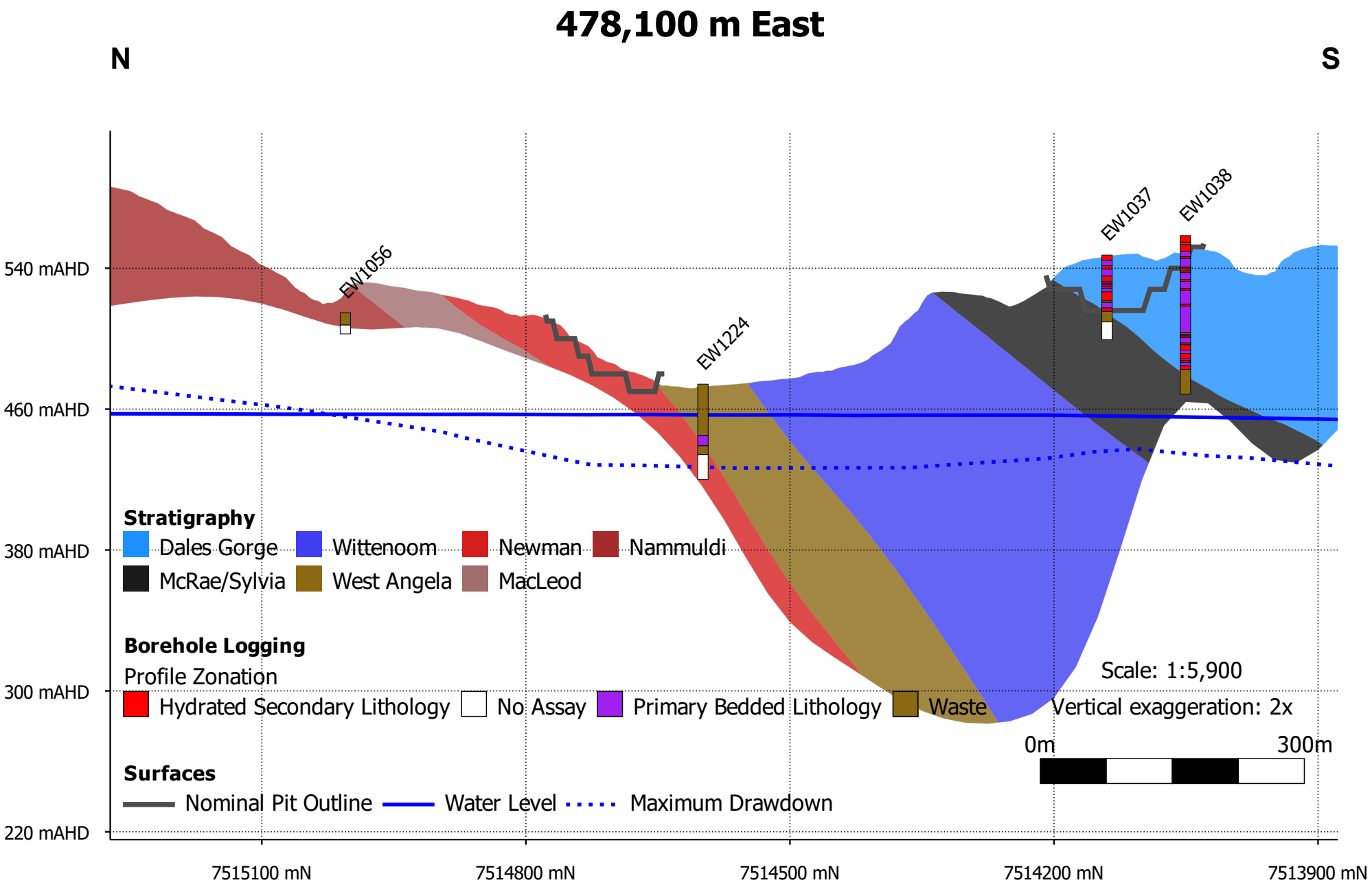


Figure 34: Cross Section 2: Outside Pit Immediately West of Broadway 1

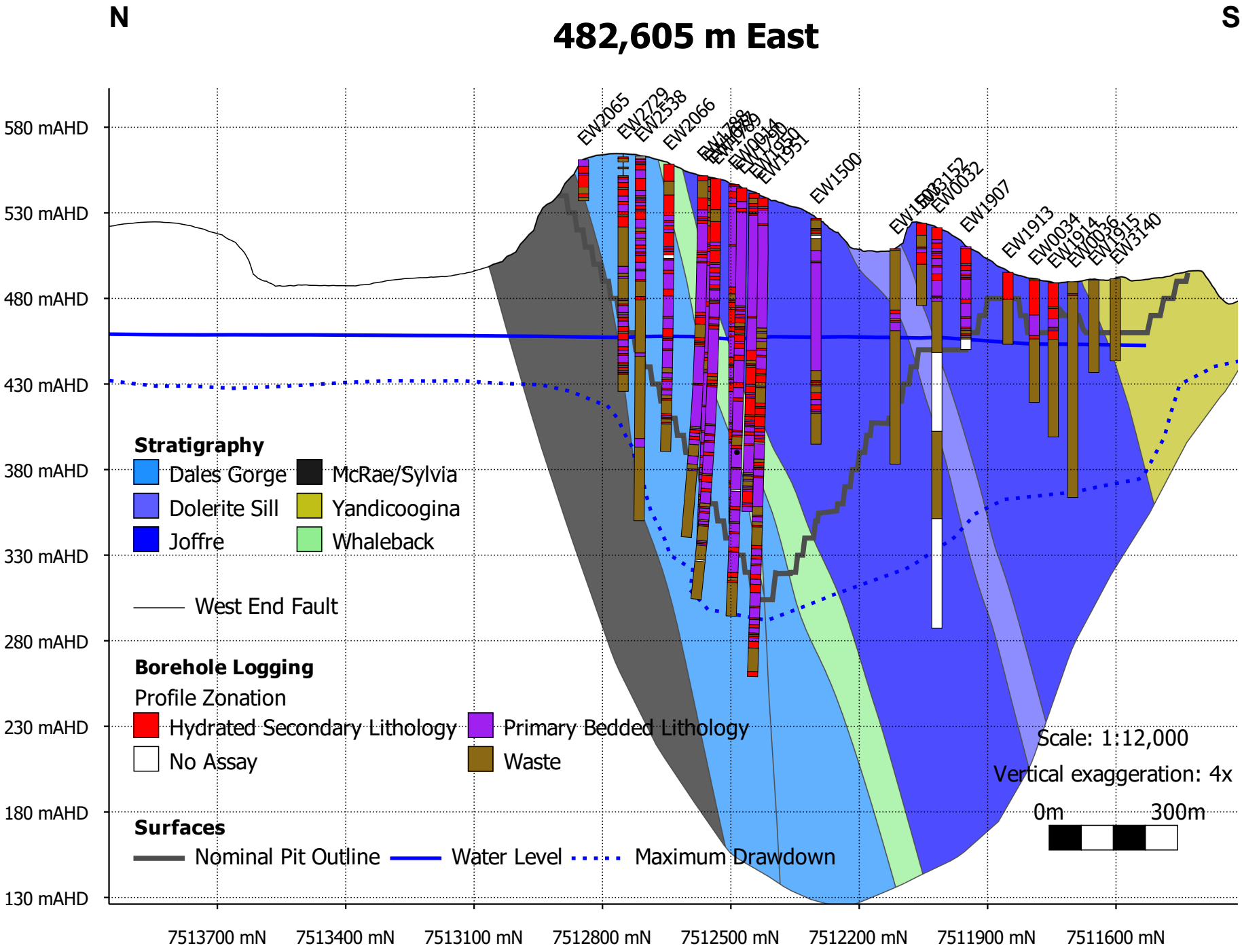


Figure 35: Cross Section 3: West End Pit

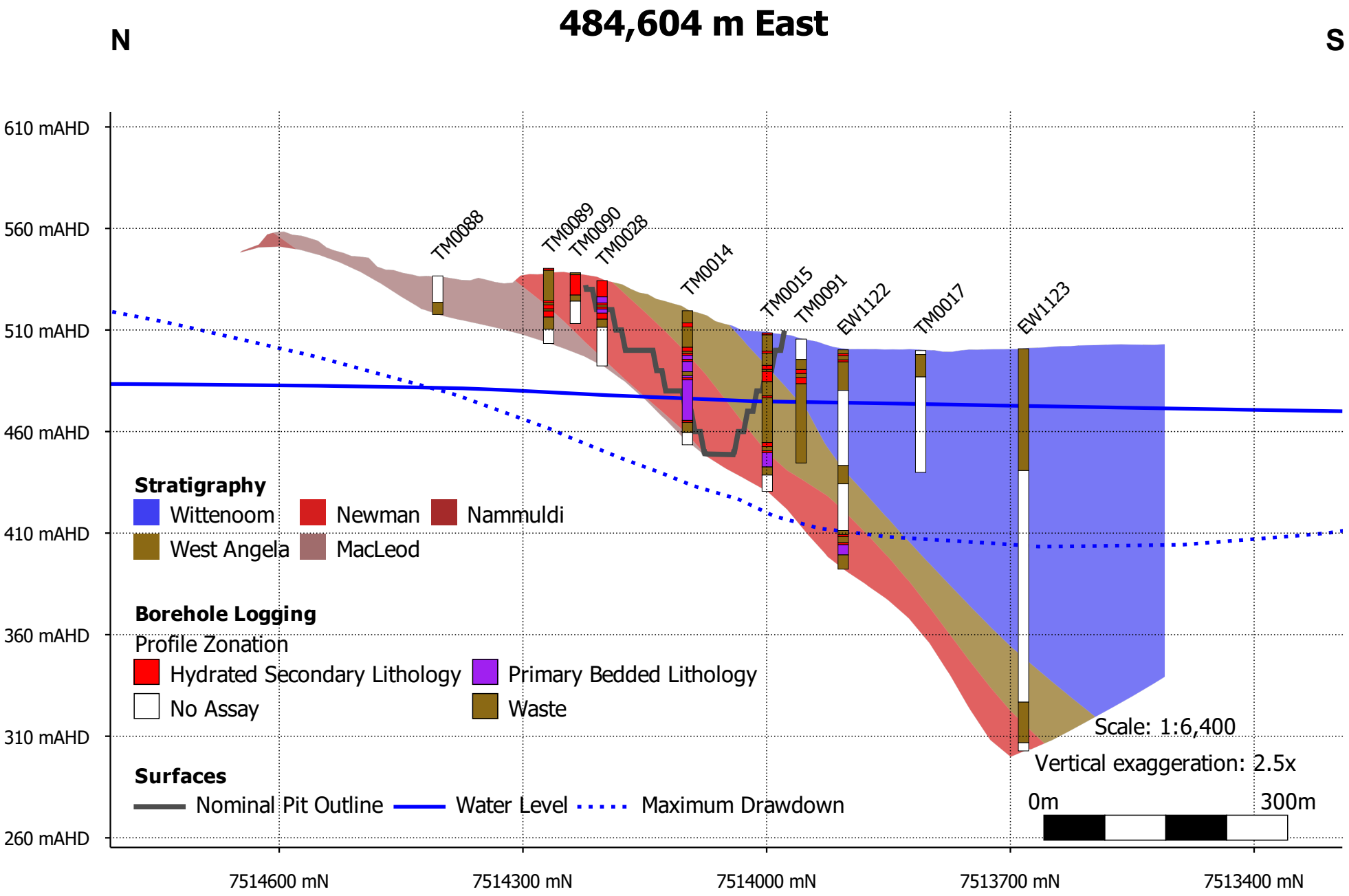


Figure 36: Cross Section 4: Talisman

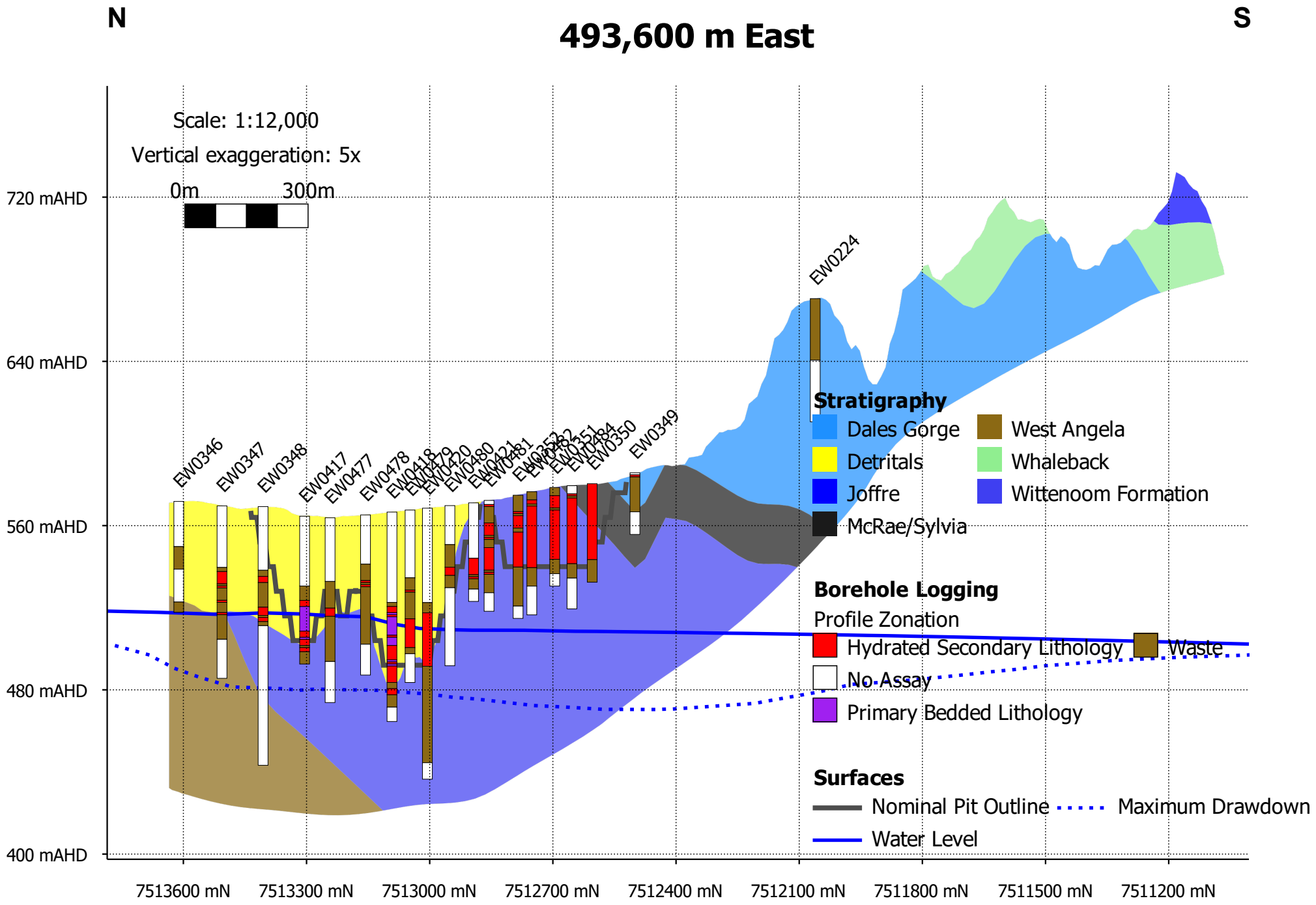


Figure 37: Cross Section 5: East 3 Pit

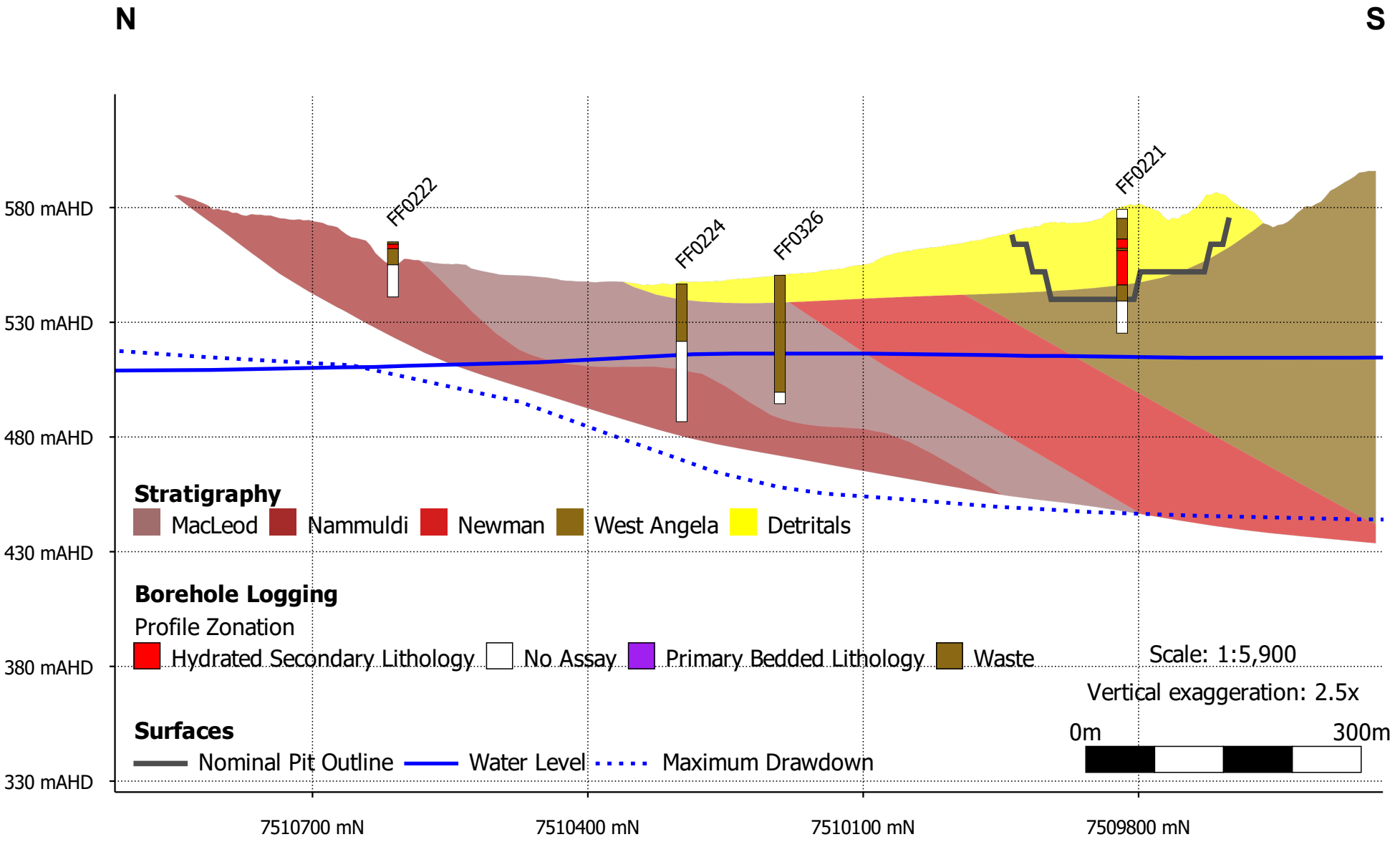


Figure 38: Cross Section 6: East 4 Pit

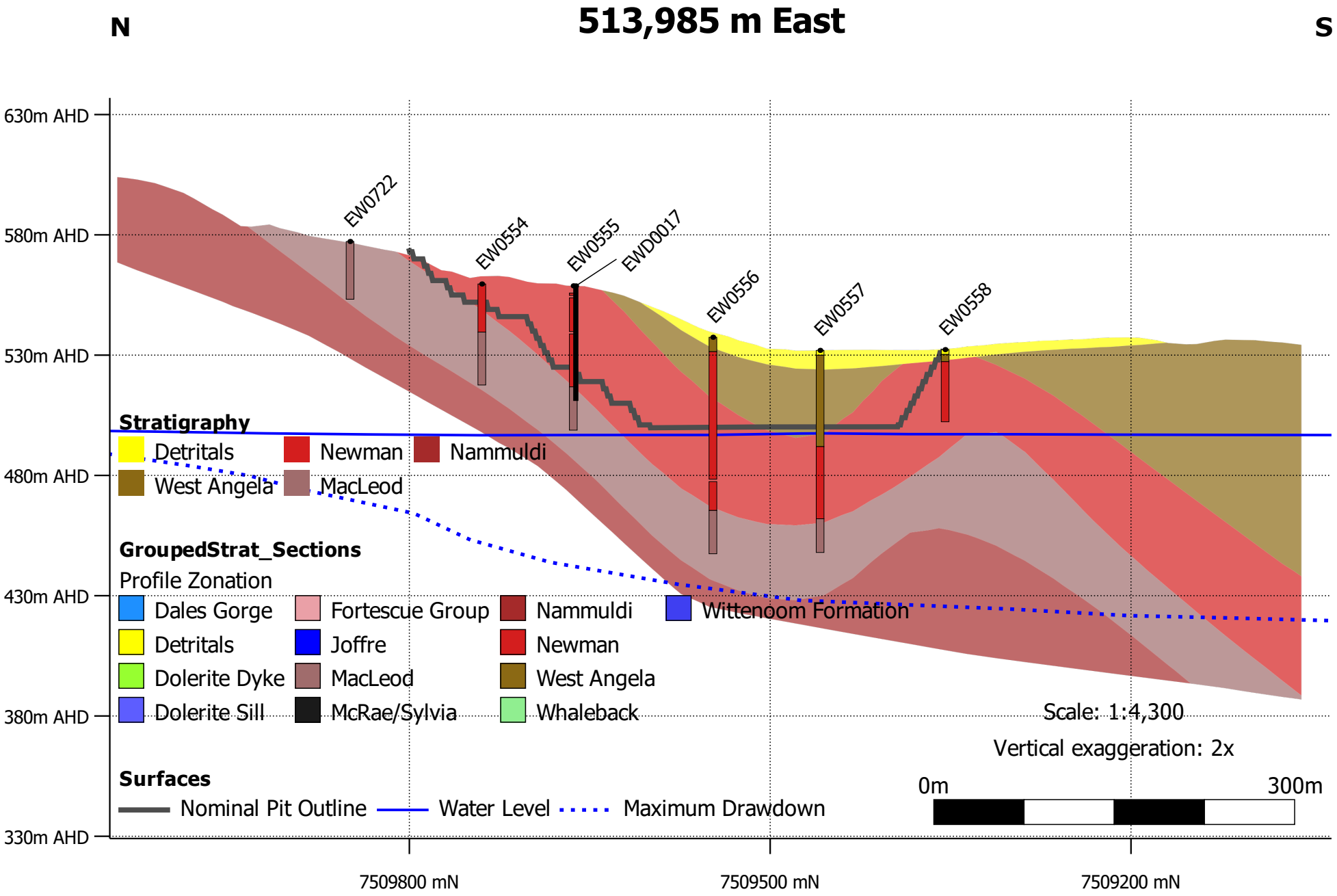


Figure 39: Cross Section 7: Flying Fish West

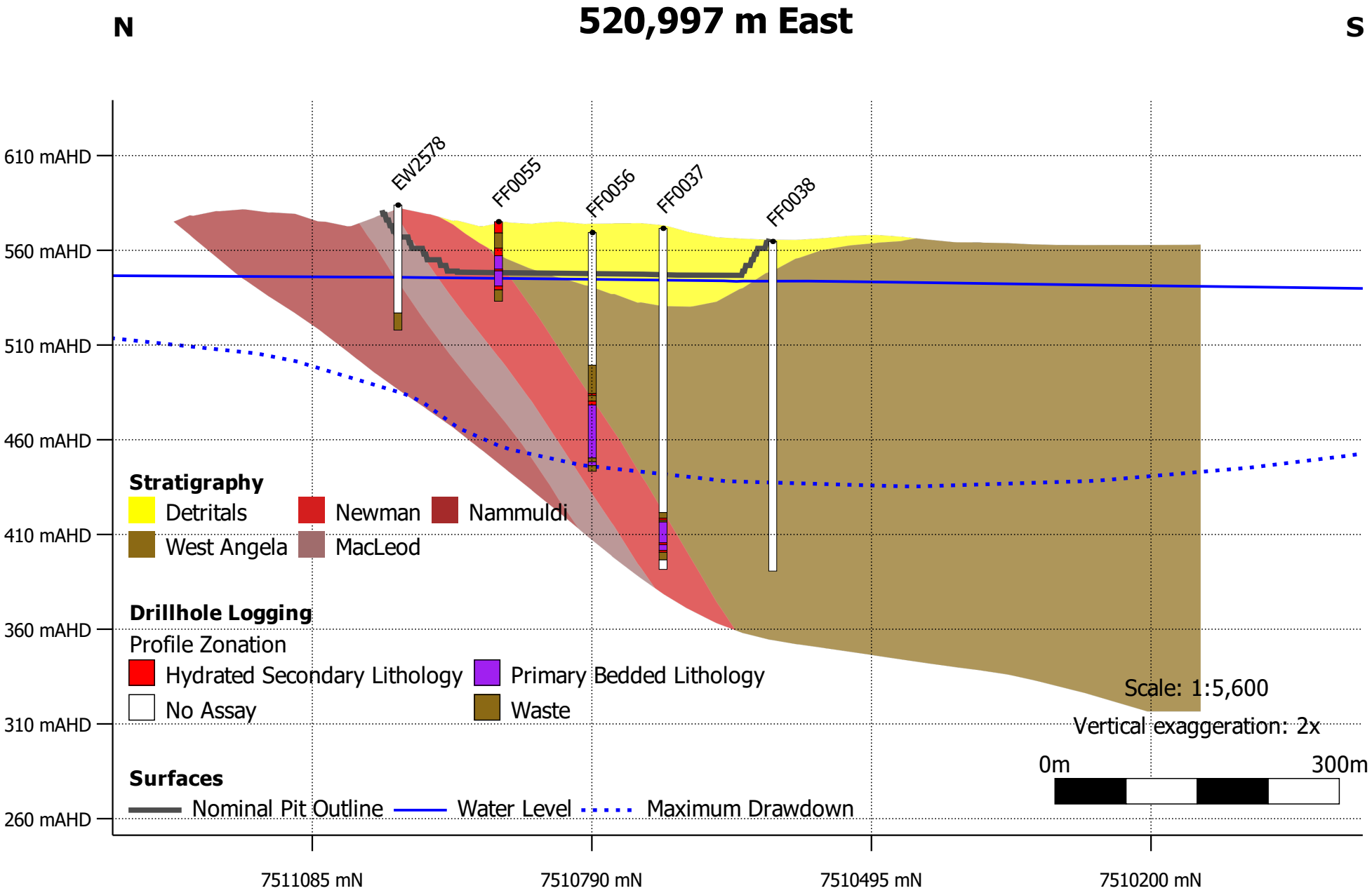
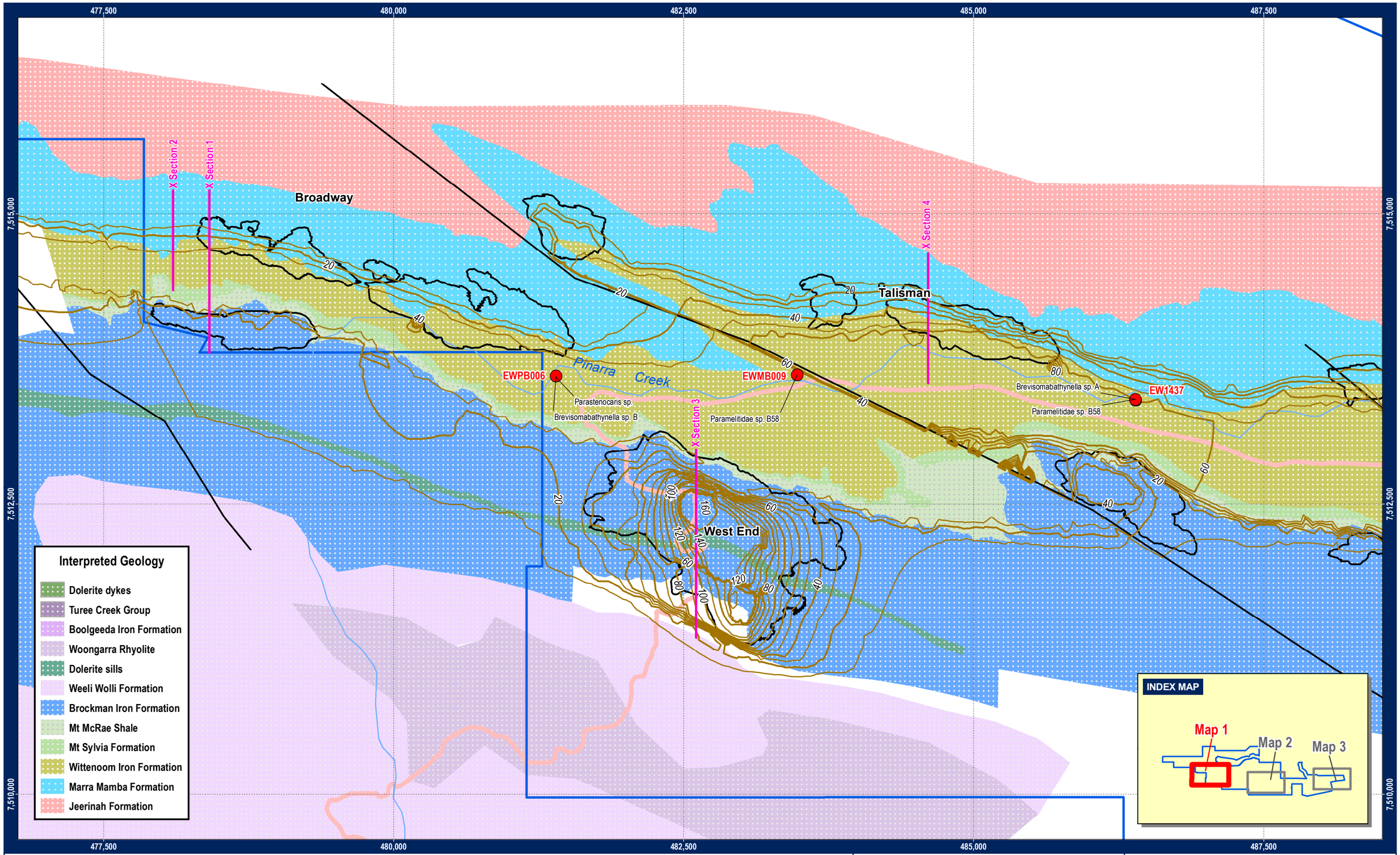


Figure 40: Cross Section 8: Flying Fish 2



Stygofauna
Cross Section
Major Drainage
Drawdown Contours
Fault/Dyke
Indicative Mine Footprint
Mine Development Envelope

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

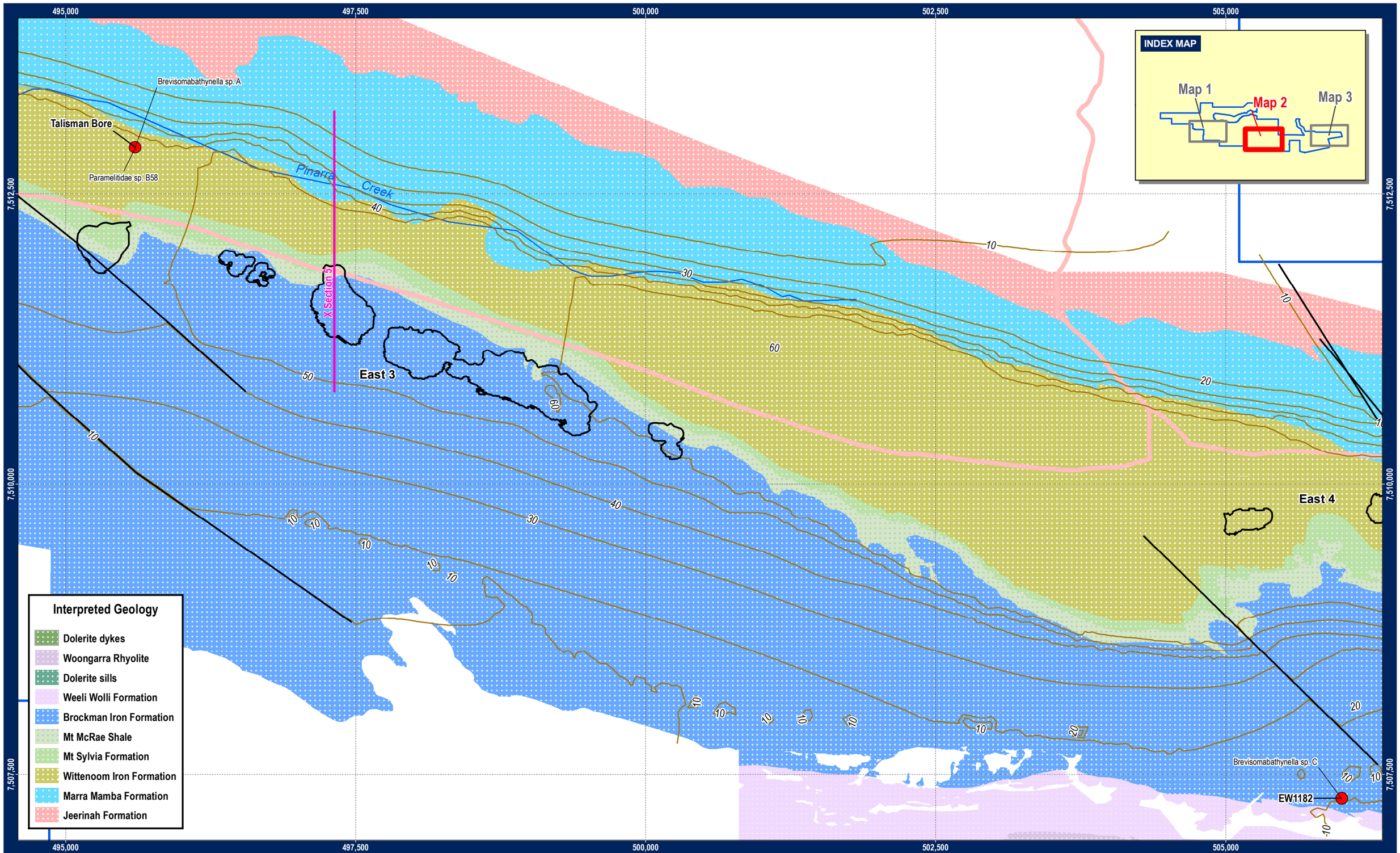
0 500 1,000 1,500
Metres

Requested By: R. Sharp
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:30,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.013a_r5

Date: 07-Dec-18
Size: A3L
Revision: 4
Confidentiality: 0

Figure 42
Stygofauna - Potentially Restricted Species
(Sheet 1 of 3)

Fortescue Metals Group Ltd
The New Force in Iron Ore



Stygofauna
Cross Section
Major Drainage
Drawdown Contours
Fault/Dyke
Indicative Mine Footprint
Mine Development Envelope

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

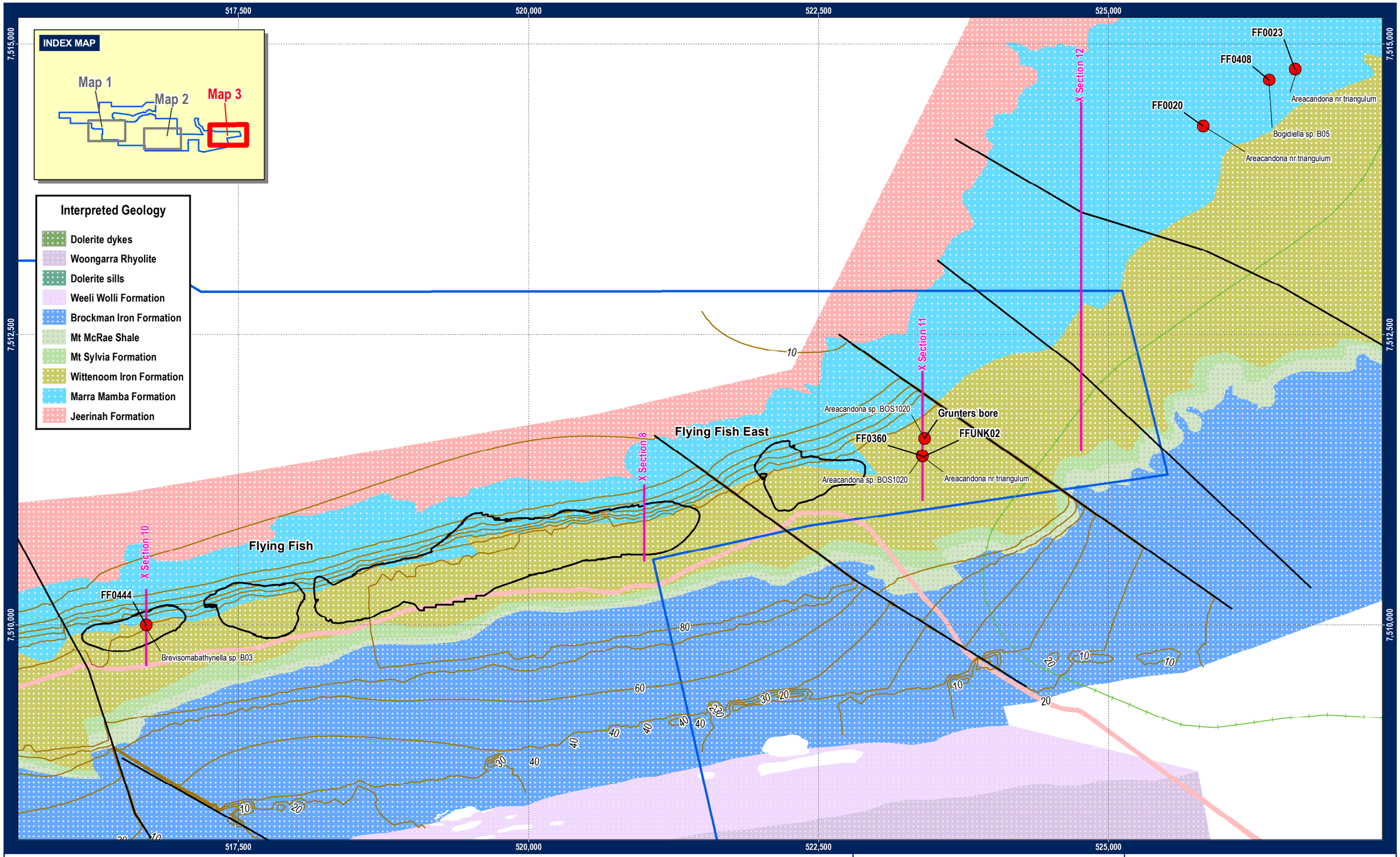
0 500 1,000 1,500
Metres

Requested By: R. Sharp
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:30,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.013b_r5

Date: 07-Dec-18
Size: A3L
Revision: 4
Confidentiality: 0

Figure 42
Stygofauna - Potentially Restricted Species
(Sheet 2 of 3)

Fortescue Metals Group Ltd
The New Force in Iron Ore



Stygofauna
Cross Section
Access Routes
Rio Tinto Rail
Drawdown Contours
Fault/Dyke
Indicative Mine Footprint
Mine Development Envelope

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

0 500 1,000 1,500
Metres

Requested By: R. Sharp
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:30,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.013c_r5

Date: 07-Dec-18
Size: A3L
Revision: 3
Confidentiality: 0

Figure 42
Stygofauna - Potentially Restricted Species
(Sheet 3 of 3)

Fortescue Metals Group Ltd
The New Force in Iron Ore

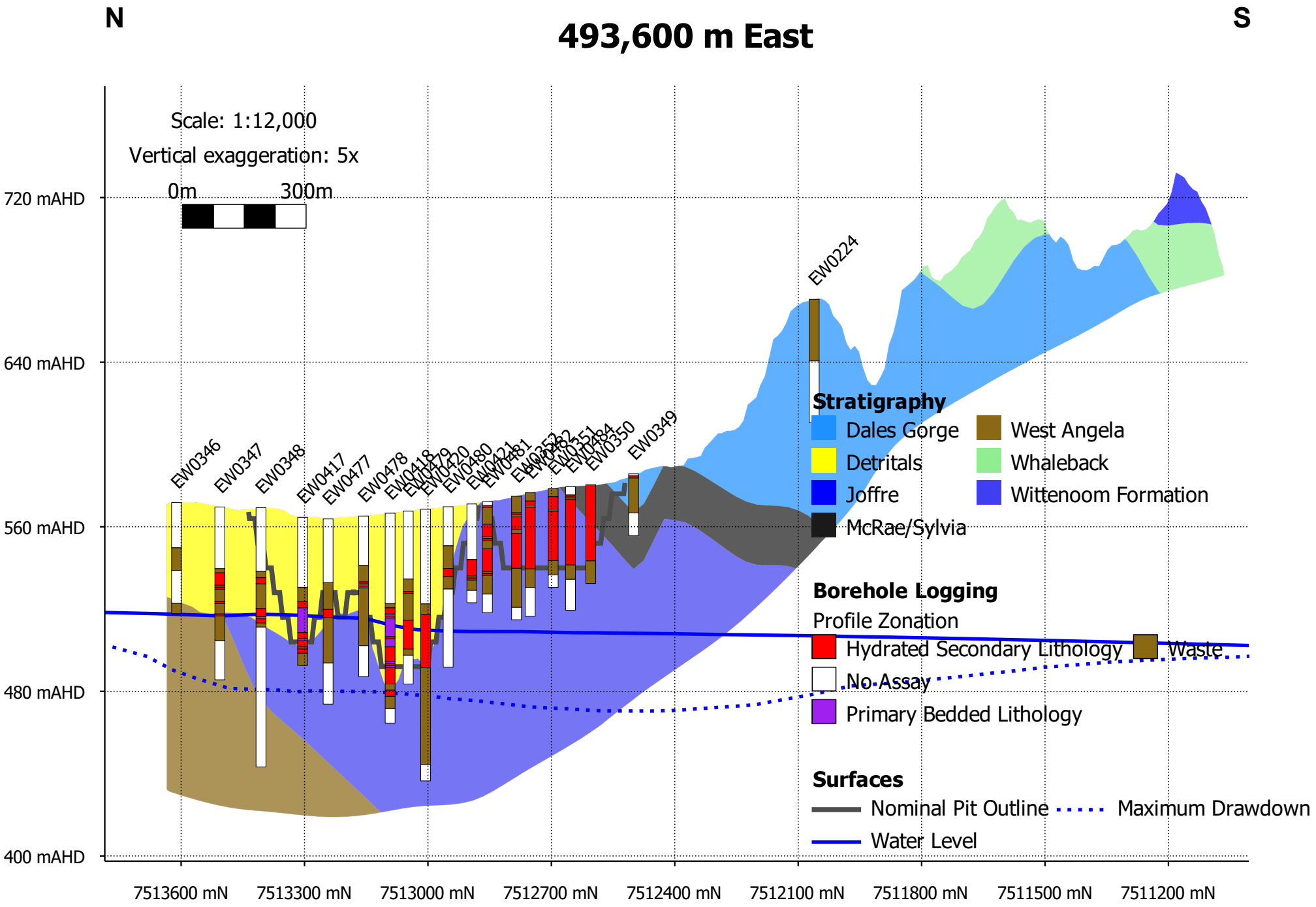


Figure 43: Cross Section 9: Eagles Nest

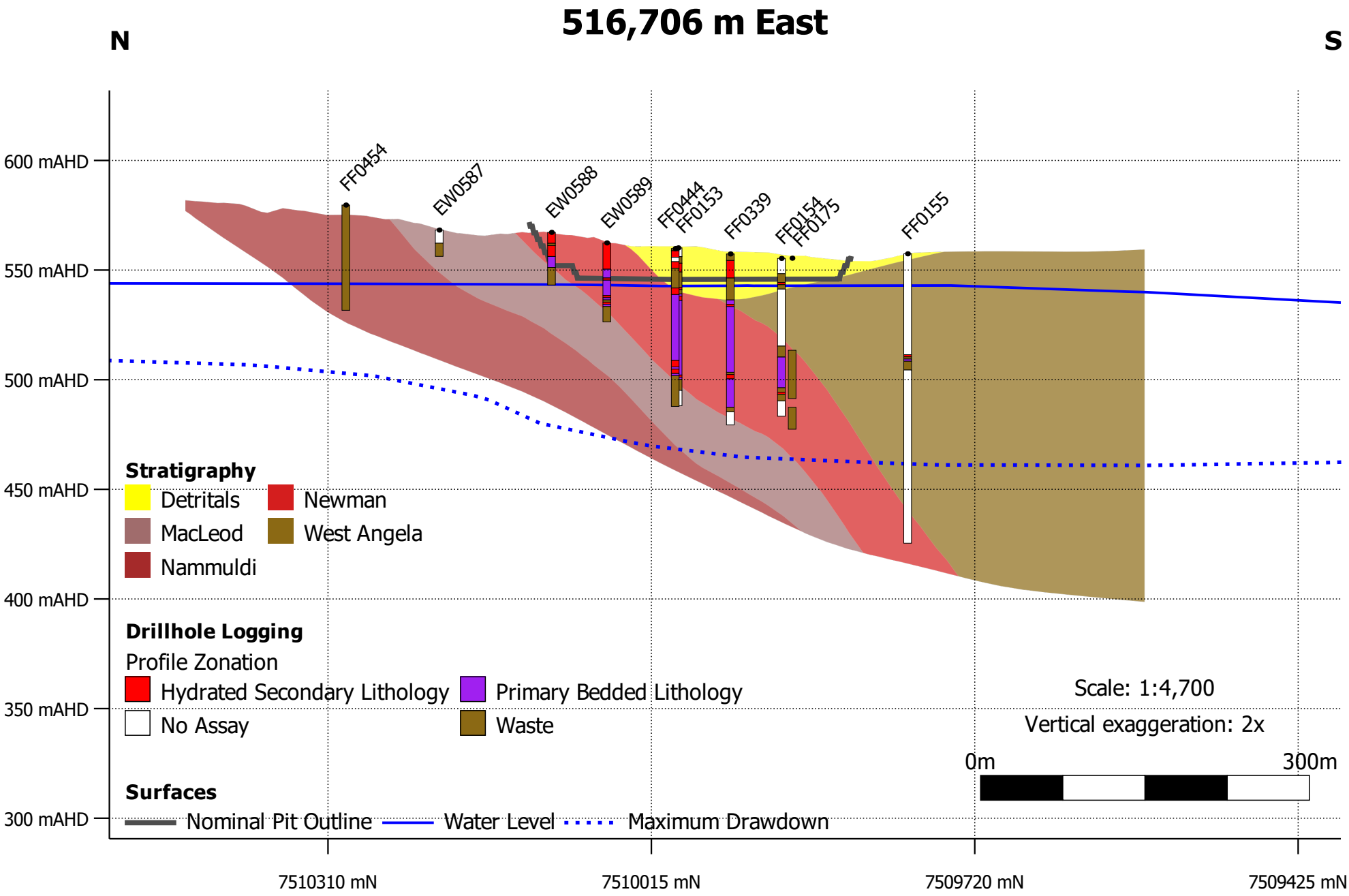


Figure 44: Cross Section 10: Flying Fish 1

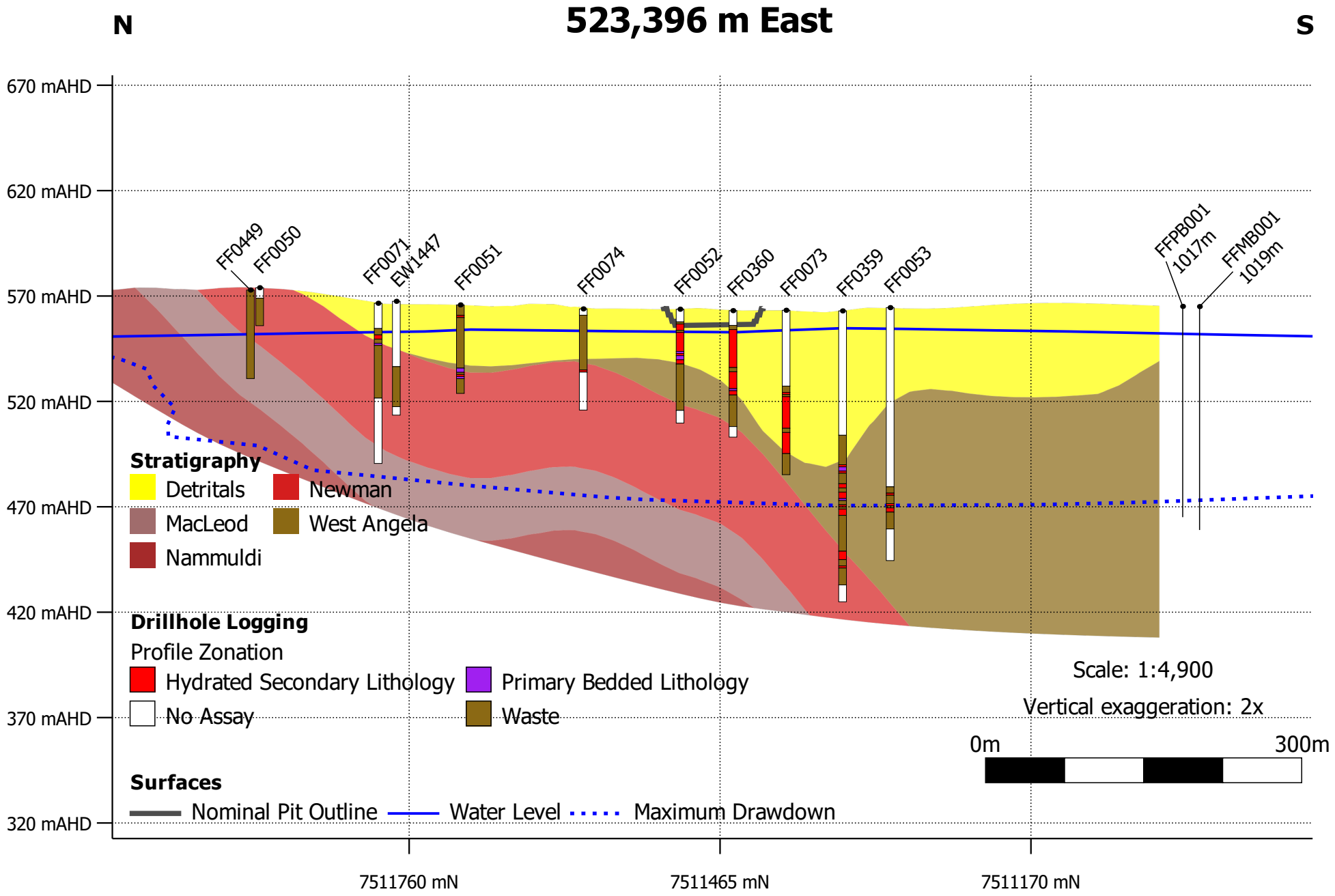
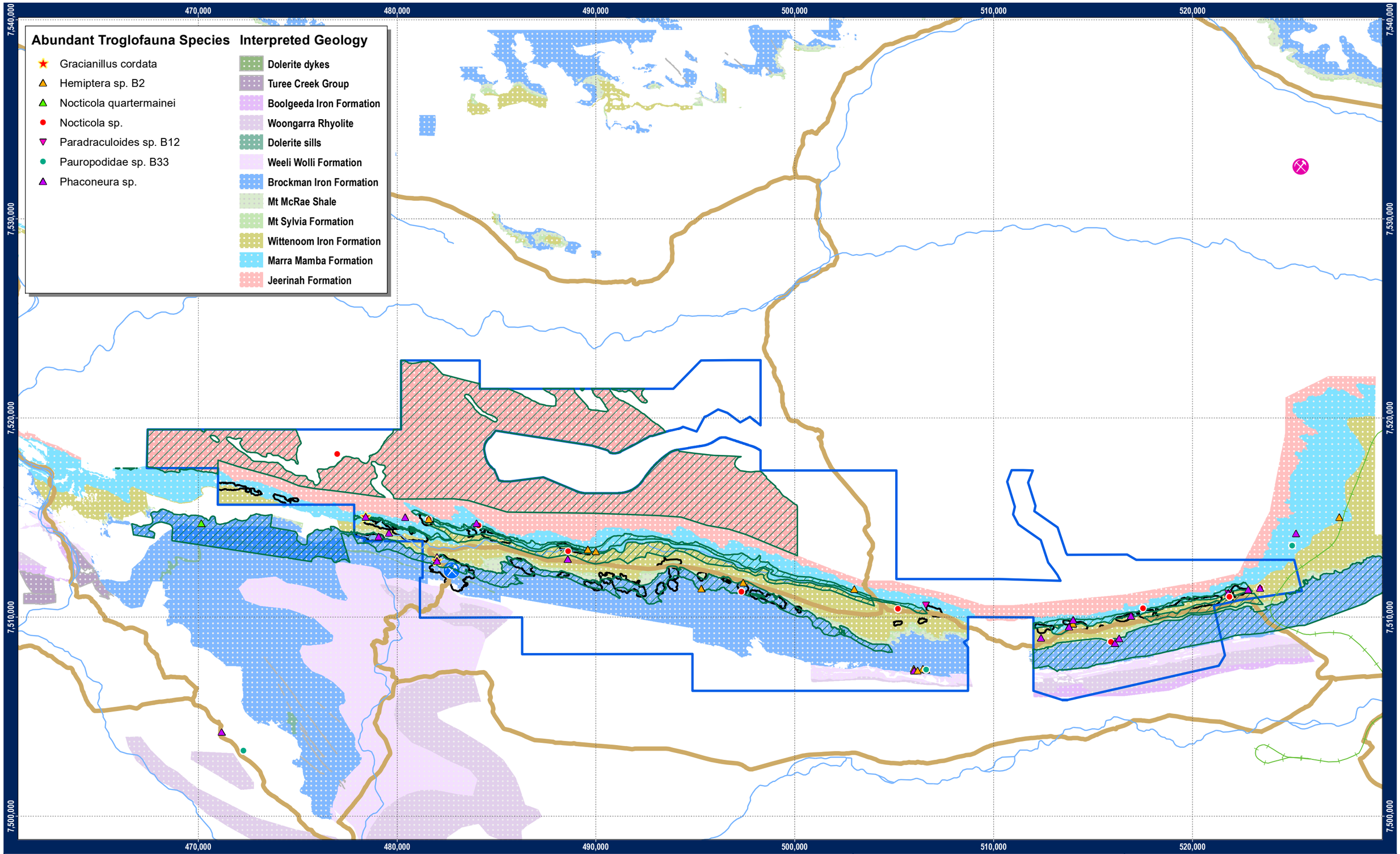


Figure 45: Cross Section 11: Flying Fish East



Fortescue Projects
Rio Tinto Mines
Mine Development Envelope
Suitable Habitat
Major Drainage
Rio Tinto Rail
Indicative Mine Footprint

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

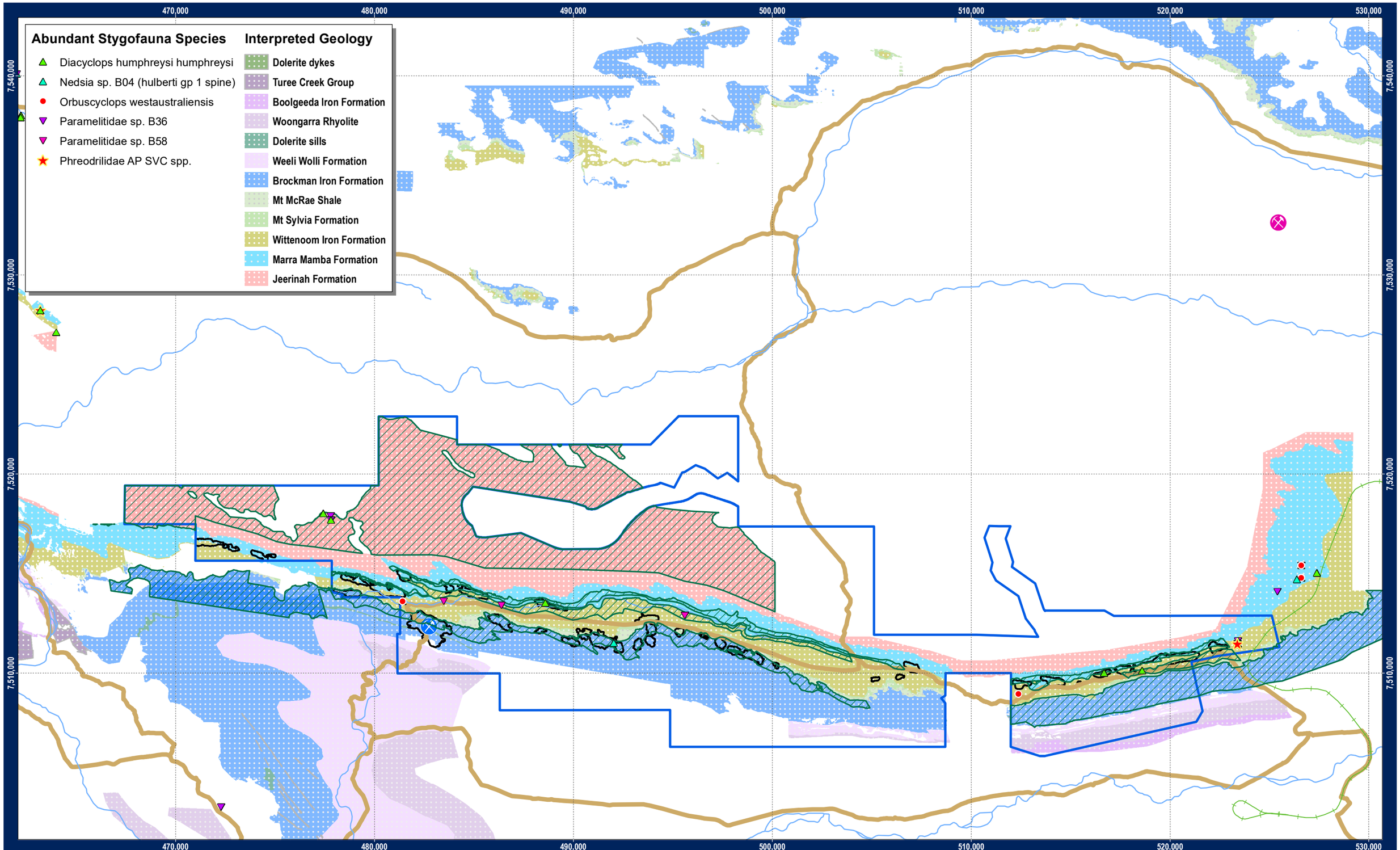
0 2 4 6 8 10
Kilometres

Requested By: A. Winzer
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:175,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.049_r2

Date: 06-Dec-18
Size: A3L
Revision: 2
Confidentiality: 1

Figure 47
Abundant troglofauna species

Fortescue Metals Group Ltd
The New Force in Iron Ore



Fortescue Projects
Rio Tinto Mines
Mine Development Envelope
Suitable Habitat
Major Drainage
Rio Tinto Rail
Indicative Mine Footprint

Data Sources:
Pastoral Stations based on source from Landgate.
Towns, Roads, Drainage, Landgate.
SRTM, GA.
All other data, FMG, 2017.

N

0 2 4 6 8 10
Kilometres

Requested By: A. Winzer
Drawn By: J. Burke
Revised By: scostello
Approved By: P. Mastalir
Scale: 1:175,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 750EW_MP_EN_0010.051_r2

Date: 06-Dec-18
Size: A3L
Revision: 2
Confidentiality: 1

Figure 48
Abundant stygofauna species

Fortescue Metals Group Ltd
The New Force in Iron Ore

Attachment 2: Amended Table 45 and 47 from the ERD

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Table 45: Location and Details of Geological/Hydrogeological Cross-sections used in habitat assessment

Section No.	Location	Distance S-N (m)	Borehole on Section	Troglofauna Sp.
XS1	Broadway 1	1400	EW1061	Pauropodidae B42 and B43, *Prethopalpus* sp. MW21, Campodeidae sp. EW, Symphyella sp. EW, *Paradraculoides* sp. new2 (near)
XS2	Outside Broadway 1 pit (west)	860	EWD0034	
XS3	West End	1620	EW1788	Pauropodidae B41
XS4	Talisman	1120	TM0015	Pauropodidae B29, Palpigradi sp., *Lepidospera* B10 (near)
XS5	East 3	2410	EW0372	*Macranillus* sp. EW
XS6	East 4	1300	EW0507	*Paradraculoides* sp. B12A
XS7	Flying Fish West	960	EWD0017	*Anapistula* sp. EW,
XS8	Flying Fish 2	650	FF0038	Projapygidae B17, *Troglarmadillo* B46 (near)

Table 47: Location and details of geological/hydrogeological cross sections used in habitat assessment

Section No	Location	Distance (S-N)	Borehole on section	Stygofauna species
XS1	Broadway 1	1400	EW1061	*Brevisomabathynella* sp. B, Parastenocaris sp.
XS4	Talisman	1120	TM0015	Paramelitidae B58, *Brevisomabathynella sp.* A,
XS5	East 3	2410	EW0372	Paramelitidae B58, *Brevisomabathynella* sp. A
XS6	East 4	1300	EW0507	*Brevisomabathynella* sp. C
XS9	Eagles Nest	1300	EW0352	Paramelitidae B58, *Brevisomabathynella* sp. A
XS10	Flying Fish 1	650	FF0444	*Brevisomabathynella* B03
XS11	Flying Fish East	1100	FF0360	*Areacandona* nr. *triangulum*, *Areacandona* BOS1020
XS12	Outside impact NE of Flying Fish	960	EWD0017	*Areacandona* nr. *triangulum*, *Bogidiella* B05

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Attachment 3: Indirect impacts to GDE and Riparian Vegetation

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Quantified impacts to GDE and Riparian Vegetation (all figures in ha)

Vegetation Type	Areal Extent	Clearing	Impacted by Drawdown only	Impacted by Surface Water only	Impacted by Discharge only	Drawdown + Surface Water	Drawdown and Discharge	Surface Water and Discharge	Drawdown, Surface Water and Discharge
MaMgCyPv	51.2	0	0	0.2	0	19.6	0	0	0
EcAcEUaTe	328.3	0	0	15.3 + 59.4 (extrapolated in West Creek as per Table 28 of ERD)	0	1	0	0	0
EvAcCcERIt	566	154.5	0	37.4 +54 (extrapolated in Strike/FF1 Creek as per Table 28 of ERD)	0	85.1*	0	12.7 (extrapolated ha in Pinarra Creek as per Table 28 of ERD)	17.1
EvAcMgERIt	357.9	0.2	0	12	0	9.2*	0	0	0
AvAcCc	5,172.6	0	0	0	0	0	0	30.2	0
EcrAcPr	1,686.4	0	0	0	102	0	0	0	0

* Impacts from drawdown unlikely, as discussed in the ERD.

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Appendix 1: Golder 2017 – Groundwater Impact Assessment

Appendix 2: Eliwana Mine and Rail Surface Water Management Plan

Appendix 3: Eliwana Groundwater Water Management Plan

Appendix 4: Eliwana Vegetation Health Monitoring and Management Plan

Appendix 5: Archaeological and Ethnographical Surveys within the MDE

Appendix 6: Acceptable Erosion Rates for Mine Waste Landform Rehabilitation Modelling in the Pilbara, Western Australia.

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