Iron Bridge

Iron Bridge (CPS6687) NVCP Amendment Supporting Document

Pippingarra and Wodgina Roads upgrade

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1. INTRODUCTION

Iron Bridge Operations Pty Ltd (IB Operations), a majority-owned subsidiary of Fortescue Metals Group Limited (Fortescue), is proposing to upgrade the portion of road between the intersection of Great Northern Highway and Wodgina Road, to the Wodgina Road and Pippingarra Road intersection and the portion of Pippingarra Road leading to the entrance of the Mine Access Road (inclusive of rail crossing intersections) to allow for the transportation of prefabricated modules from Port Hedland to Iron Bridge mine site.

Due to module sizes, rail crossings and access tracks are required to be upgraded. Design engineers have identified locations along Pippingarra and Wodgina Roads that require upgrades including minor adjustments to alignment, corner radius and width to ensure these roads remain safe and trafficable by heavy vehicles. The proposed clearing locations subject to this clearing permit amendment are all located within the existing road reserve. The road will be nominally 11 m width with additional batter area either side creating a 15 m wide formation. Verge clearing and trimming may be undertaken to remove obstacles to wide modules that will be transported to site.

A large portion of the transportation corridor requiring upgrade falls within road reserve. IB have been granted approval from both Town of Port Hedland and Shire of East Pilbara, enabling IB to undertake works within the road reserve for the purpose of constructing, upgrading and maintenance of existing access tracks. However, areas outside existing cleared tracks within road reserve require a clearing approval if pruning of vegetation or clearing is to take place. IB currently holds CPS6687/1 which covers two areas:

- Wodgina Road from the Great Northern Highway turnoff up to the Pippingarra Road turnoff
- Pippingarra Road from the junction of Mount York Road for ~6 km.

However, additional area along the roads is required to be covered by a NVCP for upgrade works to take place. These areas consist of the portion of Pippingarra Road from the Pippingarra Road turnoff up to the Mount York Road junction and a stretch of private road from the Pippingarra Road.

Clearing required for additional areas outside of road reserve and current approvals, are being assessed as part of Mining Proposal: North Star Stage 2 (Amendment 1), Reg ID 88861 for IB Operations.

This Native Vegetation Clearing Permit (NVCP) application proposes to amend CPS 6687/1 to clear up to an additional 38 ha of native vegetation. This report and its appendices provide all the relevant information required under Part V, Section 51E of the Environmental Protection Act 1986 (EP Act), to assess the proposed clearing. This includes baseline environmental data, survey reports, a digital project envelope (shapefile) and assessment against the 10 Clearing Principles.

1.1 Summary of proposal

The key details of the proposal and the proposed clearing are represented in Table 1.

Table 1: Key Details of the Proposed Clearing

Site Details		
Project name	Pippingarra and Wodgina Road upgrades	
Description of operation	Upgrading and maintenance of existing access tracks to allow for the transportation of steel fabricated modules from Port Hedland to Iron Bridge mine site.	
Total clearing proposed	38 ha of native vegetation	
Project commencement date	December 2020	
Lease agreement details	Approval from the Town of Port Hedland and Shire of East Pilbara enabling IB to undertake works within the road reserve.	
Clearing method	Clearing will be undertaken by machinery, hand felling or directional pruning	
Purpose of clearing	The clearing is to allow for the upgrade and maintenance of existing access tracks.	

Proponent Details		
Company Name	IB Operations Pty Ltd	
ACN	165 513 557	
Postal Address	[redacted]	
Key Contact	Name	[redacted]
	Position	[redacted]
	Phone	[redacted]
	Email	[redacted]

1.2 Proposed clearing activities

Iron Bridge is applying to disturb a 65 ha Indicative Disturbance Footprint (IDF) (Figure 1). The cleared area is to be used for upgraded access tracks to allow for the transportation of steel fabricated modules from Port Hedland to IB mine site.

1.3 Mitigation hierarchy

There has been considerable effort expended to ensure the road upgrade activities will have as minimal impact on the environment as practicable. The activities have been designed with the following principles in mind:

- Clearing will not have a significant impact on the environment; and

- Clearing activities can be rehabilitated.

Using these principles, all areas of environmental significance has been avoided.

1.4 Relevant approvals and background

Key legislation that may affect the environmental of the proposal are included in Table 2, as well as all relevant environmental approvals that have been sought or are required before vegetation disturbance may be implemented.

Table 2: Relevant Approvals for the Pippingarra and Wodgina Roads upgrade

Relevant Legislation	Environmental Factor	Relevant Approval / Requirement
Environmental Protection Act 1986 (EP Act) – Part IV	Preliminary key environmental factors identified via the current EPA assessment include: Flora and vegetation Terrestrial fauna	Provides for the protection and regulation of impacts on the environment in Western Australia. The road upgrades are not considered a significant proposal as proposed disturbance is unlikely to have a significance effect on the environment. No further approvals are required under Part IV of the Act.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Biodiversity/Flora/Fauna/Ecosystems (Matters of National Environmental Significance)	Provides for the protection and regulation of impacts on the environment (Matters of National Environmental Significance). The road upgrades are not a controlled action for the purposes of the EPBC Act. No further approvals are required under the Act.
EP Act – Part V	Clearing of Native Vegetation Air quality and atmospheric gases	This Native Vegetation Clearing Permit is being submitted to facilitate land clearing associated with the scope of the road upgrades. No prescribed premises categories, as listed in Schedule 1 of the EP Act, apply to the road upgrades.
Rights in Water and Irrigation Act 1914	Water resources	Provides for planning and allocation of water in Western Australia. Water required for the construction of the road upgrades will be sourced from existing licenced groundwater sources associated with Fortescue's Pilbara Mining Operations.

2. STAKEHOLDER ENGAGEMENT

Stakeholder consultation for the Pippingarra and Wodgina Roads upgrade has formed part of the broader stakeholder engagement programme for IBO projects undergoing environmental approvals. The overarching objectives of the consultation program are:

- To inform stakeholders about the Pippingarra and Wodgina Roads upgrade and its impacts to the environment and to describe the outcomes of consultation on project design;
- To enable land access through areas of multiple use; and
- To establish relationships with key stakeholders that enable ongoing dialogue through implementation and regulation of the IBO.

2.1 Key stakeholders

Key stakeholders have been identified through Fortescue's extensive experience in the Pilbara. Fortescue has also adopted previous recommendations from State government agencies on stakeholders that should be included in the program. Key stakeholders identified to date are listed in Table 3.

Table 3: Key Stakeholders for the Pippingarra and Wodgina Roads upgrade project

Government Agencies	Community and Surrounding Land Users	Pastoral and Mining Companies
Department of Mines and Petroleum (DMP) [now DMIRS]	Nyamal People (Traditional Owners)	Wallareenya Pastoral Station
Department of Indigenous Affairs (DIA) [now DAA]	The Kariyarra People (Traditional Owners)	Kangan Pastoral Station
Department of Transport WA		BHP Billiton Iron Ore P/L (BHPB)
Main Roads WA (MRWA)		
Shire of East Pilbara (SoEP)		
Town of Port Hedland (ToPH)		

2.2 Stakeholder consultation

The consultation activities undertaken to date and the feedback received by Fortescue is summarised in Table 4.

Table 4: Summary of Stakeholder Engagement

Date	Description	Stakeholder	Discussion Items with Stakeholder	Proponent Comments	Stakeholder Response and Outcome
4-Jan-15	Teleconference	DoE	Approval conditions	No objections raised	Continued open dialogue
25-Aug-15	Meeting	Wallareenya Station	General Progress Update	No objections raised	Continued open dialogue
18-Aug-15	Meeting	Nyamal FMG Sub-committee	General Progress Update	No objections raised	Continued open dialogue
8-Feb-16	Meeting	DPAW	Discussion on Northern Quoll habitat	No objections raised	Continued open dialogue
6-Sep-16	Meeting	DMP	Project progress update and discussion on future mining proposals and progress of mine closure plan assessment	No objections raised	Continued open dialogue
13-Sep-16	Meeting	DSD	Update on Project progress and proposed approvals timing	No objections raised	Continued open dialogue
8-Mar-17	Meeting	DSD	Update on and proposed infrastructure layouts	No objections raised	Continued open dialogue
11-May-17	Meeting	DMP	Update on proposed Mining Proposal development and submission schedule	No objections raised	Continued open dialogue
29-Aug-17	Meeting	JTSI	Project update	No objections raised	Continued open dialogue
1-Aug-18	Meeting	DMIRS	Update on proposed Mining Proposal development and submission schedule	No objections raised	Continued open dialogue
17-Dec-18	Meeting	DMIRS	Project update. Staged Mining Proposals are acceptable to DMIRS	No objections raised	Continued open dialogue
25-Jan-19	Meeting	Nyamal Community	General update on the Project development	No objections raised	Continued open dialogue
22-Feb-19	Meeting	FMG Nyamal Heritage Sub-Committee	Iron Bridge Project Update and Survey Requirements	No objections raised	Continued open dialogue
2-Apr-19	Meeting	FMG Nyamal Working Group	Iron Bridge Project Update	No objections raised	Continued open dialogue

Date	Description	Stakeholder	Discussion Items with Stakeholder	Proponent Comments	Stakeholder Response and Outcome
2-May-19	Site Tour	FMG Nyamal Working Group	Iron Bridge Project Site Tour	No objections raised	Continued open dialogue
17-May-19	Meeting	DMIRS Environment, EPA Services DWER Licencing	Mining Proposal update.	No objections raised	Continued open dialogue
15-Jul-19	Meeting	FMG Nyamal Heritage Sub-Committee	Iron Bridge Project Update and Survey Requirements	No objections raised	Continued open dialogue
8-Oct-19	Meeting	DMIRS Environment	Mining Proposal Update, Early Works Mining Proposal submission	Include MCP with Stage 2 Mining Proposal	Continued open dialogue
9-Oct-19	Letter	Town of Port Hedland	Consent provided to carry out works as proposed in the Mining Proposal (in relation to Condition 19)	Consent provided	Continued open dialogue.
16-Oct-19	Meeting	DMIRS Environment	Stage 2 Mining Proposal, Early Works Mining Proposal	Mining Proposal to be placed on hold following comments received	Continued open dialogue
22-Oct-19	Meeting	DMIRS Environment and Executive	Stage 2 Mining Proposal, Early Works Mining Proposal update	No objections raised	Continued open dialogue
21-Nov-19	Letter	Main Roads WA	Consent provided to carry out works as proposed in the Mining Proposal (in relation to Condition 19)	Consent provided	Continued open dialogue.
6-Dec-19	Meeting	DMIRS Environment	Stage 2 Phased Strategy – splitting of Phase A, Phase B and separation of Pipelines from Mine EGS	No objections raised	Continued open dialogue
13-Jan-20	Letter	DMIRS Environment	EARS submission of Stage 2 Phase A Mining Proposal and Mine Closure Plan	-	-
4-Mar-20	Meeting	FMG Nyamal Heritage Sub-Committee	Iron Bridge Project Update	No objections raised	Continued open dialogue
10-Mar-20	Letter	DMIRS Environment	Stage 2 Phase A Mining Proposal – Request for Further Information (RFI)	Revision of the Phase A MP required	Continued open dialogue
12-Mar-20	Email	DMIRS Environment	Stage 2 Phase A Assessment MP 84768 regarding a number of disturbance figures/land	Revision of the previous disturbance	Continued open dialogue

Date	Description	Stakeholder	Discussion Items with Stakeholder	Proponent Comments	Stakeholder Response and Outcome
			uses that appear to not have been approved	figures required	
12-Mar-20	Email	DMIRS Environment	Condition 19 - L45/294	Include engagement with MRWA and ToPH regarding the access road is documented in the revised MP	Continued open dialogue
19-Mar-20	Meeting	DMIRS Environment	Meeting to clarify points of the IBO draft RFI response prior to submission	Feedback provided by DMIRS on draft response	Continued open dialogue
19-Mar-20	Letter	DMIRS Environment	Stage 2 Phase A Mine Closure Plan – RFI	Revision of the MCP required	Continued open dialogue
7-Apr-20	Email	DMIRS Environment	IBO Response provided for MP and MCP RFI.	No objections raised	Continued open dialogue
16-Apr-20	Letter	DMIRS Environment	Stage 2 Phase A Mining Proposal and Mine Closure Plan – RFI #2	Response to RFI and revision of the MP and MCP required	Continued open dialogue

2.3 Heritage and Native Title

The project is located within the Nyamal Native Title Determination land Nyamal #1 and Kariyarra Native Title Determined Land.

IBO and The Nyamal People are parties to a Project Area Agreement dated 13 February 2012 (PAA). The PAA assists in facilitating Fortescue's exploration and mining activities within the Nyamal determined areas. IBO regularly meets and consults with nominated representatives of The Nyamal People over all matters relating to the identification, protection and management of their cultural heritage.

Fortescue and The Kariyarra People are parties to a Land Access Agreement dated 10 October 2005 (LAA). The LAA assists in facilitating Fortescue's exploration and mining activities within the Kariyarra determination area. Fortescue regularly meets and consults with nominated representatives of The Kariyarra over all matters relating to the identification, protection and management of their cultural heritage.

Iron Bridge will continue to liaise with the Nyamal and Kariyarra traditional owners regarding the development of the Iron Bridge Project. As required by the tenement conditions, a copy of this Mining Proposal will be provided to the Nyamal and Kariyarra people following submission to DMIRS.

3. BASELINE ENVIRONMENTAL DATA

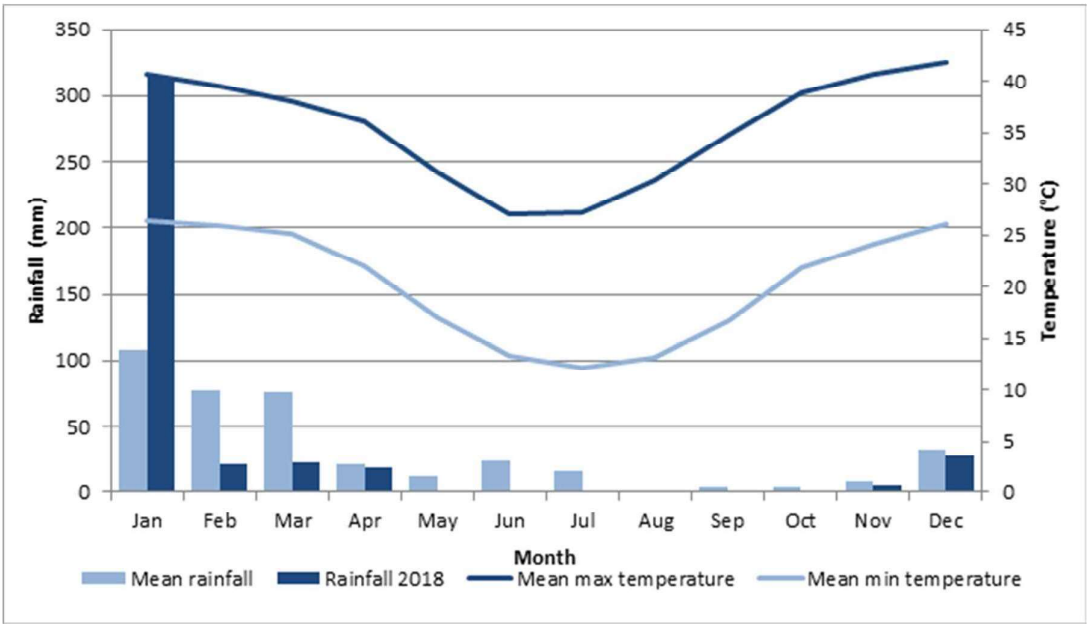
3.1 Climate

The Project area experiences a dry desert climate, with hot dry summers and mild winters (van Vreeswyk *et al*, 2004).

The closest BoM recording station to the Project is Marble Bar (Site No. 004106). Marble Bar is located approximately 80 km east of the proposal.

Summary statistics for the year 2000 to 2018 period (see Graph 1) shows that temperatures are generally high, with mean maximum temperatures at Marble Bar ranging from 27.0°C in July to 41.9°C in December (BoM, 2018). Average minimum temperatures at Marble Bar range from 12.1°C in July to 26.5°C in January.

Annual rainfall in the Pilbara has substantial yearly variation, but generally follows an inland to coastal and southern to northern increasing trend. Tropical cyclones, many of which originate in the Timor Sea, along with local thunderstorms, produce much of the summer and early autumn rainfall (McKenzie et al. 2009). Mean annual rainfall is 394 mm, with January recording the highest monthly total of 107 mm. The annual rainfall for the year 2018 was higher than average, with 418 mm recorded, the majority (314 mm) of which fell in January.



Graph 1: Average monthly temperature and rainfall data at Marble Bar

3.2 Landscape

Land use in the region is dominated by pastoral grazing as well as mining. The project area is located entirely within the Pilbara biogeographic region of the Interim Biogeographic Regionalisation for Australia (IBRA). The Pilbara biogeographic region incorporates 17,831,892 ha and includes four subregions: Chichesters, Roebourne, Hamersley and Fortescue Plains. The project footprint is located within the Chichester Subregion which is described as:

Chichester:

The Chichester subregion (PIL 1) comprises the northern section of the Pilbara Craton. Undulating Archaean granite and basalt plains include significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* (formerly *Triodia pungens*) hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges. The climate is Semi-desert-tropical and receives 300mm of rainfall annually. Drainage occurs to the north via numerous rivers (e.g. De Grey, Oakover, Nullagine, Shaw, Yule, Sherlock) (DBCA 2020).

Land systems

Three land system, as described by van Vreeswyk et al (2004) occur within the Disturbance Envelope (Table 5). Land systems found in the disturbance envelope are presented in Figure 2.

Table 5: Landforms and Soils Occurring in the Disturbance Envelope based on Land System Mapping

Land System	Description
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands
Macroy	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands
River	Active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands

Source: van Vreeswyk et al., 2004

3.3 Materials classification

Risks associated with acidic and metalliferous drainage, sodic and dispersive materials, and naturally occurring radioactive materials are not considered relevant to the project.

The IDF intersects two soil landscape land quality zones (Figure 3) according to the Department of Primary Industries and Regional Development dataset DPIRD-017, described as:

Nullagine Hills

Hills and ranges (with some stony plains) on volcanic and sedimentary rocks of the Pilbara Craton (including the Hamersley Basin) with Stony soils and Red shallow loams and sands.

Abydos Plains and Hills

Stony plains (with some hills) on granitic rocks of the Pilbara Craton (East Pilbara Terrane) with Red deep sandy duplexes, Red shallow loams, Stony soils, Red sandy earths and Red loamy earths.

3.4 Flora and vegetation

The flora and vegetation of the IDF area has been analysed through a desktop literature review and a reconnaissance survey, with the results being produced in this section.

Regional vegetation units

The IDF occurs entirely within one subregion of the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA), being the Chichester subregion. Vegetation units have been described on a regional scale by Beard (1975) and updated by DAFWA (2012). These vegetation units are broad scale descriptors and attempt to depict the native vegetation as it was presumed at the time of European settlement. Two Beard vegetation units occur within the application area and are listed in Table 6 with their total estimated Pre-European extent.

Table 6: Pre-European vegetation association representation, DBCA 2019

Association	Description	Pre-European	Current Extent	Extent mapped within the Indicative Disturbance Envelope
93	Hummok grasslands, shrub steppe; kanji over soft spinifex	3,044,309.52	3,040,640.98	99.88
619	Medium woodland; river fum (*Euclyptus camaldulensis*)	74,186.11	72,765.18	98.08

Flora and vegetation studies

The project area has been subject to flora and vegetation survey efforts (Table 7). A desktop review of the previous assessments was included in the assessment undertaken by Ecoscape. A reconnaissance flora and vegetation survey of the area was undertaken by Ecoscape in July 2020. The assessment is included as Appendix 1.

Table 7: Flora and Vegetation Surveys intersecting the study area

Report Title	Survey Date	Survey Type
North Star Slurry and Infrastructure Corridors, Conservation Significant Flora and Vegetation Assessment - Ecologia Environment	2015	Targeted Conservation Significant Flora Survey
North Star Alternate Access Road, Flora and Vegetation Assessment – Coffey Environments	2014	Flora and Vegetation Assessment (Level 2 - Single Phase)
North Star Vegetation and Flora Assessment - Ecologia Environment	2011	Flora and Vegetation Assessment (Level 2 - Two Phase)
Supplementary Vegetation and Flora Surveys of the Port Hedland to Cloudbreak Rail Corridor and Associated Borrow Pits and Infrastructure - Coffey Environments	2006	Flora and Vegetation Assessment (Level 2 - Single Phase)
Vegetation and Flora Survey of the Proposed FMG Stage A Rail Corridor – Biota Environmental Sciences	2004	Flora and Vegetation Assessment (Level 2 - Single Phase)

Vegetation communities

A total of seven vegetation communities have been mapped within the IDF as depicted in Table 8 and Figure 4.

Table 8: Vegetation communities intersecting the indicative disturbance footprint

Veg Type Code	Description	Mapped Extent within Purpose Permit Envelope (ha)
AaTl	*Acacia ancistrocarpa* tall sparse shrubland over *Triodia lanigera* low hummock grassland.	24.95
AaTw	*Acacia acradenia* and *Grevillea wickhamii* mid open shrubland over *Triodia wiseana* and *T. lanigera* low hummock grassland.	4.18
AoTw	*Acacia orthocarpa* and *A. inaequilatera* tall sparse shrubland over *Triodia wiseana* and *T. lanigera* low closed hummock grassland.	1.29
CzAaTl	*Corymbia zygophylla* low open woodland over *Acacia ancistrocarpa* mid sparse shrubland over *Triodia lanigera, Isotropis atropurpurea* and *Ptilotus astrolasius* low hummock grassland/shrubland.	4.29
ChAtTe	*Corymbia hamersleyana* low open woodland over *Acacia tumida* var. *pilbarensis* mid sparse shrubland over *Triodia epactia* and *T. wiseana* low hummock grassland.	0.76
EcAtCc	*Eucalyptus camaldulensis* subsp. *refulgens* and *Eucalyptus victrix* mid woodland over *Acacia trachycarpa* and *Atalaya hemiglauca* tall open shrubland over *Cenchrus ciliaris* and *Triodia longiceps* mid tussock/hummock grassland.	0.62
ChAbTc	*Corymbia hamersleyana* low open woodland over *Acacia bivenosa* and *Petalostylis labicheoides* mid sparse shrubland over *Triodia chichesterensis* low closed hummock grassland.	1.67
Not Vegetated	*Previously cleared vegetation or devoid of vegetation*	*27.19*
	Total (ha)	64.94

Vegetation condition

Vegetation condition recorded within the survey area was generally categorised as 'Excellent' with the exception of small areas adjacent existing laydown areas and vegetation in 'Good' condition associated with the Turner River watercourse (vegetation type EcAtCc). The condition of this vegetation type was impacted by the presence of weeds (Kapok and Buffel Grass) and evidence of livestock activity.

Areas of survey area adjacent to existing laydown areas and road features ranged in condition from 'Very Good' to 'Poor' based on disruption to vegetation structure, bare ground cover and species assemblage. A total of 27.19 ha (41.87%) of the area is cleared or devoid of vegetation.

Conservation Significant Vegetation Communities

In Western Australia, a vegetation community can be classified as a Threatened Ecological Community (TEC) by the Western Australian Minister for Environment, based on the assessment and recommendation of the Threatened Species Scientific Committee. TECs that are listed to be of State conservation significance in Western Australia are considered to be Environmentally Sensitive Areas (ESA) under Part V of the EP Act.

Potential TECs that do not meet survey criteria are added to the Priority Ecological Community (PEC) list under Priority 1, 2 or 3. Ecological communities that are adequately known, are rare but not threatened, meet criteria for "Near Threatened", or that have been recently removed from the threatened list, are placed in Priority 4. Conservation dependent ecological communities are placed in Priority 5.

There are no TECs and PECs within the IDF, therefore no impact is anticipated. There is no TEC in proximity to the survey area based on the DBCA database search and desktop assessment. The nearest known PEC is the Gregory System (*Linear dunes and restricted sandplains supporting shrubby hard spinifex (and occasionally soft spinifex) grasslands)*, located approximately 15 km to the west of the survey area.

Sheetflow Dependent Vegetation

The term 'sheetflow dependent vegetation' refers to vegetation communities that are dependent on an overland flow of water, which occurs on broad plains with a very gradual slope. The main communities considered to be reliant on this process in the Pilbara are typically recognised as grove-intergrove vegetation.

There were no species of Mulga recorded within the survey area and therefore no sheetflow dependant vegetation is present within the IDF.

Groundwater Dependent and Potentially Groundwater Dependent Vegetation

One potential Groundwater Dependent vegetation community was identified in surveys undertaken by Ecoscape (2020). This vegetation type occurred within the survey area in proximity to the Turner River and occupied 0.6 ha or 0.95 % of the IDF area.

- EcAtCc: *Eucalyptus camaldulensis subsp. refulgens and Eucalyptus victrix mid woodland over Acacia trachycarpa and Atalaya hemiglauca tall open shrubland over Cenchrus ciliaris and Triodia longiceps mid tussock/hummock grassland.*

Eucalyptus camaldulensis sens. lat. and potentially *Eucalyptus victrix* are considered phreatophytic species, and as such the vegetation unit including these species is considered representative of groundwater dependant vegetation.

Flora Taxa

The IDF area has been subject to flora and vegetation survey effort by Ecoscape. Ecoscape included a desktop assessment of the previous flora and vegetation assessments in their report. A total of 100 vascular flora taxa from 54 genera. The most commonly represented families were Fabaceae with 21 taxa, Poaceae (15 taxa) and Malvaceae (11 taxa). The most commonly represented genera were Acacia with 11 taxa, Triodia (seven taxa) and Ptilotus (six taxa).

Flora of Conservation Significance

No Threatened Flora listed under the *Environment Protection and Biodiversity Conservation Act 1999* or the *Biodiversity Conservation Act 2016* has been mapped within the IDF. One Threatened Flora species, *Pityrodia* sp. Marble Bar has been previously recorded within 50km of the survey area, however, no TF species are considered likely to occur within the survey area as no suitable habitat was observed during the field assessment. During the field survey, one priority-listed flora, *Heliotropium muticum* (P3) was recorded within the IDF area and one priority-listed flora, *Triodia chichesterensis* (P3) was recorded outside of the survey corridor.

A post-survey likelihood assessment identified that three conservation significant taxa remain a possibility of occurring within the survey area including:

- *Eragrostis crateriformis* (P3)
- *Euphorbia clementii* (P3)
- *Goodenia nuda* (P4).

The potential impacts (if any) to the species listed above are considered negligible based on known distribution and the relatively small disturbance footprint.

Weeds

No Weeds of National Significance (WONS) were identified within the IDF. However, the following alien species were observed within the survey area.

- * *Aerva javanica* (Kapok)
- * *Cenchrus ciliaris* (Buffel Grass)

3.5 Vertebrate Fauna

The project area has been subject to fauna survey efforts (Table 9). A desktop review of the previous assessments was included in the assessment undertaken by Ecoscape. A Basic fauna survey, as defined by the recently released (July 2020) *Technical Guidance – Terrestrial Vertebrate Fauna Survey for Environmental Impact Assessment* (EPA 2020) of the area was undertaken by Ecoscape in July 2020. The assessment is included as Appendix 1.

Table 9: Fauna surveys intersecting the study area

Report Title	Survey Date	Survey Type
North Star Alternate Access Road, Targeted Level 2 Fauna Assessment – Coffey Environments	2014	Terrestrial Vertebrate Fauna and Fauna Habitat Assessment (Level 1) and Targeted Conservation Significant Fauna Survey
Fortescue Metals Group Ltd Proposed Gas Pipeline Targeted Threatened Fauna Survey – Outback Ecology	2013	Targeted Conservation Significant Fauna Survey
North Star Project Level 2 Terrestrial Vertebrate Fauna Assessment – Ecologia Environment	2011	Terrestrial Vertebrate Fauna and Fauna Habitat Assessment (Level 2 - Two Phase, and Targeted Conservation Significant Fauna)
North Star Subterranean Fauna Survey and Assessment – Subterranean Ecology	2011	Subterranean Fauna Assessment - Stygofauna and Troglofauna (Two Phases)
Targeted Fauna Assessment of the Rail Duplication – Bamford Consulting Ecologists	2010	Targeted Conservation Significant Fauna Survey
Stygofauna assessment within the Fortescue Metals Group Ltd Rail Corridor – Bamford Consulting Ecologist	2008	Subterranean Fauna Assessment - Stygofauna (One Phase)
Fauna Habitats and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor – Biota Environmental Sciences	2004	Terrestrial Vertebrate Fauna and Fauna Habitat Assessment (Level 2 - Two Phase)

Fauna Habitat

Two fauna habitat types, as assessed by Ecoscape (2020), were mapped within the IDF (Figure 5). Details regarding these habitat types are listed in Table 10, including whether they support conservation significant fauna.

Table 10: Fauna surveys intersecting the study area

Habitat Type	Description	Significant Fauna & Suitability of Habitat Type	Mapped Extent within IDF (ha)
*Cleared areas	N/A	N/A	27.19
Hummock grasslands	Hummock Grasslands associated with either emergent *Acacia* shrubs or *Corymbia* woodlands on stony clay or, to a lesser extent sandy and stony sandplain soils.	Habitat type is suitable for common suite of bird species, small reptiles, and mammals e.g. White-breasted Woodswallow, Military Dragon, Spinifex Hopping Mouse, and Western Pebble-mound Mouse.	32.96
Creeklines	Eucalypt Woodlands over Hummock Grasses and shrubs on sandy soils.	Habitat type is suitable for common creekline and woodland species e.g. Magpie Lark, Yellow-throated Miner, and Sand Goanna	4.79

Conservation Significant Fauna

Forty five vertebrate fauna species were recorded during the field survey, 11 mammals (including two introduced); 29 birds; and four reptiles. Of the fauna species recorded, one is conservation listed, *Pseudomys chapmani* (Western Pebble-mound Mouse, P4).

Seven species of bat were positively identified from full spectrum WAV-format recordings of their echolocation calls. The conservation listed species Ghost Bat (*Macroderma gigas)* and Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) were not detected.

One conservation significant fauna species (Fork-tailed Swift) has previously been recorded by Ecologia Environment in 2012 within the IDF. The likelihood of conservation significant fauna species for Grey Falcon, Peregrine Falcon, Fork-tailed Swift, within the survey area were considered to have a high likelihood of occurrence from the desktop assessment by Ecoscape. However, these species are rarely sighted and have a nomadic and widely dispersed distribution pattern, however the small extent of native vegetation and recent fires within the survey area have also reduced the available food resources.

Western Pebble-mound Mouse

This Western Pebble-mound Mouse is native and endemic to Western Australia, where it lives in pebbly soils in arid tussock grassland and acacia woodland (Kitchener, 1983). Like other pebble-mound mice, the Western Pebble-mound Mouse creates its own microhabitat by scattering a mound of pebbles around its burrows (Dunlop & Pound, 1981). The preferred habitat of the species is hummock grasslands of *Triodia basedowii*, *Cassia*, *Acacia* and *Ptilotus*, and is associated with eroding sands at natural features which expose small stones (pebbles).

The Western Pebble-mound Mouse was recorded with five active mounds, one of these mounds was within the survey area but outside the IDF and one individual mouse image was

captured by trail camera. All five mounds were in the Hummock Grassland habitat type in areas regenerating from a recent fire.

It is considered negligible for there to be a significant impact associated with road widening and associated activities to the Western Pebble-mound Mouse based on the single mound recorded within the survey area and numerous that were recorded outside of the survey area nearby.

Feral Animals

Two introduced mammal species were recorded in the survey area during the 2020 survey, including:

- **Canis familiaris* (Wild Dog)
- **Equus asinus* (Donkey)

3.6 Hydrology

Pilbara creeks are typically ephemeral and are dry for the majority of the year, with the exception of pools and groundwater fed springs. Pilbara soils typically have high initial infiltration rates for dry catchment conditions, i.e. when the antecedent moisture content of the soils is low. Significant streamflow usually occurs when antecedent moisture content of the soils is high, which is caused by significant rainfall in the days or weeks preceding a storm event.

There are typically two different types of climatic events which cause flood response in the Pilbara, namely: Cyclonic activity/Tropical Low-Pressure Systems, and localised diurnal thunderstorms.

Cyclonic activity can result in severe and widespread flooding, generally on a river catchment scale. The occurrence of this flooding activity can be forecast in advance (albeit with significant uncertainty), so catchment wide flood warnings are typically issued. This type of flooding typically produces large peak flows and may result in damage to infrastructure due to the magnitude of flow. However, not all cyclones will result in severe flooding.

Isolated thunderstorms have the potential to create fast and localised flooding, referred to as flash flooding. These events are much harder to predict as they can occur in the upper reaches of catchments. These events generally have a lower potential for widespread damage as the extent and magnitude of flooding is much smaller than cyclonic events.

The survey area is in the Turner River catchment and intersects the Turner River near the southern extent. All roads will be constructed to maintain surface water flows where practicable, using surface water management infrastructure such as culverts and spillways where required. Significant disturbance to the natural drainage of water from the landscape is not anticipated with the proposed clearing.

4. ENVIRONMENTAL IMPACTS AND MANAGEMENT

The environmental impacts of the proposed vegetation clearing have been considered in the following section.

4.1 Potential Impacts to Flora and Vegetation

Potential impacts to flora and vegetation resulting from implementation of vegetation disturbance for the road upgrades include:

- Direct loss of vegetation at a local level
- Direct loss of potentially GDV
- Degradation of vegetation due to indirect impacts such as:
  - Fragmentation, leading to edge effects
  - Dust deposition
  - Chemical and hydrocarbon spills and leaks
  - Changes to surface hydrology

Direct Loss of Vegetation

Vegetation disturbance for the road upgrades will result in disturbance of approximately 38 ha of native vegetation, comprising of a total of seven vegetation communities, these are detailed in Table 8 and Figure 4.

Direct Loss of Conservation Significant Vegetation

There are no TECs or PECs within the IDF.

Direct Loss of Sheetflow Dependent Vegetation

No sheetflow dependent vegetation unit are recorded within the IDF, therefore no impact is expected.

Direct Loss of Potentially Groundwater Dependent Vegetation

One potential Groundwater Dependent vegetation community was identified in surveys undertaken by Ecoscape (2020). This vegetation type occurred within the survey area in proximity to the Turner River and occupied 0.6 ha or 0.95 % of the IDF area.

Direct Loss of Flora of Conservation Significance

One priority-listed flora, *Heliotropium muticum* (P3) was recorded within the IDF area and one priority-listed flora, *Triodia chichesterensis* (P3) was recorded outside of the survey corridor.

A post-survey likelihood assessment considered it possible that three conservation significant taxa could occur within the survey area It is considered that the clearing of vegetation will not pose a significant threat to any priority species.

Degradation of Vegetation

Degradation of vegetation may occur as a result of:

- Uncontrolled vehicle access leading to physical damage of vegetation and/or the introduction or spread of weeds
- Dust deposition on vegetation resulting from land clearing and construction activities
- Introduction or spread of weed species
- Leaks of containment structures, pipes, vehicles or equipment leading to contamination of soils, surface water or groundwater
- Spills of chemicals or hydrocarbons leading to contamination of soils, surface water or groundwater
- Inappropriate disposal of domestic waste, waste hydrocarbons and chemicals, construction waste or treated sewage leading to contamination of soils, surface water or groundwater

Dust Deposition

Dust deposition can occur through movement of vehicles and earth moving. Dust deposition on foliage can impact on a plants ability to photosynthesise, or control water loss through transpiration. One published study indicates that vegetation health is not impacted by dust deposition until relatively high levels of dust are experienced, that is, greater than 7g/m^2/month (Doley, 2006). The impact from dust deposition from this proposal is low due to short construction timeframe due to rolling nature of construction activities and Fortescue's dust management measures (refer to Table 11).

Chemical Spills, Leaks and Leachate

Contamination of soil by chemical and hydrocarbon spills can impede plant growth or kill vegetation. Drainage from infrastructure can contain higher levels of sediments which may cause a decline in vegetation health. Fortescue consider the risk of impacts to vegetation from contamination and pollution to be low with the implementation of the measures detailed in Table 11.

Altered Surface Hydrology

All roads will be constructed to maintain surface water flows where practicable, using surface water management infrastructure such as culverts and spillways where required. Significant disturbance to the natural drainage of water from the landscape is not anticipated with the proposed clearing.

No sheetflow dependent vegetation unit are recorded within the IDF.

Management Measures for Flora and Vegetation

There has been considerable effort expended to ensure the road upgrades and associated activities will have as minimal an impact on flora and vegetation as practicable. The activities have been designed to ensure that the clearing avoids any significant impact on the environment and can be mitigated though rehabilitation.

The IDF does not have any Threatened Flora listed under the *Environment Protection and Biodiversity Conservation Act 1999* or the *Biodiversity Conservation Act 2016.* One priority-listed flora, *Heliotropium muticum* (P3) was recorded within the IDF area. No TECs or PECs will be impacted.

Mitigation measures to manage the residual risk are captured in Table 11.

Fortescue manages clearing of native vegetation through a Land Use Certification (LUC). A LUC identifies the area to be disturbed and considers multiple factors, such as environmental (significant values and approvals), heritage, tenure, pastoral leases and water, prior to disturbance being permitted. Each LUC application is reviewed for each factor by technical leads with Fortescue before approval is granted. Conditions are placed on each LUC with regards to the identified factors to ensure clearing is undertaken in accordance with legal obligations and with regards to environmental or heritage values. The LUC process allows applicants to modify their application to avoid significant or sensitive values in consultation with the technical leads prior to approval of the LUC.

Conditions of the LUC may include ground inspections for conservation significant flora or fauna depending on the receiving environment and the conditions of any environmental approval applicable to the area. No LUC would be approved without the area having been subject to heritage survey.

Table 11: Management Measures for Flora and Vegetation

Impact	Management Actions
Direct loss of vegetation and flora	• Review the proposed project design against the vegetation survey data to avoid/minimise clearing of significant flora and vegetation.

Impact	Management Actions
	• All Threatened and Priority Flora are to be identified on the ground by appropriate signage, fencing and/or flagging prior to clearing. • Minimise clearing and vegetation disturbance to ensure significant flora and vegetation are protected. Conduct vegetation clearing in accordance with a permit issued under the *Land Use Certificate (LUC) Procedure (100-PR-TA-0001).* • Ensure staff and contractors are aware of the location of significant flora and vegetation on site and their responsibility to ensure they are protected.
Fragmentation	• Weed hygiene requirements are implemented for plant and equipment in identified weed risk areas and/or in areas where weed populations have been identified and high-risk activities are proposed to be undertaken in accordance with the *Weed Management Plan (100-PL-EN-1017).*
Altered fire regimes	• Site induction will inform about fire risk and potential sources. • A Hot Works Permit system will be implemented. • Appropriate fire breaks will be installed from workspaces and around camps and other infrastructure in accordance with regulations.
Dust	• Vehicle speeds restricted according to *Traffic Management Plan (100-PR-SA-0049).* • Dust suppression will be carried out during construction. • Appropriate cover placed on open areas to minimise dust lift off post-closure.
Chemical and hydrocarbon spills	• Ensure relevant personnel and contractors involved in chemical and hydrocarbon handling and storage activities are provided with the appropriate training and equipment as outlined in the *Chemical and Hydrocarbon Spills Procedures 100-PR-EN-0014* and *the Hazardous Materials Management Procedure 100-PR-SA-1059.* • Chemicals and hydrocarbons should be stored in accordance with AS 1940, AS 3833 or AS 3780 to minimise the potential for environmental harm. Storage should only be in designated areas and within the limits specified in applicable Licence conditions under the EP Act. • Where a chemical or hydrocarbon spill has occurred, manage the spill including any contaminated material, in accordance with the *Chemical and Hydrocarbon Spills Procedure 100-PR-EN-0014* and investigate and report the incident in accordance with the *Incident Event Management Procedure 100-PR-SA-0011.* • Contain and appropriately manage potentially contaminated stormwater prior to release to the environment. • Remediate any area declared contaminated as defined under the *Contaminated Sites Act 2003* in accordance with the DER's

Impact	Management Actions
	Contaminated Sites Management Series – Assessment Levels for Soil, Sediment and Water (2011).
Altered surface hydrology	• Conduct a risk assessment to determine the likelihood of a change to the surface water regime that may lead to unacceptable environmental impacts. • Protect natural drainage lines from construction impacts where possible to minimise impacts to water quality.

Conclusion – Impacts to Flora

Considering the existing environment, proposed activities and management strategies, IBO believes the impacts to flora and vegetation of the proposed clearing are not significant.

4.2 Potential Impacts to Fauna

Potential impacts to terrestrial fauna, including the conservation significant fauna resulting from implementation of the road upgrades include:

- Habitat loss from direct clearing of fauna habitat
- Habitat fragmentation, resulting in:
  - Restriction or removal of access to breeding habitat, foraging habitat or water sources through the placement of infrastructure
  - Increased feral animal species
  - Increased weed species
- Increased vehicle strike

Habitat Loss

The habitat types present within the survey area may be suitable for conservation listed fauna species including Greater Bilby (which has been previously recorded from the survey area), Northern Quoll, and Brush-tailed Mulgara. These species were not detected within the survey area and the habitats have been impacted by recent fires and disturbance from Cattle.

One conservation significant fauna species (Fork-tailed Swift) has previously been recorded by Ecologia Environment in 2012 within the IDF. The likelihood of conservation significant fauna species for Grey Falcon, Peregrine Falcon, Fork-tailed Swift, within the survey area were considered to have a high likelihood of occurrence from the desktop assessment by Ecoscape. However, these species are rarely sighted and have a nomadic and widely dispersed

distribution pattern, however the small extent of native vegetation and recent fires within the survey area have also reduced the available food resources.

Fragmentation of Habitat

Fragmentation occurs when a large expanse of habitat is transformed into a number of smaller patches due to clearing, isolating these smaller fragments from each other by cleared areas (Wilcove, McLellan & Dobson, 1986). Where the landscape surrounding the fragments is inhospitable to species of the original habitat, and when dispersal is low, remnant patches can be considered true habitat island and local communities will be isolates. Small habitat fragments are likely to be low in heterogeneity, that is, the habitat may not present the range of habitat variety required by some species (e.g. both foraging and breeding habitat) (Wilcove, McLellan & Dobson, 1986).

It is possible that the vegetation disturbance for the road upgrades may cause a barrier to some species movement within their home ranges, particularly small reptiles and mammals. Significant impacts to fauna resulting from habitat fragmentation is not anticipated.

Increased Vehicle Strike

The undertaking of vegetation disturbance will result in an increase in the number of vehicles in the local area. Vehicles may strike fauna species on roads, particularly slow-moving animals or species that are easily startled. Vehicles travelling at night are more likely to strike native fauna when visibility is reduced and animals are more active. Species such as birds of prey are also likely to feed off dead carcases on roads and may also become victim to vehicle strike.

Fortescue keeps a record of all vehicle related fauna incidents. The species with the highest number of vehicles strikes at Fortescue's operating sites is the kangaroo, usually at dawn and dusk. There have been relatively few vehicle strikes involving significant fauna at Fortescue sites. It is not expected that the clearing activities will result in a significant increase in vehicle strikes.

Increased Weed Species

Clearing for development and increased movement of vehicles, including earth moving machinery may result in the spread of existing or the establishment of new, populations of weed species. Increased numbers of weeds can significantly increase the risk of fire, which can impact on fauna habitat value. Areas of dense weed infestation can also reduce the ability of fauna to move through their habitat and impact on their ability to forage. Weed species palatable to feral herbivores may attract these animals to the area causing an increase in predation of native species, potential land degradation and further spreading of weed species either by movement of soil or in the animal's dung. Through the implementation of weed

hygiene management measures and creating hardstands within the IDF, it is not expected that the road upgrades will result in significant of or the introduction of new weed populations.

Mitigation

Fortescue has applied the mitigation hierarchy of the IDF in relation to terrestrial fauna. Mitigation measures to address potential impacts are detailed in Table 12.

Table 12: Management Measures for Fauna

Impact	Management Actions
Habitat loss	• Record conservation significant fauna and habitat identified during a targeted fauna survey in the Corporate GIS and PIMS in accordance with the *Environmental Datasets – Data Governance Guidelines (100-GU-EN-0020)*. • Land use certification (LUC) procedure. Must be adhered to before any ground disturbance, rehabilitation or land access. This ensures all proposed disturbance is checked for: purpose; cultural heritage; and environmental significance. No ground disturbance can take place without a valid land use certificate. • Ensure infrastructure location, design, construction and operation reflects risk assessment outcomes in minimising impacts on conservation significant fauna and associated habitat. • Prior to conducting ground disturbance activities, ensure known locations of environmentally sensitive areas to be retained and protected from disturbance are identified on the ground by appropriate signage, fencing or flagging.
Fragmentation of habitat	• Land use certification (LUC) procedure must be adhered to before any ground disturbance, rehabilitation or land access. This ensures all proposed disturbance is checked for: purpose; cultural heritage; and environmental significance. No ground disturbance can take place without a valid land use certificate.
Increased feral animals	• Domestic waste stored in appropriate bins inaccessible to animals. • All domestic waste will be transported off site. • No domestic animals permitted on site.
Increased vehicle strike	• To minimise the potential for fauna injuries or deaths on access roads, implement appropriate mitigation measures such as speed limit restrictions, right of way for fauna and the prohibition of off tenure driving.
Increased weed species	• Weed hygiene requirements are implemented for plant and equipment in identified weed risk areas and/or in areas where weed populations have been identified and high-risk activities are proposed to be undertaken in accordance with the *Weed Management Plan (100-PL-EN-1017).*

Conclusion – Impacts to Fauna

Considering the existing environment, proposed activities and management strategies, Fortescue believes the impacts to fauna and fauna habitat from the proposed clearing are not significant.

4.3 Assessment against the Ten Clearing Principles

The Environmental Protection Act 1986 includes 10 principles that provide decision makers with a guide on whether native vegetation should be cleared. The principles, outlined in Schedule 5 – Principles for Clearing Native Vegetation, are used as a comparative tool by DWER and DMIRS in determining whether clearing activities are environmentally acceptable and capable of being appropriately managed. Table 13 assesses the proposed clearing against these Principles.

Table 13: Proponent Assessment of the Clearing Principles

Proponent Assessment of the Clearing Principles
(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.
Proposed clearing is not likely to be at variance to this Principle The IDF has been subject to flora and vegetation survey efforts. The reconnaissance survey conducted by Ecoscape in 2020 included a Literature Review of previous surveys undertaken in the area. The Ecoscape assessment recorded a total of 100 vascular flora taxa from 54 genera. The vegetation condition of the IDF has been classified as Excellent to Good condition whilst the remaining area is cleared or devoid of vegetation (41.87%). No Weeds of National Significance (WONS) were identified within the IDF as detailed under section 3.4. Weed species within the IDF include **Aerva javanica* (Kapok Bush), **Cenchrus ciliaris* (Buffel Grass). As noted in Principle (b), the fauna habitat and recorded fauna species of the IDF indicated that it is not more biodiverse when compared to other locations within the Pilbara bioregion. The IDF is composed of vegetation and fauna habitat that are typical in the landscape thereby not reducing the potential biodiversity by reducing habitat diversity. Based on the above, the proposed clearing is not likely to be at variance to this Principle.
(b) Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.
Proposed clearing is not at variance to this Principle The IDF has been subject to flora and vegetation survey efforts. The reconnaissance survey conducted by Ecoscape in 2020 included a Literature Review of previous surveys undertaken in the area. No Conservation Significant Fauna was recorded by Ecoscape within the IDF area. One species was recorded (Western Pebble-mound Mouse) was recorded within the survey area and one conservation significant fauna species (Fork-tailed Swift) has previously been recorded by Ecologia Environment in 2012 within the IDF. It is considered negligible for there to be a significant impact associated with road widening and associated activities to the Western Pebble-mound Mouse based on the single mound recorded within the survey area and numerous that were recorded outside of the survey area nearby. The habitat types present within the survey area may be suitable for conservation listed fauna species including Greater Bilby (which has been previously recorded from the survey area), Northern Quoll, and Brush-tailed Mulgara. These species were not detected within the survey area and the habitats have been impacted by recent fires and disturbance from Cattle Based on the above, the proposed clearing is not likely to be at variance to this Principle.
(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.
Proposed clearing is not at variance to this Principle No Threatened Flora listed under the *Environment Protection and Biodiversity Conservation Act 1999* or the *Biodiversity Conservation Act 2016* has been mapped within the IDF. One Threatened Flora species, *Pityrodia* sp. Marble Bar has been previously recorded within 50km of the survey area, however, no TF species are considered likely to occur within the survey area as no suitable habitat was observed during the field assessment. One priority-listed flora, *Heliotropium muticum* (P3) was recorded within the IDF area and one priority-listed flora, *Triodia chichesterensis* (P3) was recorded outside of the survey corridor. The potential impacts (if any) to the species listed above are considered negligible based on known distribution and the relatively small disturbance footprint.

Proponent Assessment of the Clearing Principles

The habitat types that are proposed to be cleared are common in the landscape and are not considered habitat that would support threatened flora.

Based on the above, the proposed clearing is not at variance to this Principle.

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Proposed clearing is not at variance to this Principle

There are no TECs and PECs within the IDF, therefore no impact is anticipated. There is no TEC in proximity to the survey area based on the DBCA database search and desktop assessment. The nearest known PEC is the Gregory System (*Linear dunes and restricted sandplains supporting shrubby hard spinifex (and occasionally soft spinifex) grasslands)*, located approximately 15 km to the west of the survey area.

Based on the above, the proposed clearing is not at variance to this Principle

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Proposed clearing is not at variance to this Principle

The IDF occurs within one subregion of the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA), being the Chichester subregion. The Chichester subregion have not been extensively cleared nor are there vegetation communities within the IDF that would be considered a remnant.

There is two Beard (1975) vegetation community within the IDF. These vegetation community are considered widespread across the Pilbara, with over 98 percent of their pre-European extent remaining:

- 93; Hummok grasslands, shrub steppe; kanji over soft spinifex
- 619; Medium woodland; river gum (*Euclyptus camaldulensis*)

Based on the above, the proposed clearing is not at variance to this Principle.

(f) Native vegetation should not be cleared if it growing in, or in association with, an environment associated with a watercourse or wetland.

Proposed clearing is not likely to be at variance to this Principle

The survey area is in the Turner River catchment and intersects the Turner River near the southern extent. The survey area includes areas of the River land system which is characterised by major river channels and seasonally active flood plains.

Significant disturbance to the natural drainage of water from the landscape is not anticipated with the proposed clearing.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Proposed clearing is not likely to be at variance to this Principle

The management measures detailed in previous sections will assist in reducing the likelihood of land degradation as a result of clearing of the IDF. These management measures include surface water and weed management. In addition, all of the proposed clearing is for the instatement of hardstands which will be maintained so it will be unlikely erosion to take place.

Risks associated with acidic and metalliferous drainage, sodic and dispersive materials, and naturally occurring radioactive materials are not considered relevant to the project.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environment values of any adjacent or nearby conservation area.

Proposed clearing is not at variance to this Principle

The IDF does not intersect or adjoin any conservation areas. The nearest conservation estate is Mungaroona Range Nature Reserve approximately 60 km south west of the survey area.

Based on the above, the proposed clearing is not at variance to this Principle.

(i) Native vegetation should not be cleared if the clearing of vegetation is likely to cause deterioration in the quality of surface or underground water.

Proposed clearing is not likely to be at variance to this Principle

Proponent Assessment of the Clearing Principles
The only surface water features within the IDF is the Turner River in the southern extent. All roads will be constructed to maintain surface water flows where practicable, using surface water management infrastructure such as culverts and spillways where required. Significant disturbance to the natural drainage of water from the landscape is not anticipated with the proposed clearing. Based on the above, the proposed clearing is not likely to be at variance to this Principle.
(j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.
Proposed clearing is not at variance to this Principle The only surface water features within the IDF is the Turner River in the southern extent. All roads will be constructed to maintain surface water flows where practicable, using surface water management infrastructure such as culverts and spillways where required. Significant disturbance to the natural drainage of water from the landscape is not anticipated with the proposed clearing. Based on the above, the proposed clearing is not at variance to this Principle.

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Figure 1: Project Footprint

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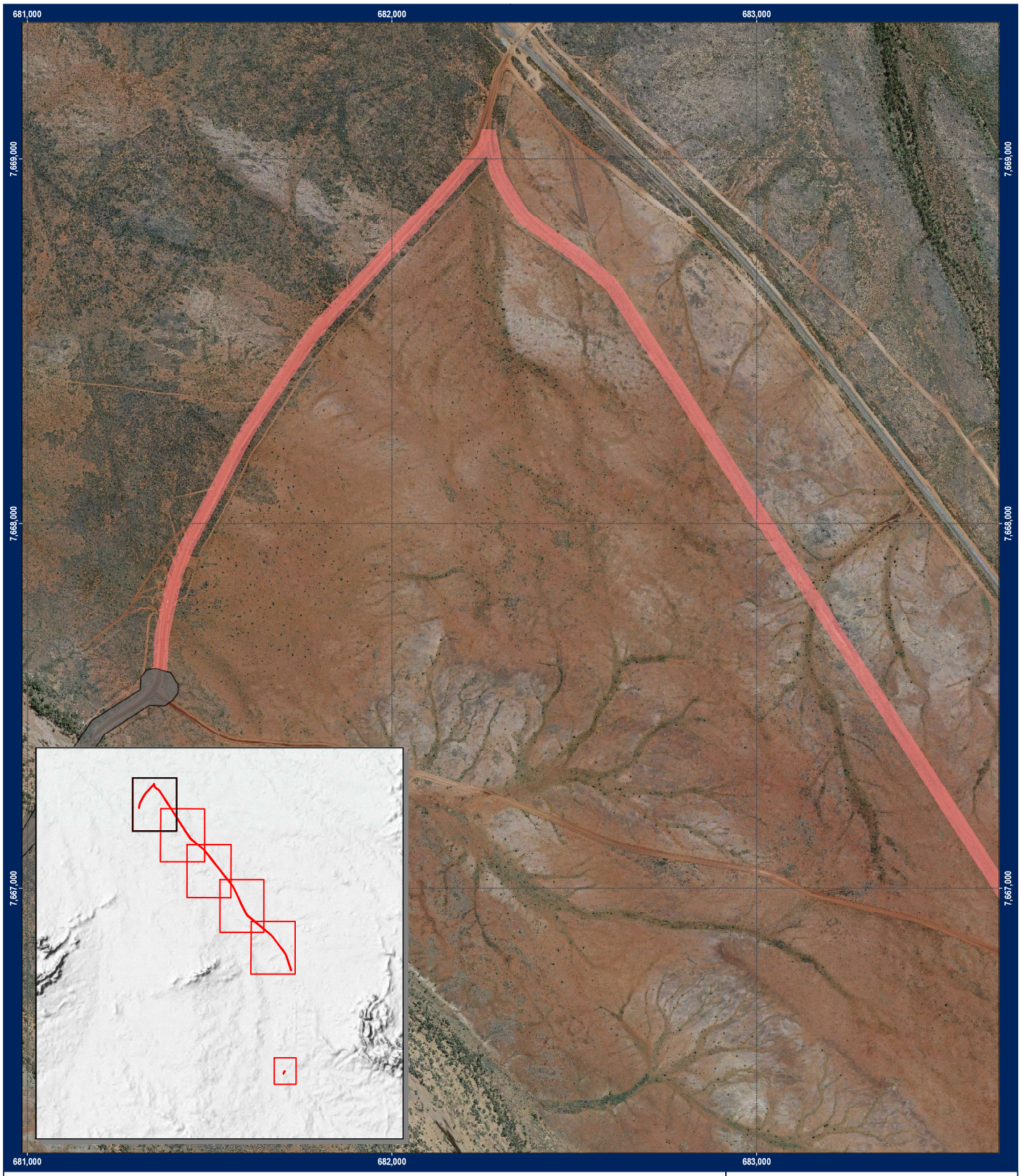

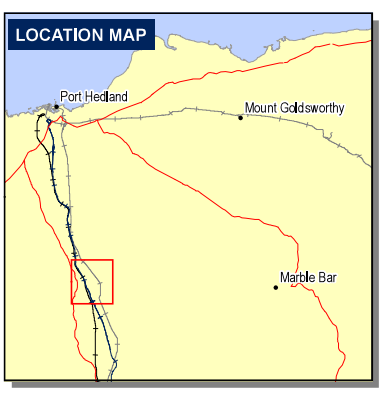

LEGEND

- Proposed Disturbance Area
- Approved NVCP CPS6687

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Meters

Figure 1
Project Footprint
Page 1 of 6

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Drawn By: FD
Revised By: fdemeo
Approved By:
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Data Source(s):
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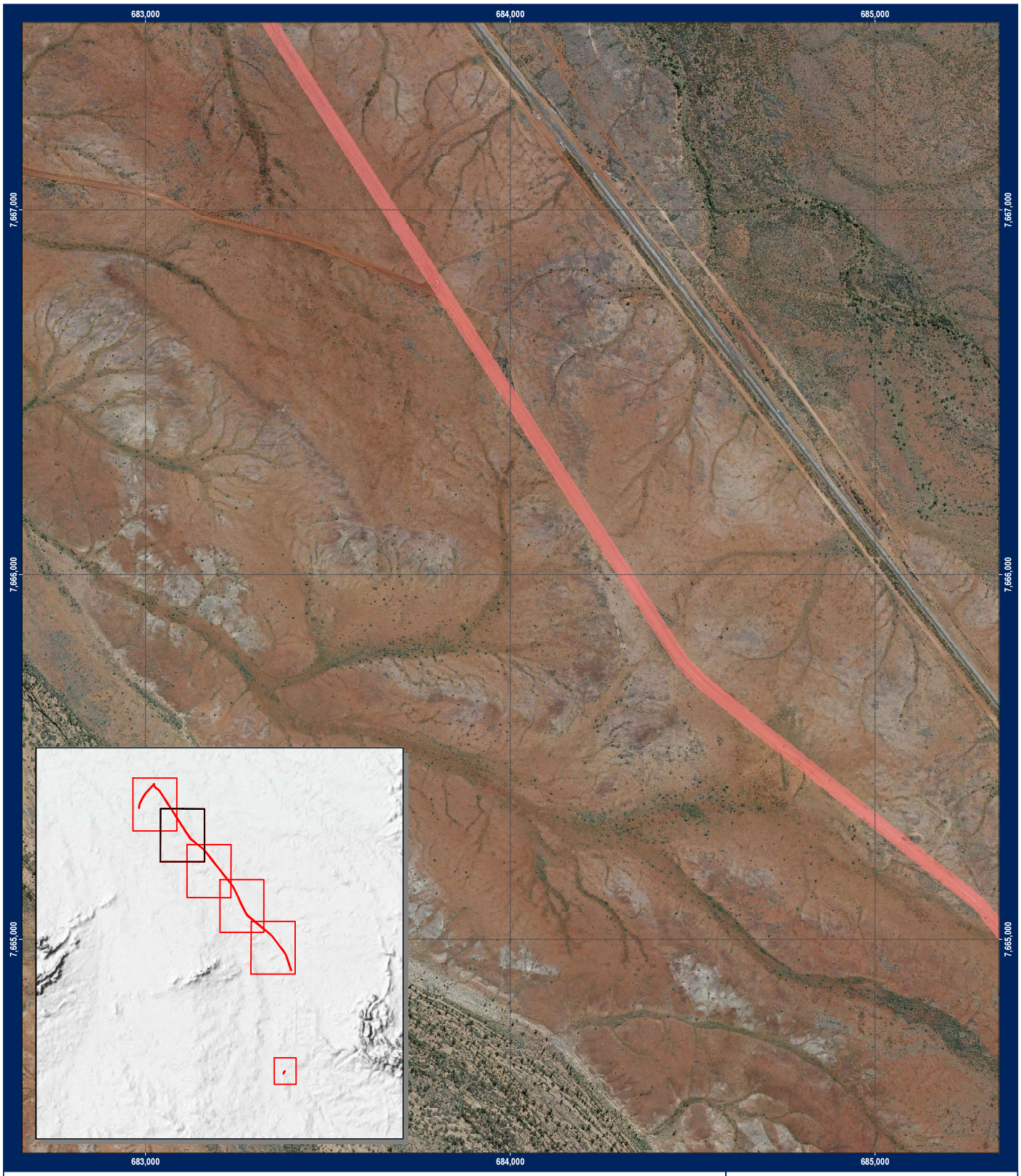

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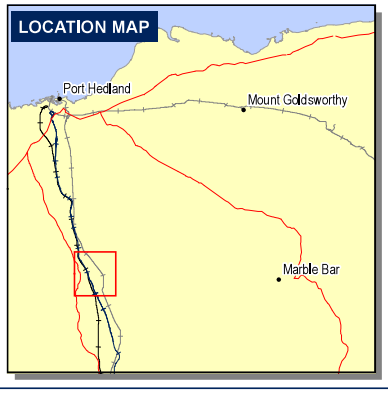

LEGEND

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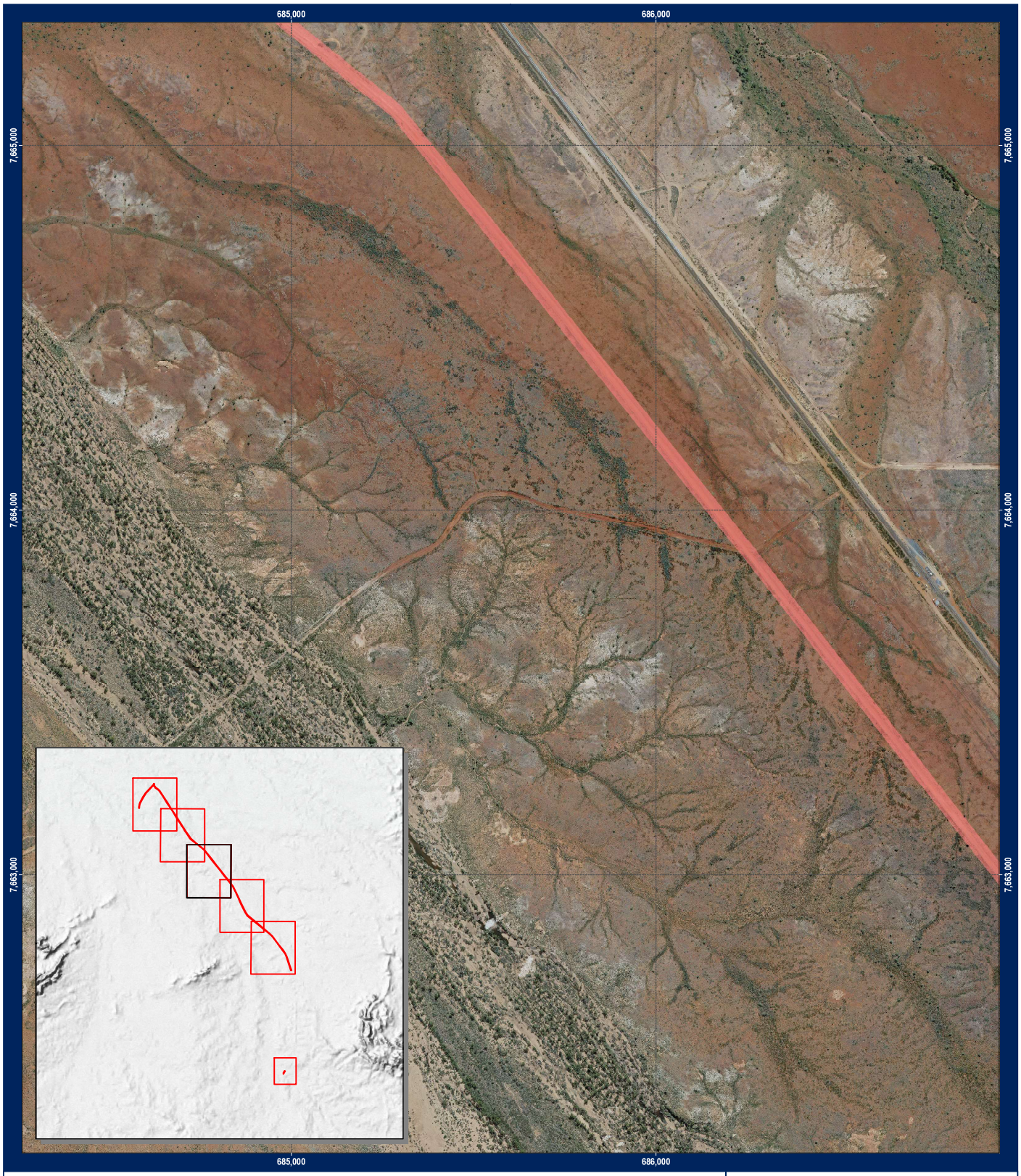

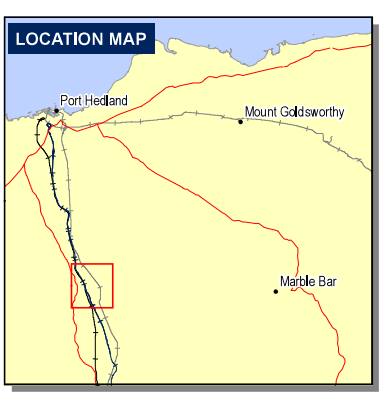

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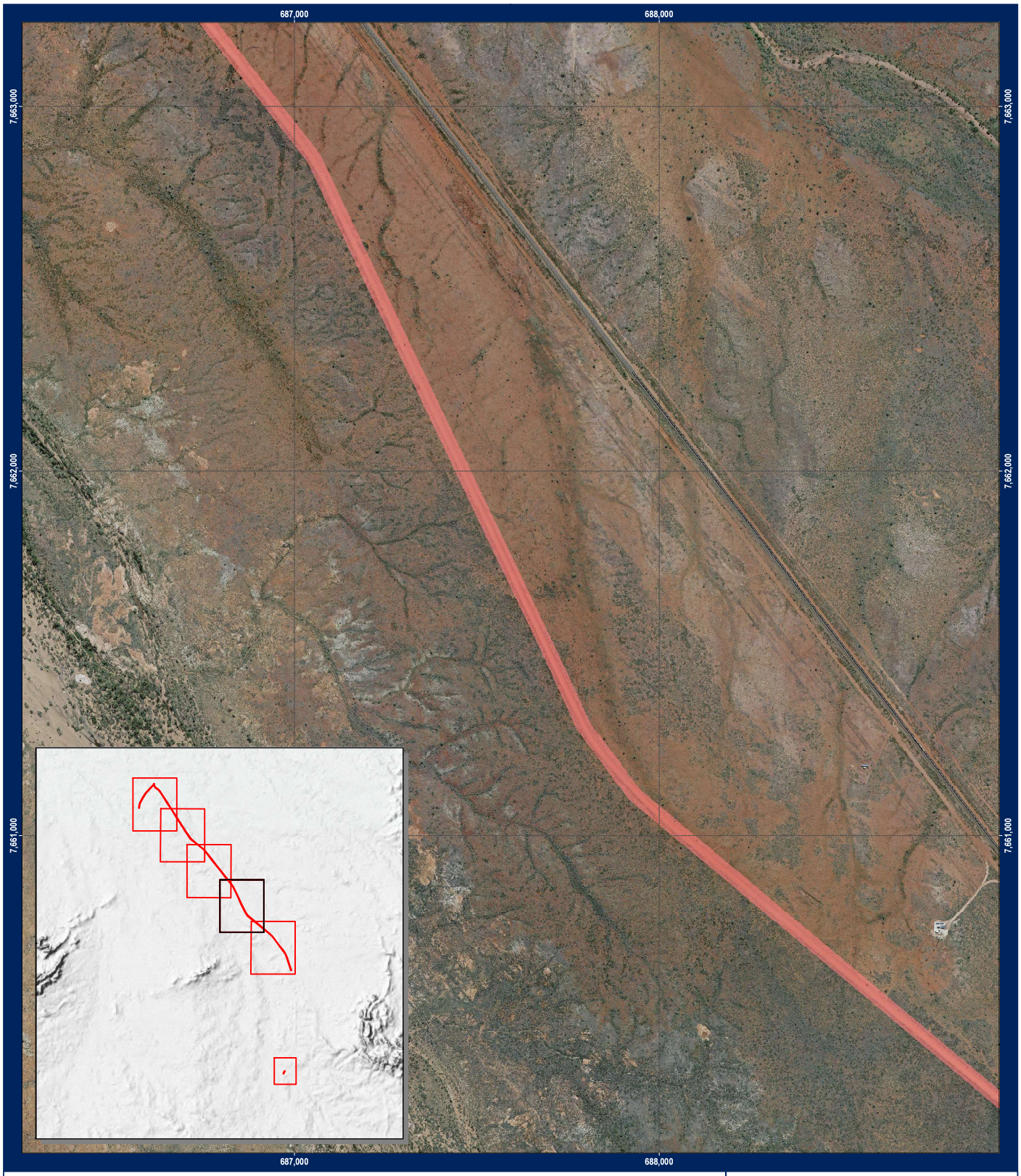

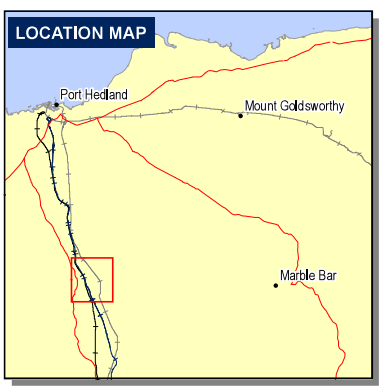

LEGEND

Proposed Disturbance Area

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Meters

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Page 4 of 6

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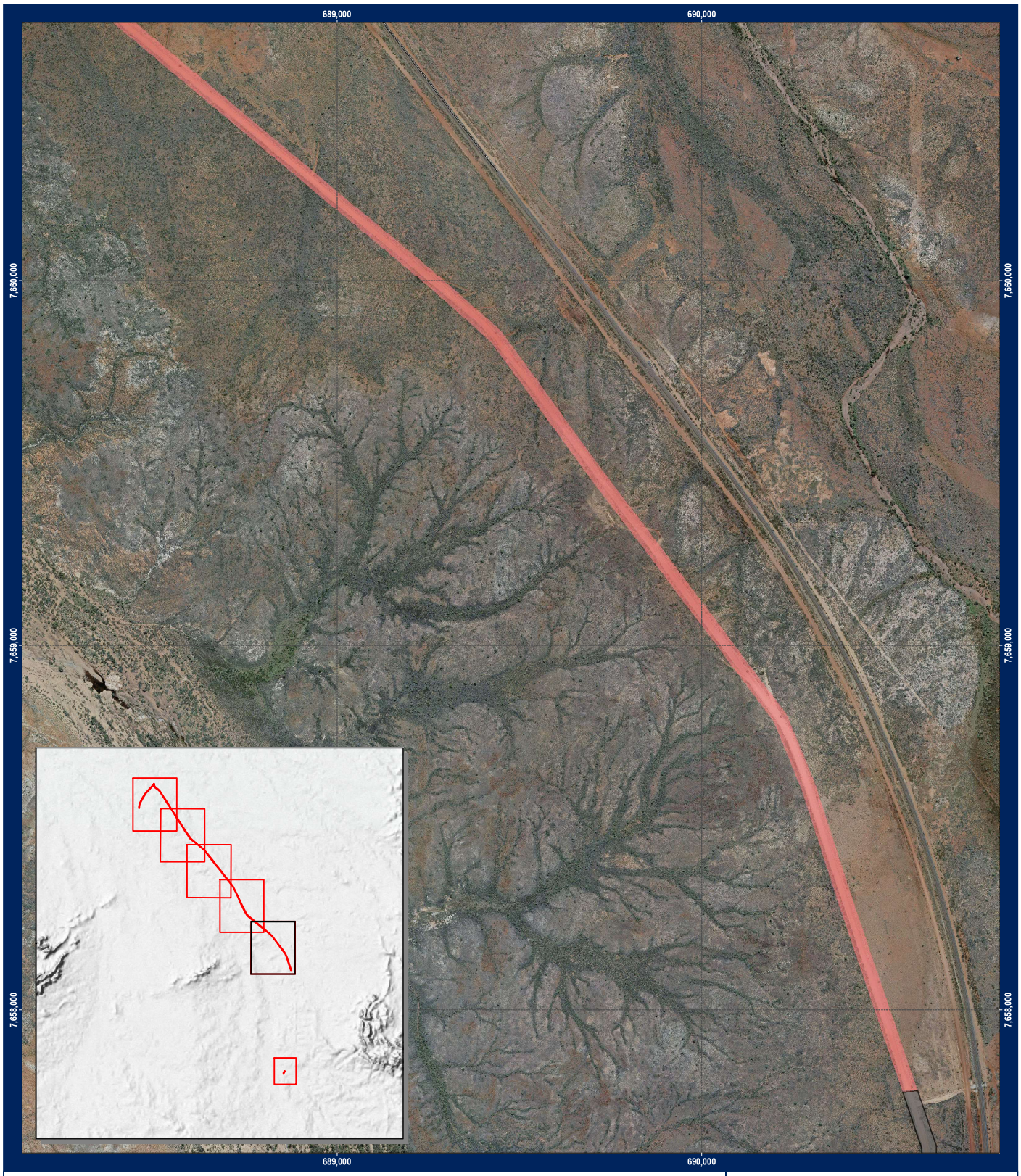
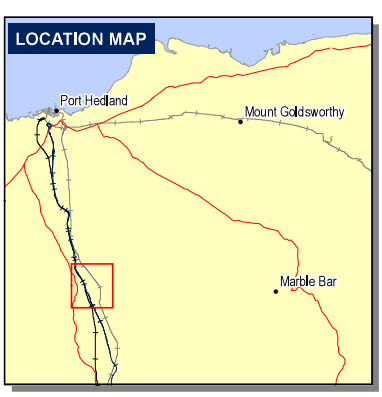
All data FMG 2020

Fortescue





LEGEND

- Proposed Disturbance Area
- Approved NVCP CPS6687

N

0 200 400

Meters

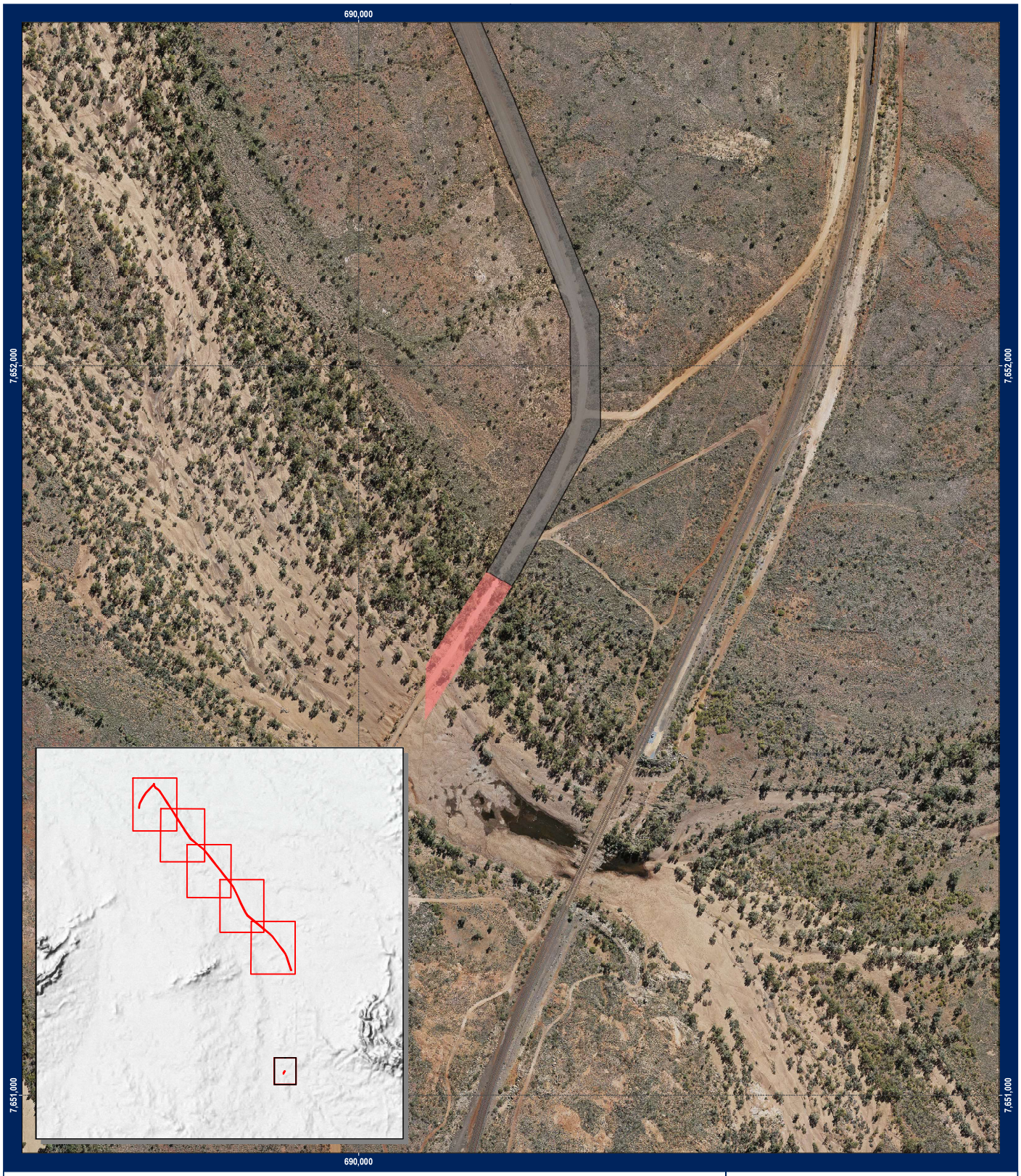
Figure 1
Project Footprint
Page 5 of 6

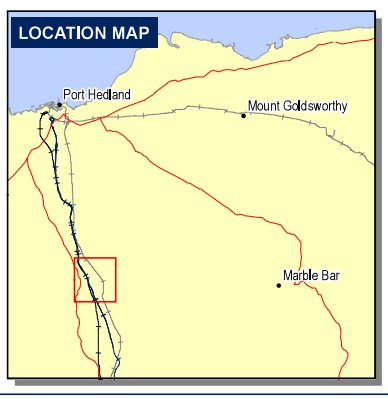
Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.001_r0

Date: 27/08/2020
Size: A3P
Revision: 0
Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue





LEGEND

- Proposed Disturbance Area
- Approved NVCP CPS6687

N

0 100 200
Meters

Figure 1
Project Footprint
Page 6 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:5,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.001_r0

Date: 27/08/2020
Size: A3P
Revision: 0
Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue

Figure 2: Land Systems

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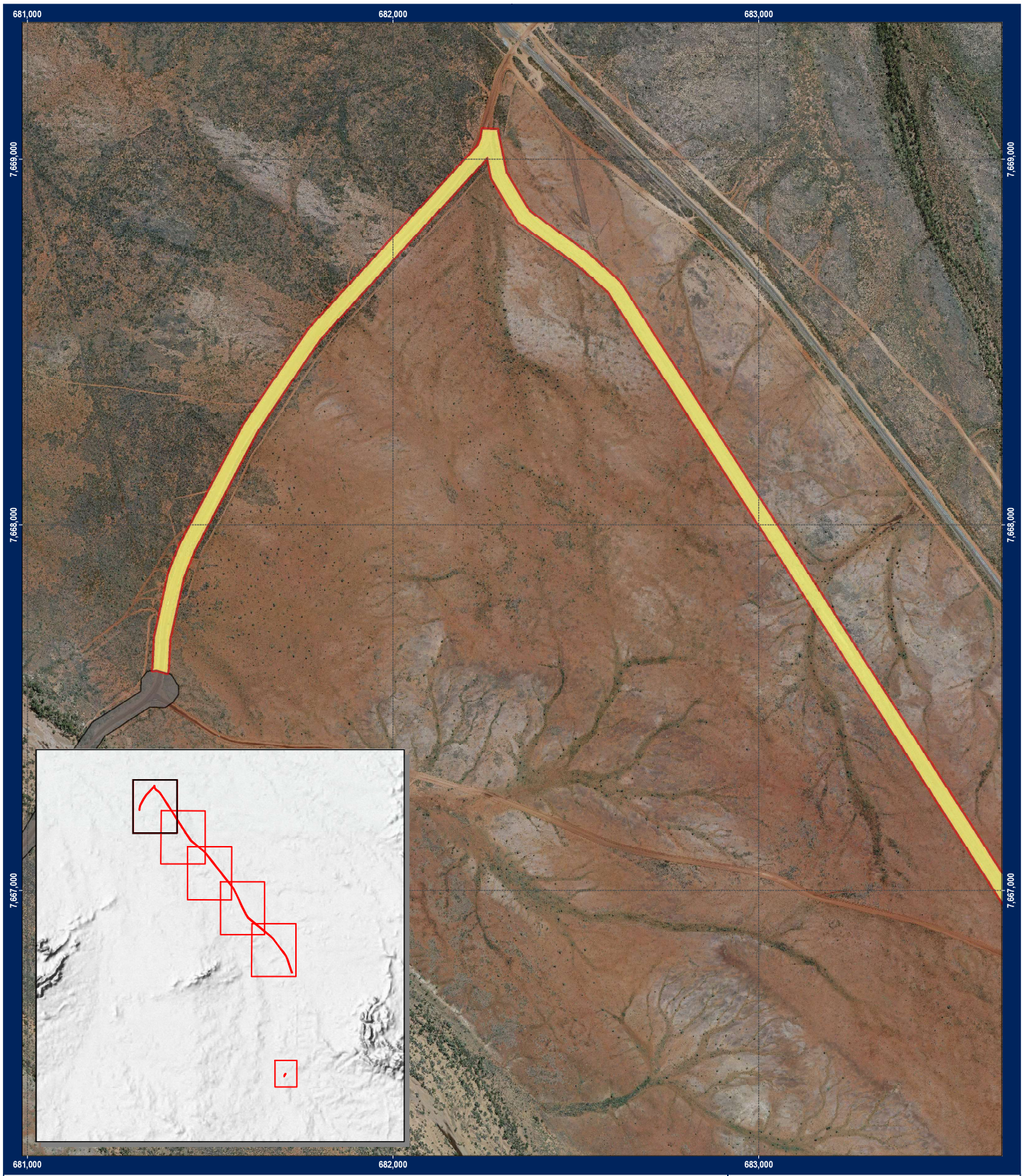

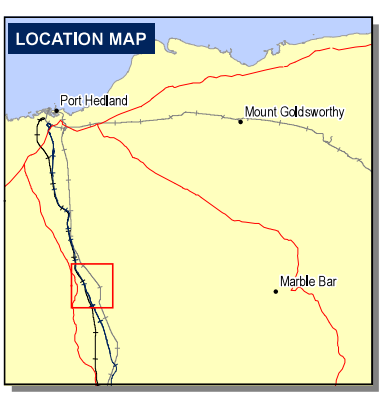

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

WA Land Systems

- Macroy System

N

0 200 400
Meters

Figure 2
Land Systems
Page 1 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.002_r1_LandSystems

Date: 27/08/2020
Size: A3P
Revision: 1
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Data Source(s):
All data FMG 2020

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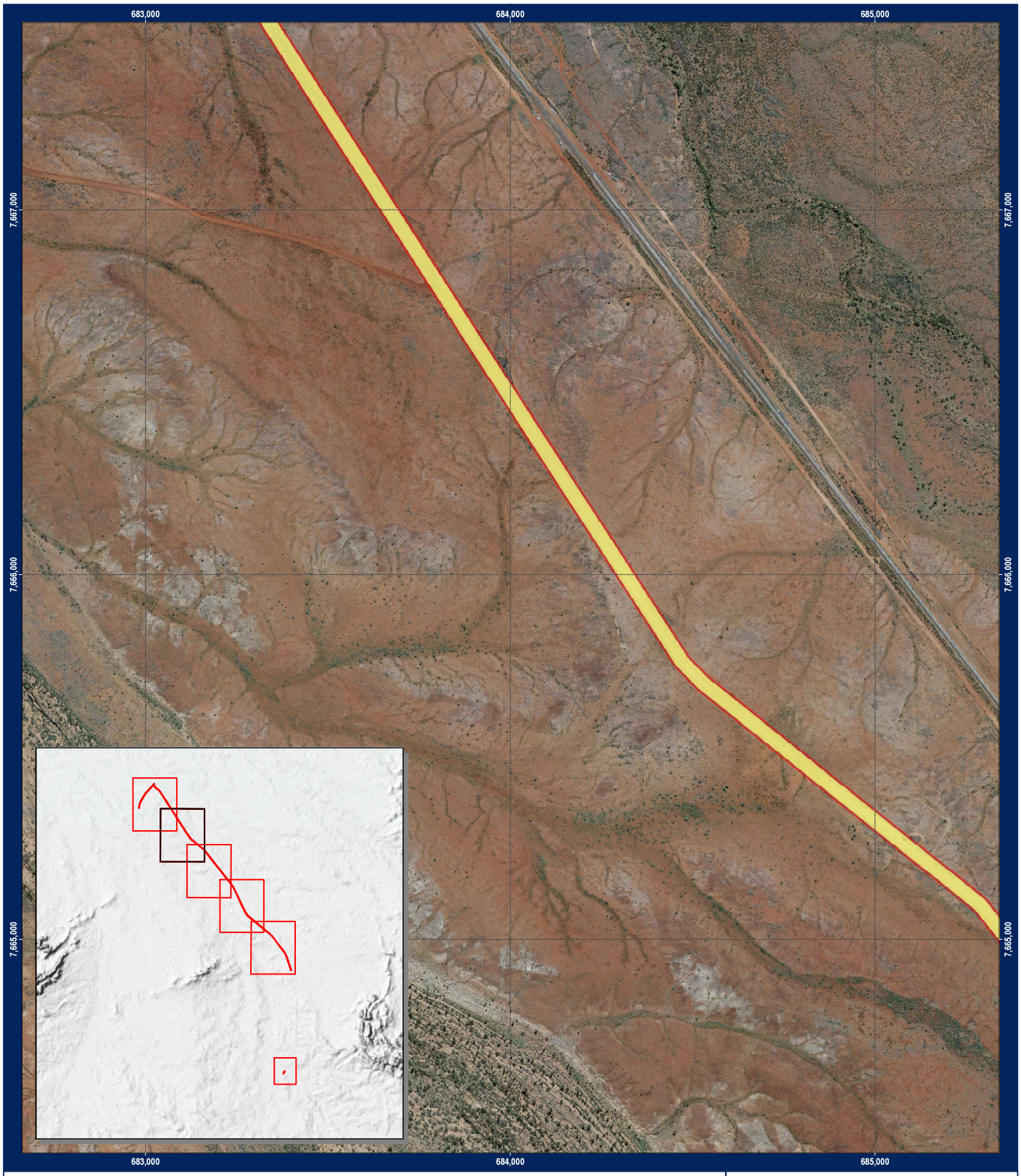

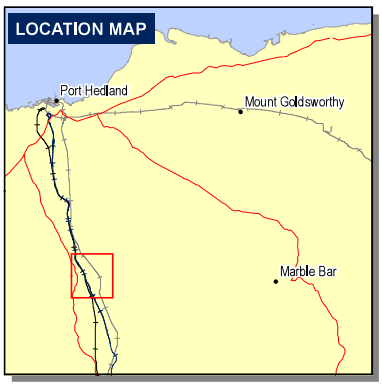

Legend

Proposed Disturbance Area

WA Land Systems

Macroy System

N

0 200 400

Meters

Figure 2
Land Systems
Page 2 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.002_r1_LandSystems

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Size: A3P
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Confidentiality: 1

Data Source(s):
All data FMG 2020

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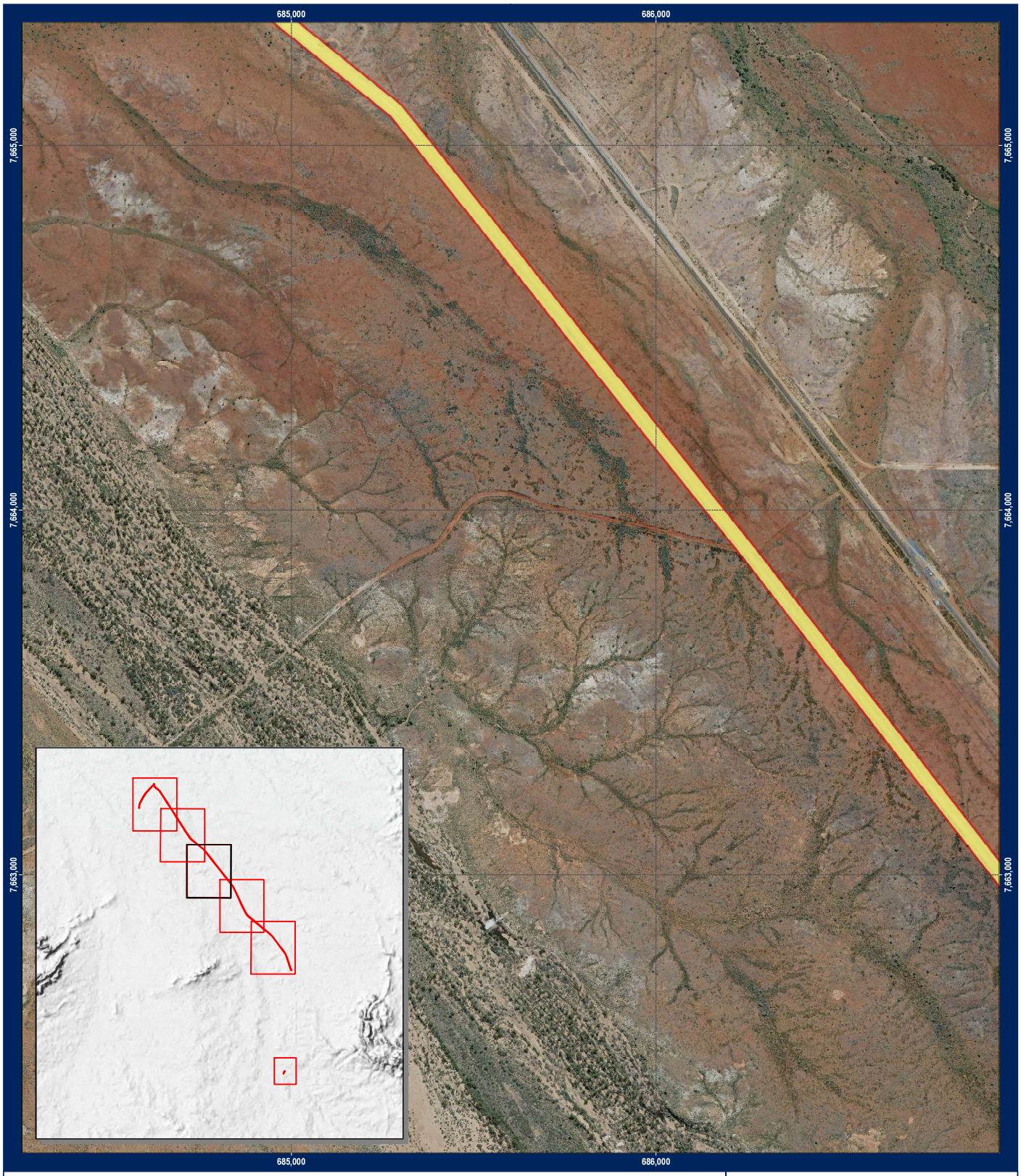

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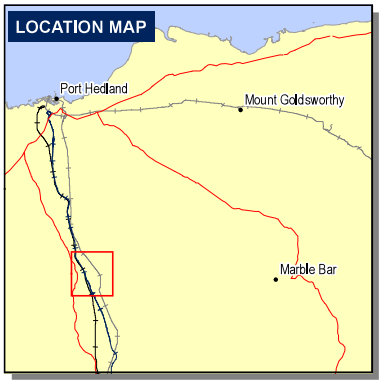

Legend

Proposed Disturbance Area

WA Land Systems

Macroy System

N

0 200 400

Meters

Figure 2
Land Systems
Page 3 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
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Scale: 1:10,000
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All data FMG 2020

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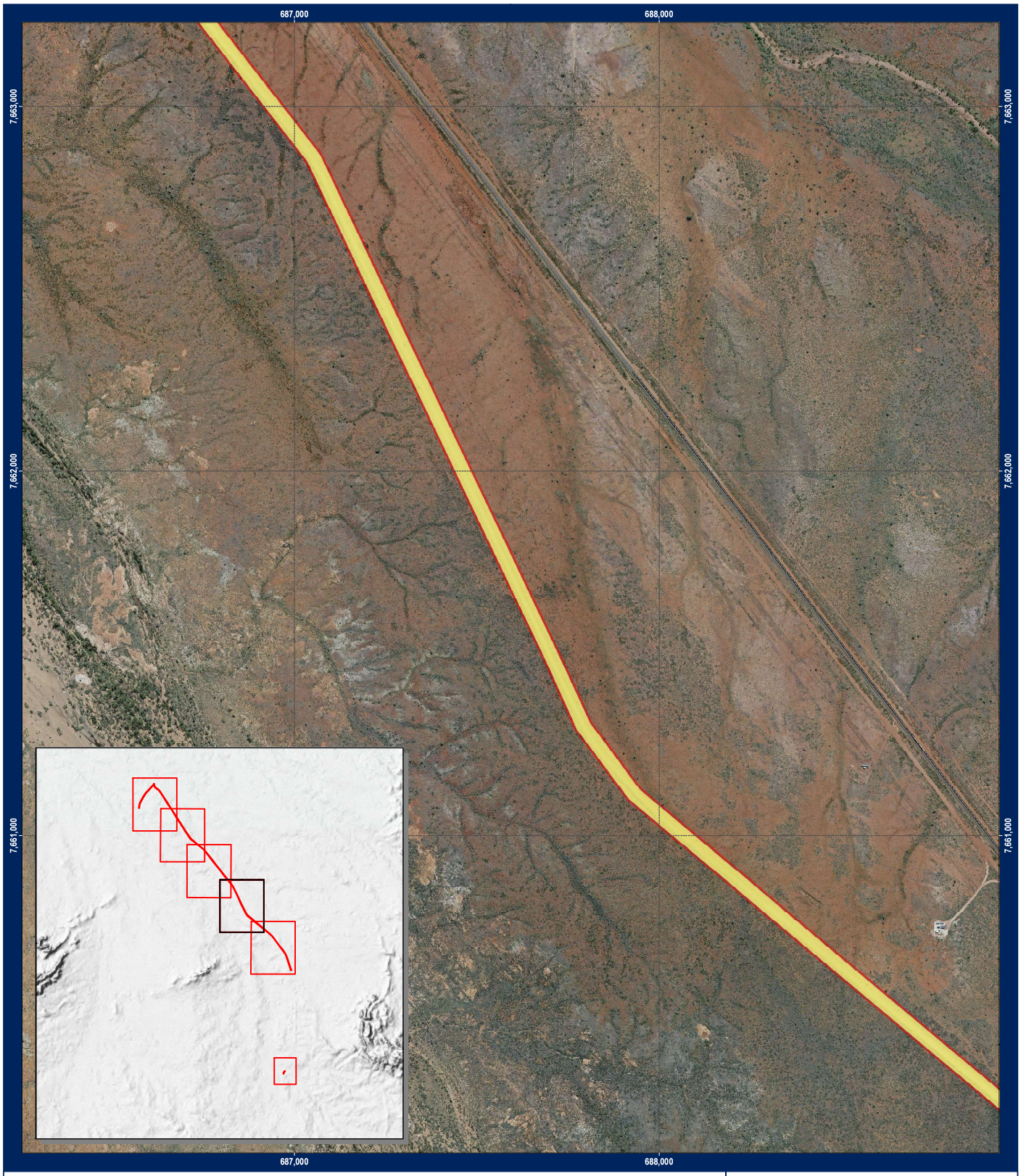

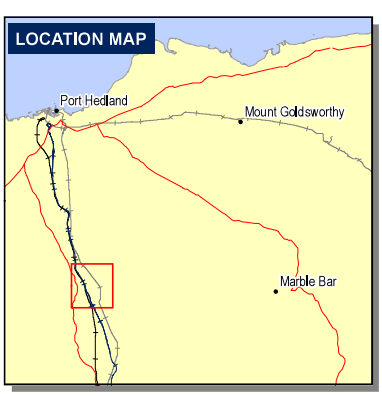

Legend

Proposed Disturbance Area

WA Land Systems

Macroy System

N

0 200 400

Meters

Figure 2
Land Systems
Page 4 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
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Confidentiality: 1

Data Source(s):
All data FMG 2020

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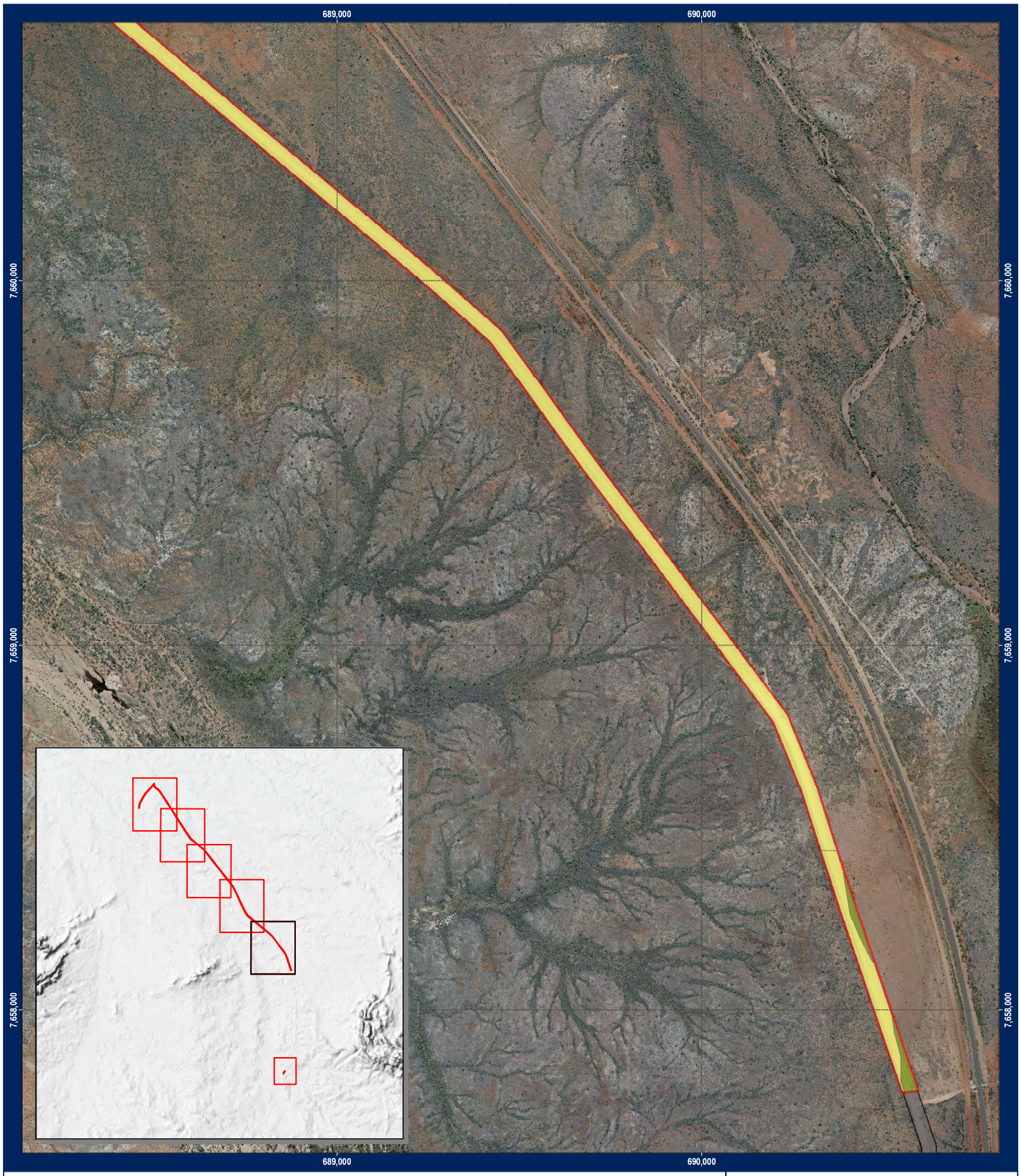

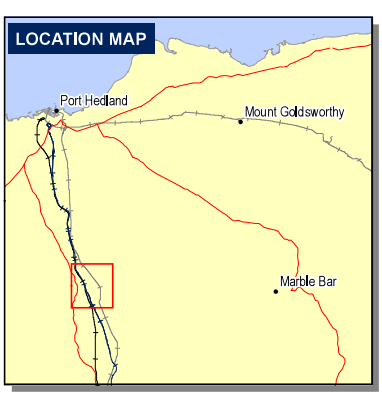

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

WA Land Systems

- Boolgeeda System
- Macroy System

N

0 200 400
Meters

Figure 2
Land Systems
Page 5 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
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All data FMG 2020

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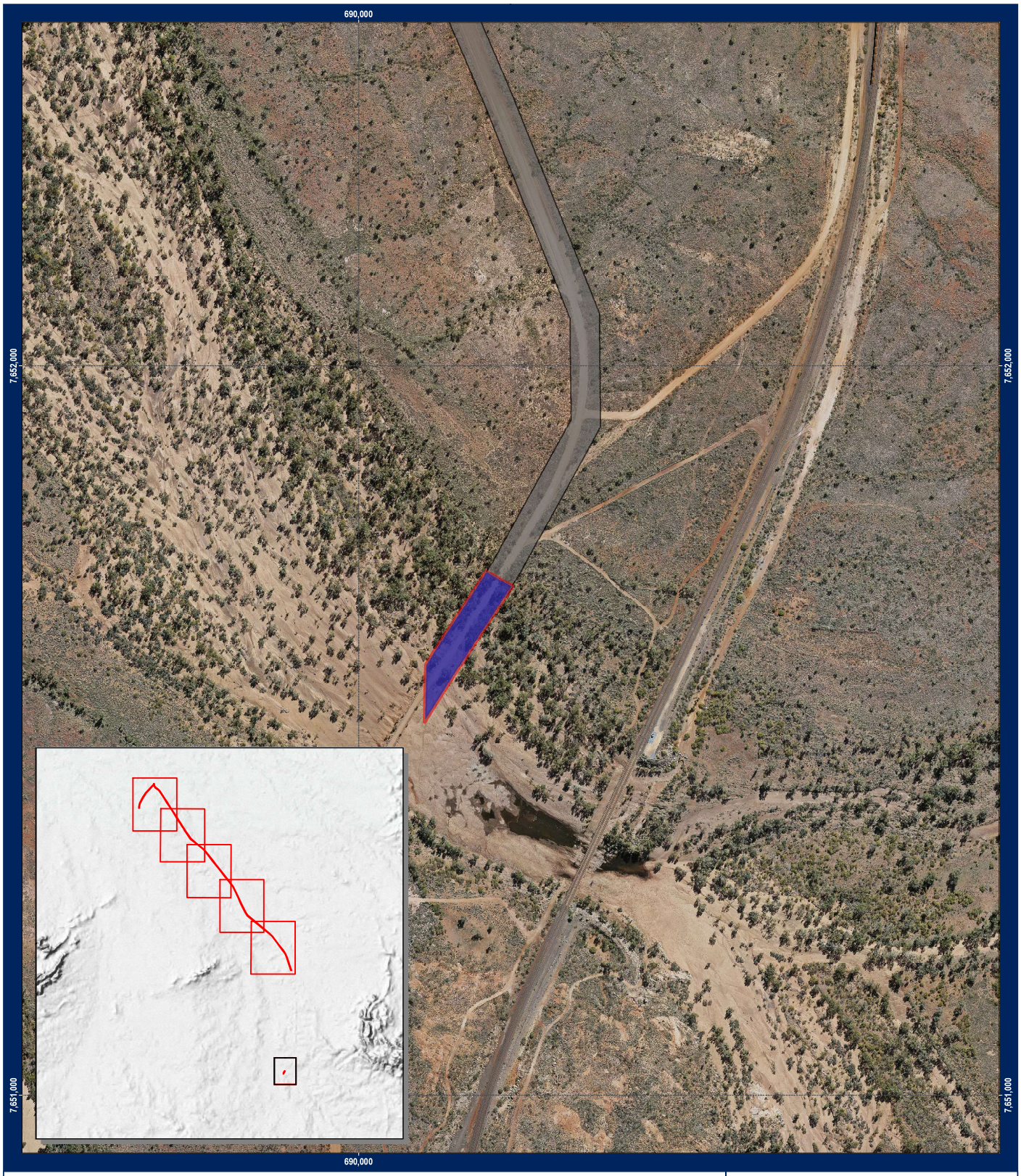

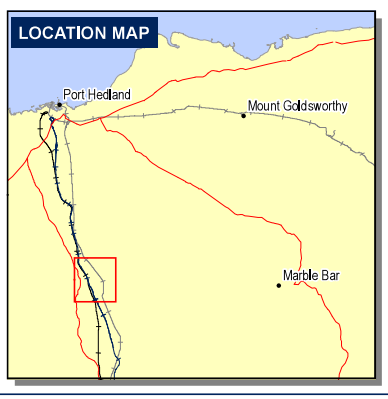

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

WA Land Systems

- River System

N

0 100 200
Meters

Figure 2
Land Systems
Page 6 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:5,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.002_r1_LandSystems

Date: 27/08/2020
Size: A3P
Revision: 1
Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue

Figure 3: Soil Landscape Land Quality Zones

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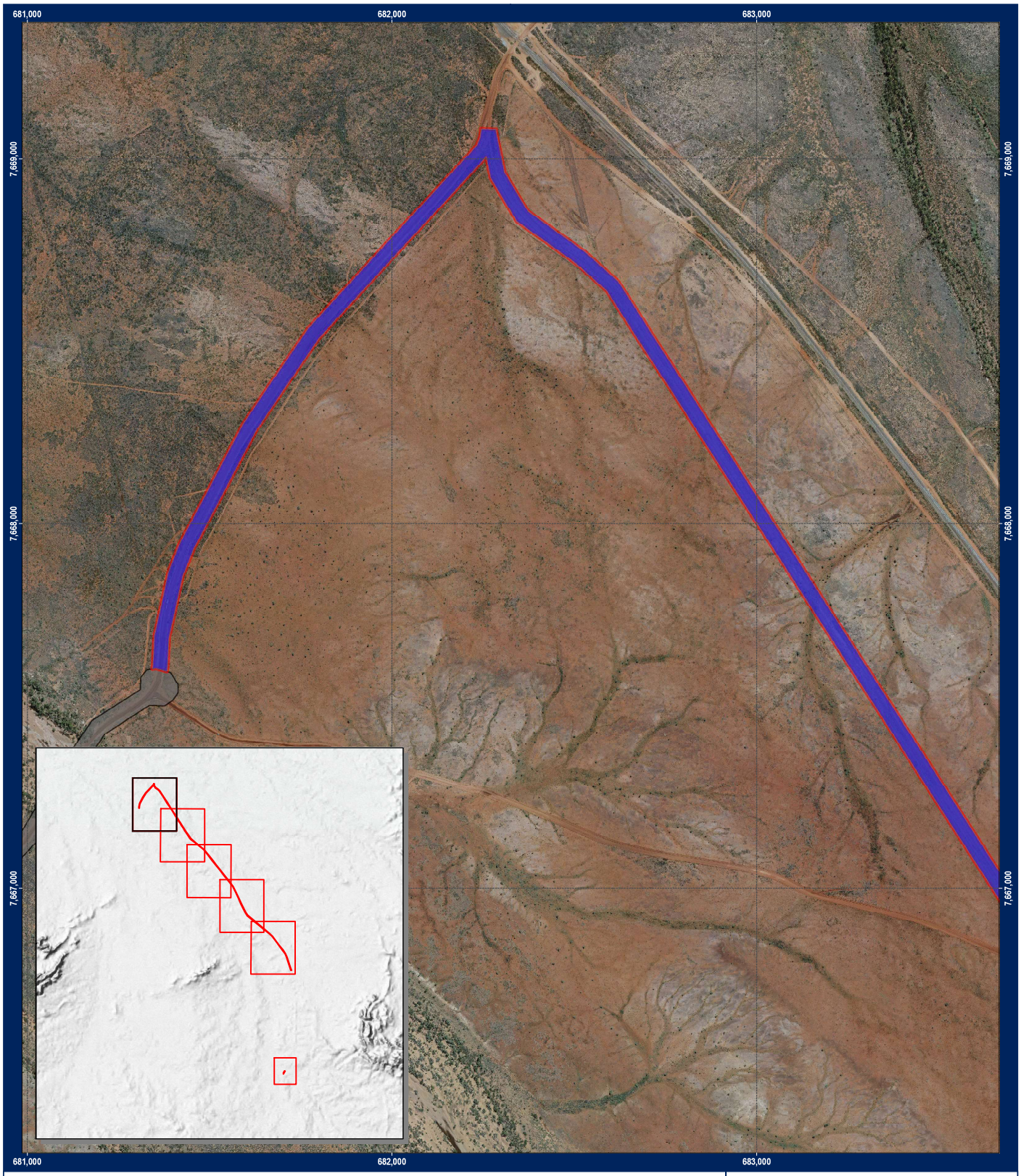

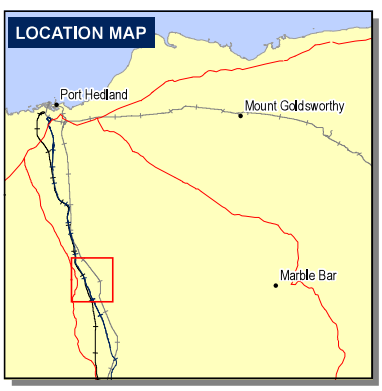

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Soil Landscape Land Quality Zones

- Abydos Plains and Hills Zone

N

0 200 400
Meters

Figure 3
Soil Landscape Land Quality Zones
Page 1 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.003_r1_Soil

Date: 27/08/2020
Size: A3P
Revision: 1
Confidentiality: 1

Data Source(s):
All data FMG 2020

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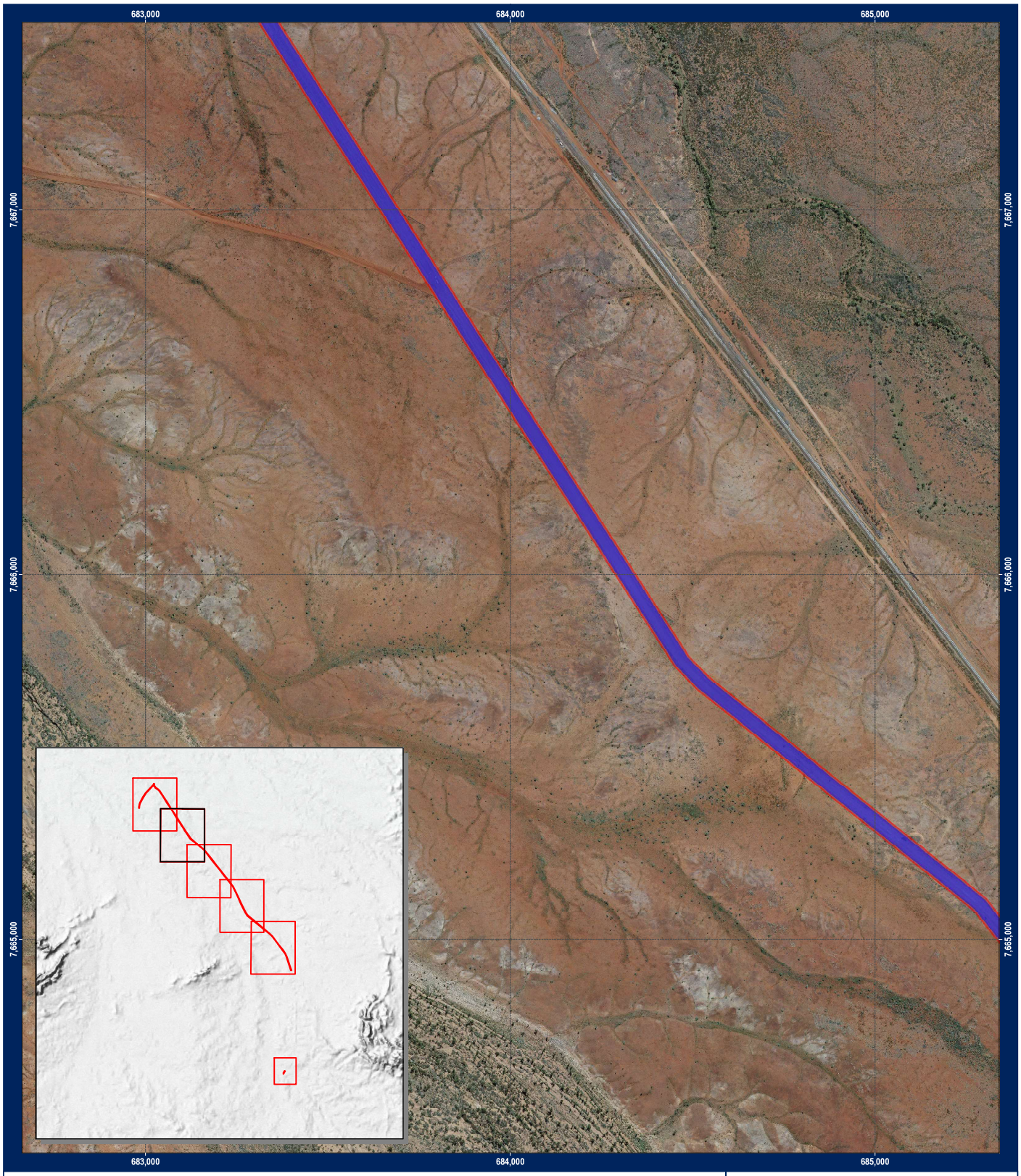

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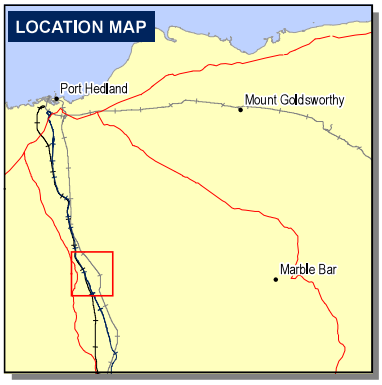

Legend

Proposed Disturbance Area

Soil Landscape Land Quality Zones

Abydos Plains and Hills Zone

N

0 200 400

Meters

Figure 3
Soil Landscape Land Quality Zones
Page 2 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.003_r1_Soil

Date: 27/08/2020
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Revision: 1
Confidentiality: 1

Data Source(s):
All data FMG 2020

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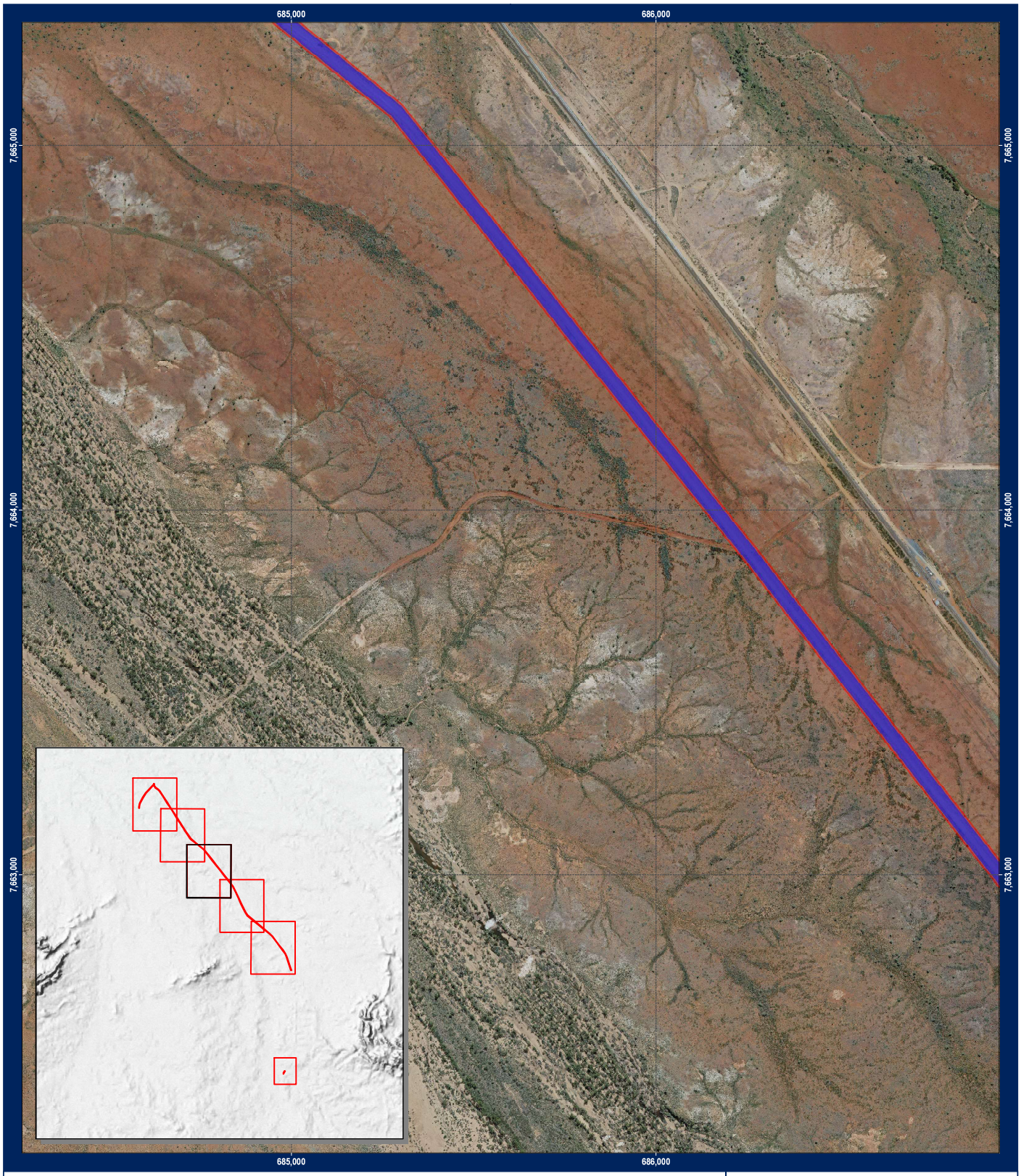
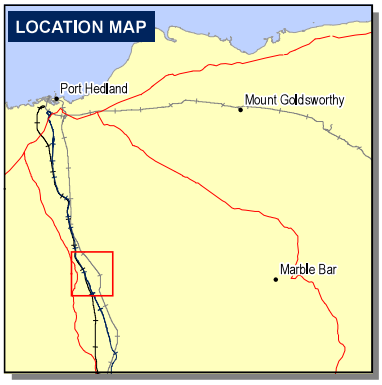


LOCATION MAP



Legend

Proposed Disturbance Area

Soil Landscape Land Quality Zones

Abydos Plains and Hills Zone

N

0 200 400

Meters

Figure 3
Soil Landscape Land Quality Zones
Page 3 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
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Data Source(s):
All data FMG 2020

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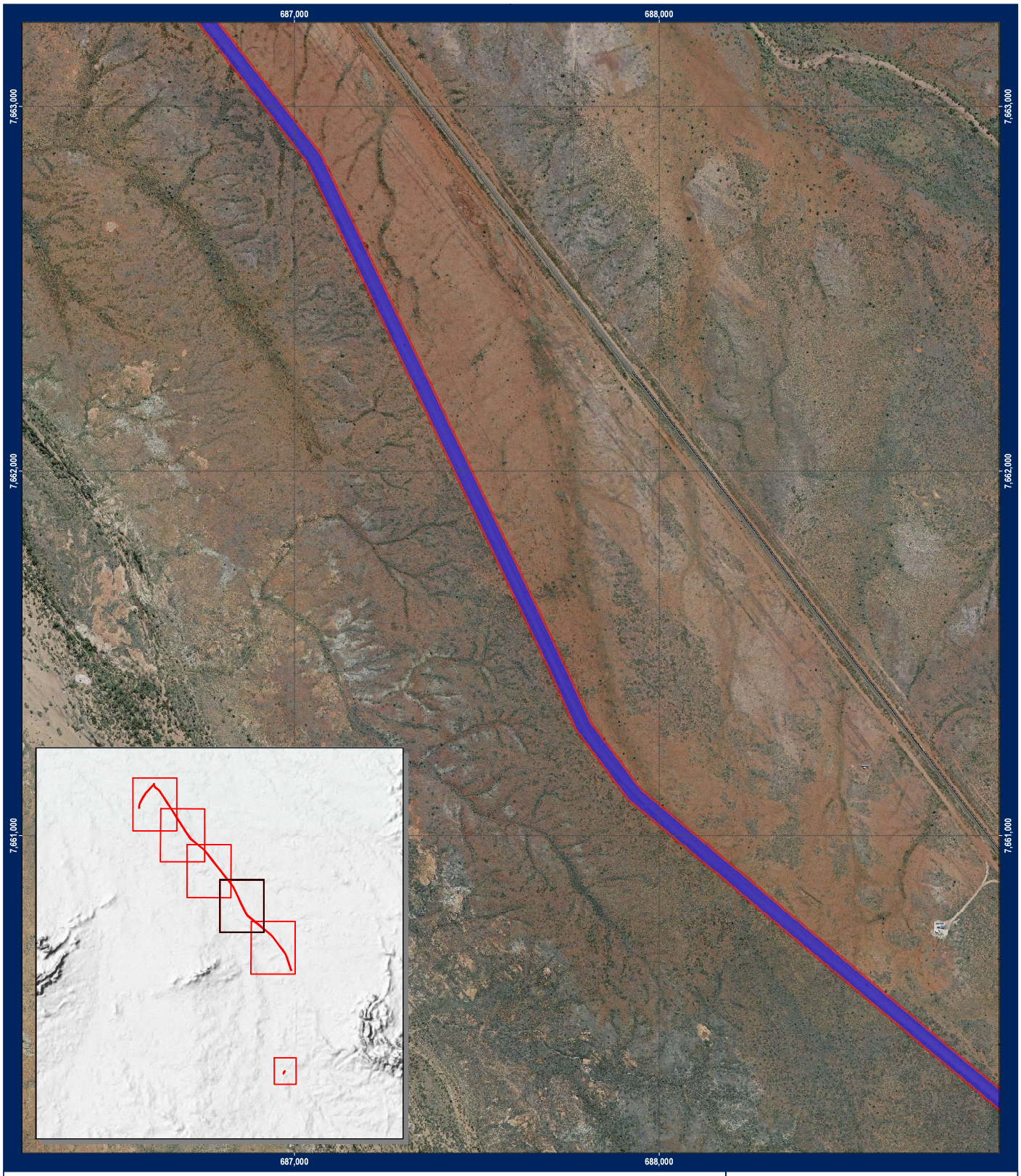

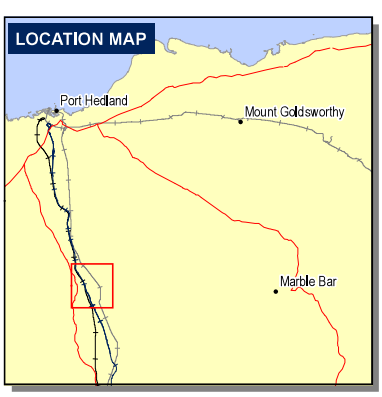

Legend

Proposed Disturbance Area

Soil Landscape Land Quality Zones

Abydos Plains and Hills Zone

N

0 200 400

Meters

Figure 3
Soil Landscape Land Quality Zones
Page 4 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
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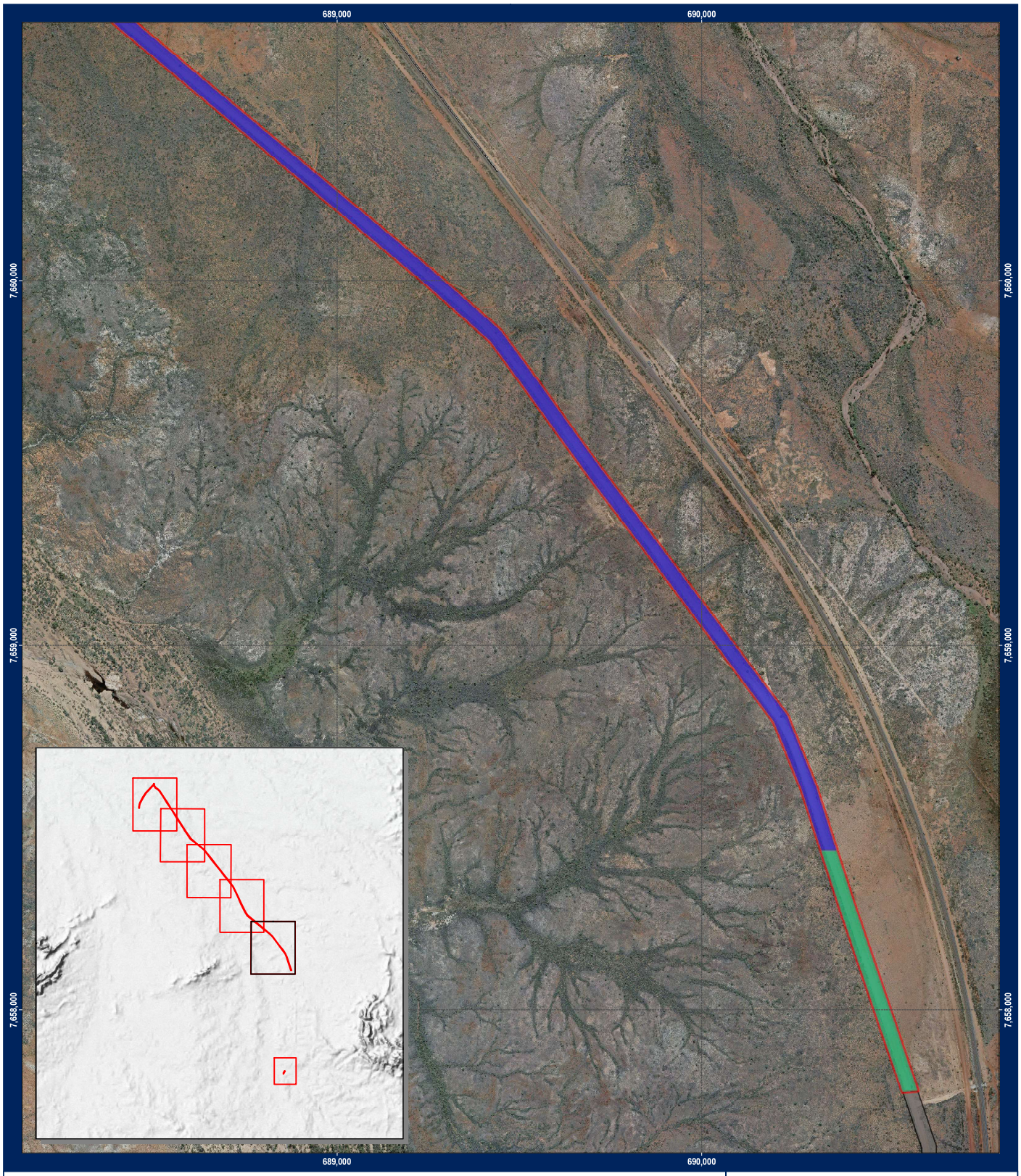

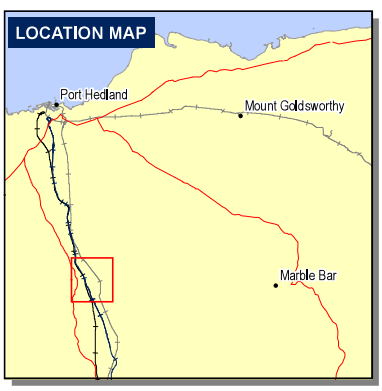

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Soil Landscape Land Quality Zones

- Abydos Plains and Hills Zone
- Nullagine Hills Zone

N

0 200 400
Meters

Figure 3
Soil Landscape Land Quality Zones

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.003_r1_Soil

Date: 27/08/2020
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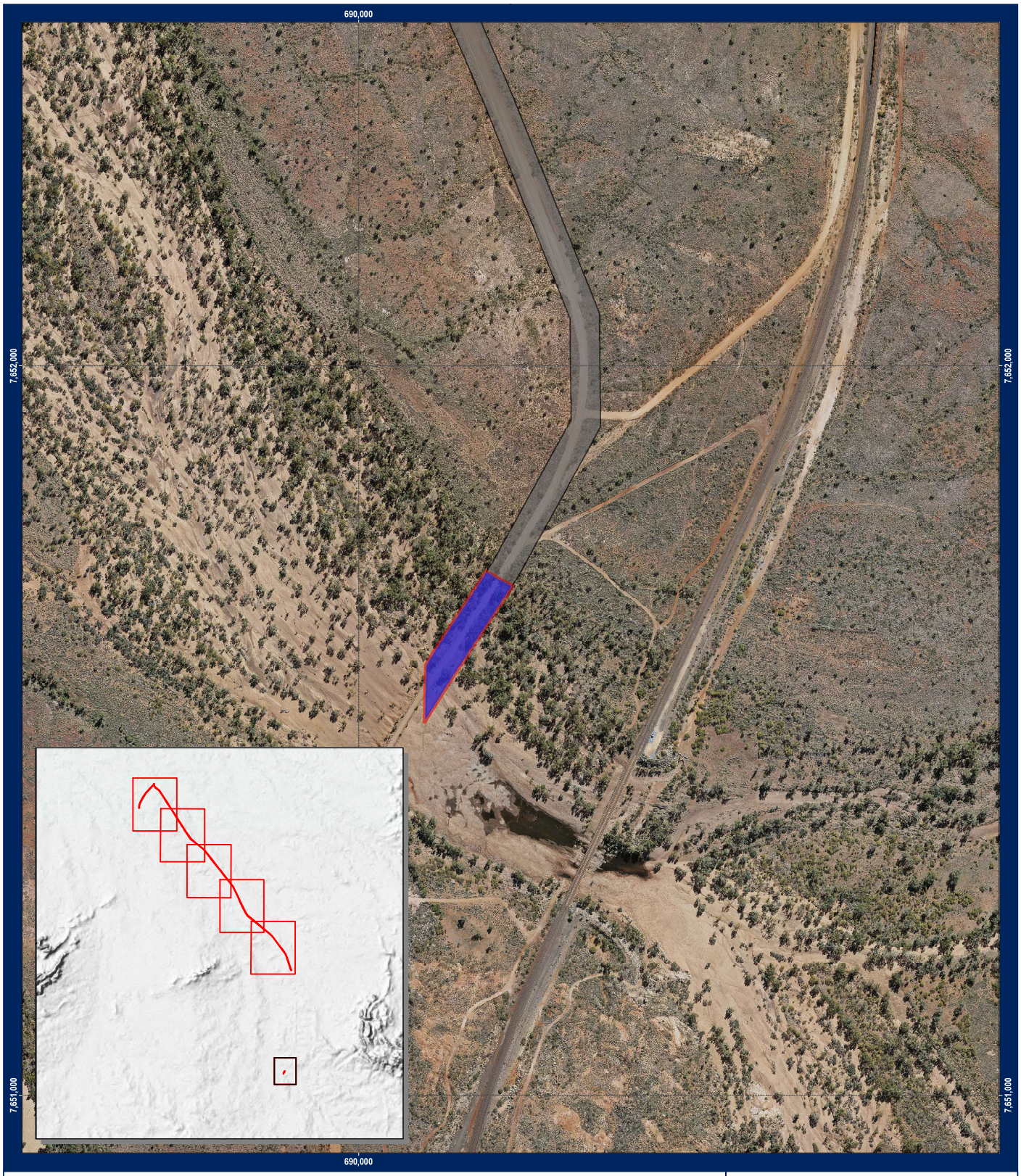

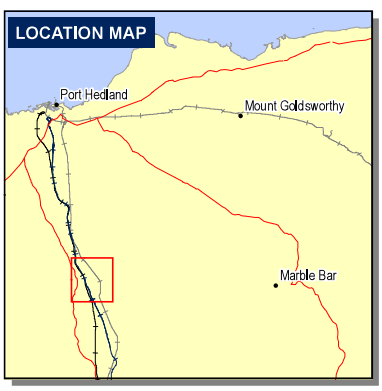

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Soil Landscape Land Quality Zones

- Abydos Plains and Hills Zone

N

0 100 200
Meters

Figure 3
Soil Landscape Land Quality Zones
Page 6 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:5,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.003_r1_Soil

Date: 27/08/2020
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Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue

Figure 4: Vegetation Communities

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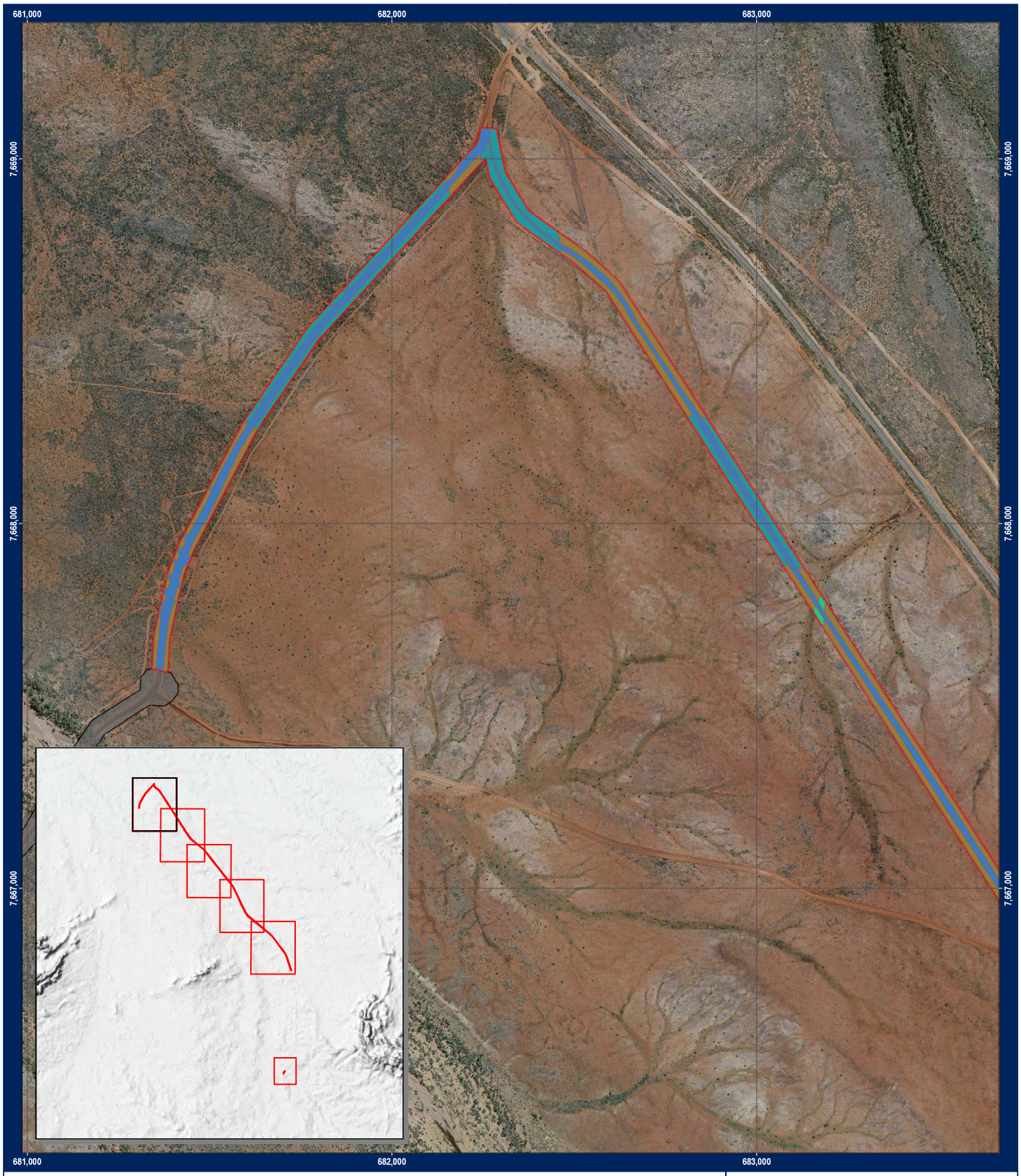

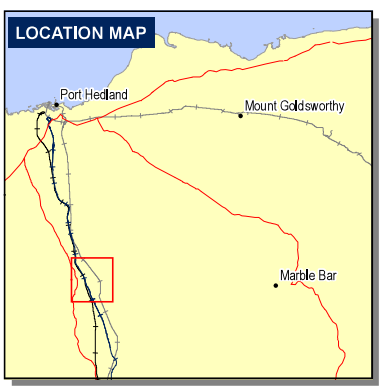

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Vegetation Mapping

- AaTl
- ChAtTe
- CzAaTl
- NV

N

0 200 400
Meters

Figure 4
Vegetation Communities
Page 1 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.004_r0_VegComml

Date: 27/08/2020
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Confidentiality: 1

Data Source(s):
All data FMG 2020

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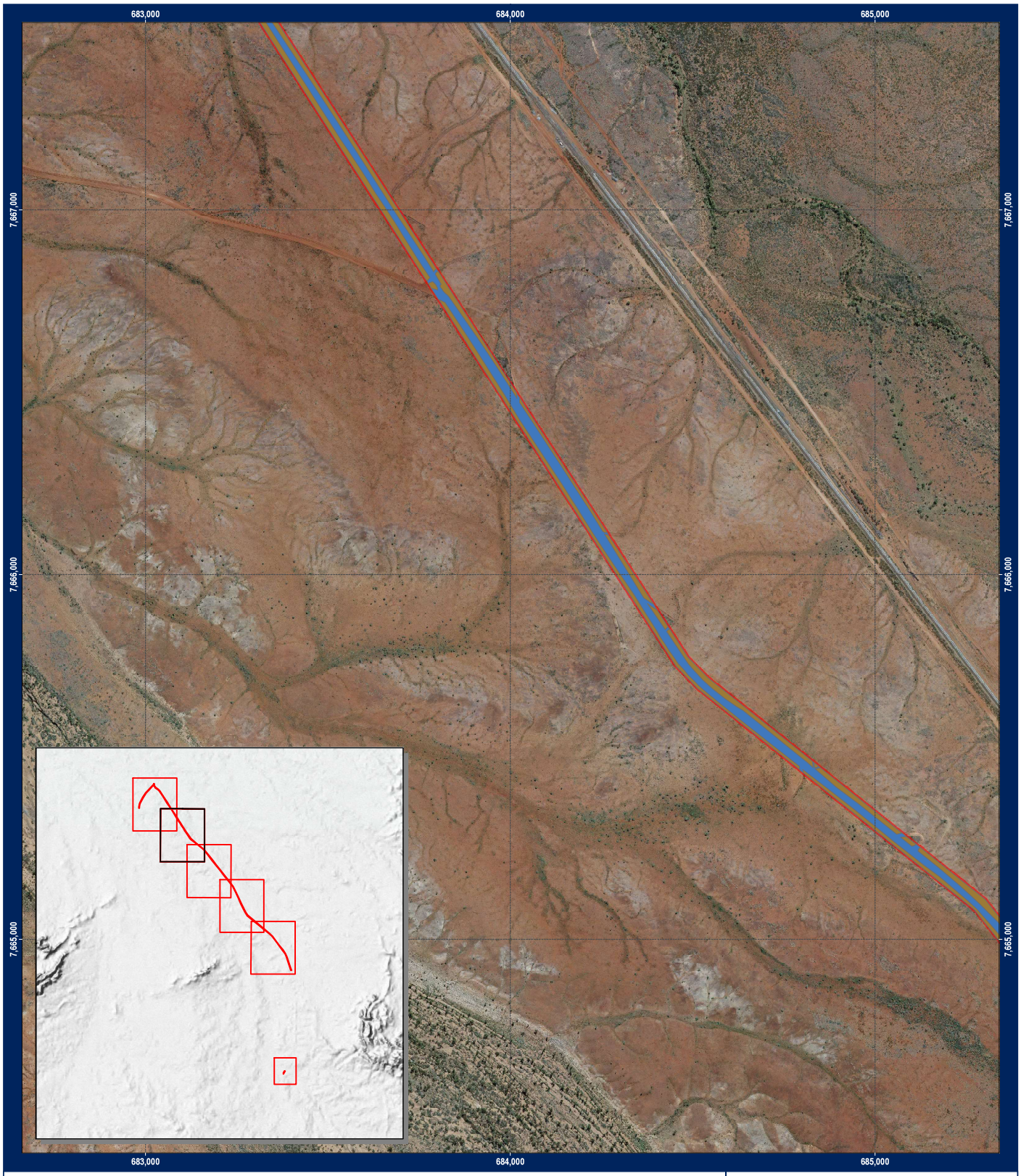

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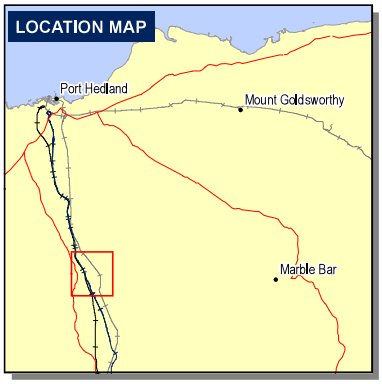

Legend

Proposed Disturbance Area

Vegetation Mapping

AaTl

NV

N

0 200 400

Meters

Figure 4
Vegetation Communities
Page 2 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.004_r0_VegComm

Date: 27/08/2020
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Revision: 0
Confidentiality: 1

Data Source(s):
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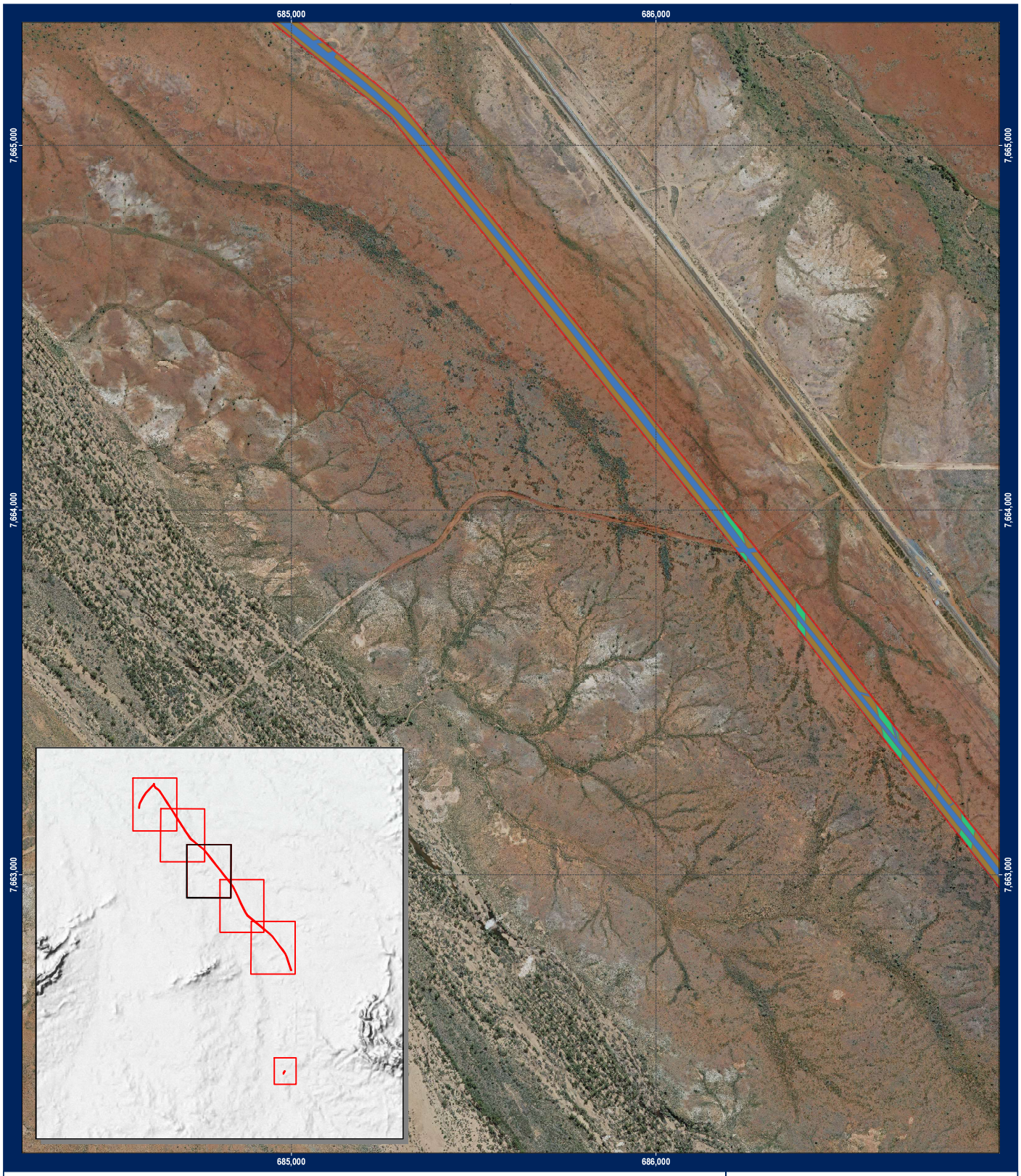
Fortescue



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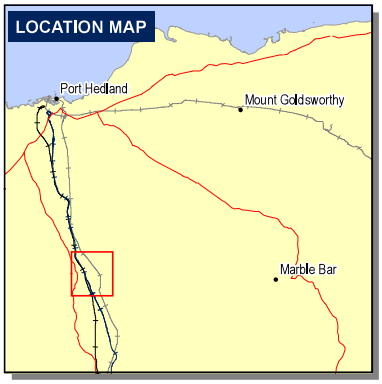

Legend

Proposed Disturbance Area

Vegetation Mapping

- AaTl
- ChAtTe
- NV

N

0 200 400

Meters

Figure 4
Vegetation Communities
Page 3 of 6

Requested By: K. Fox
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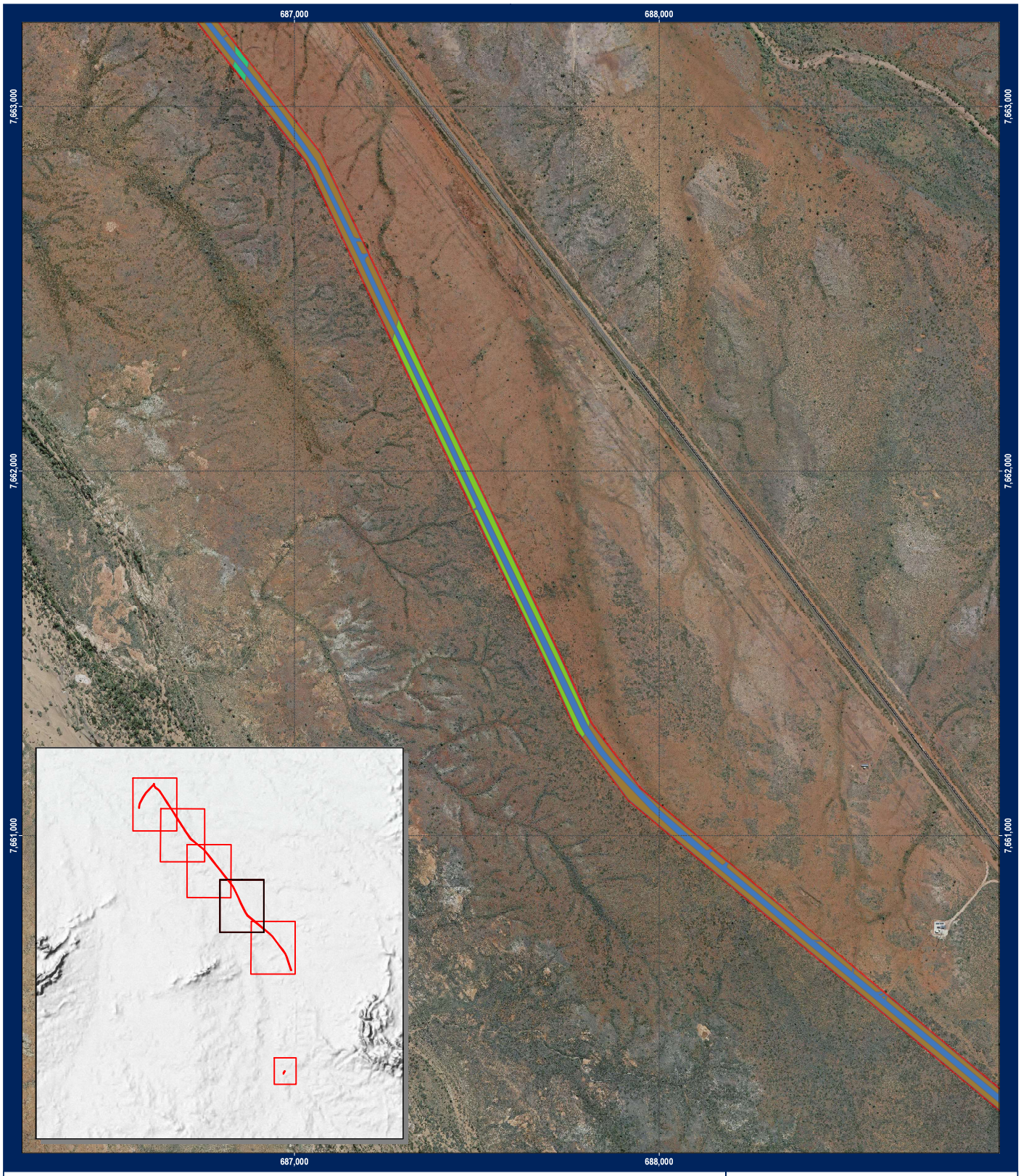

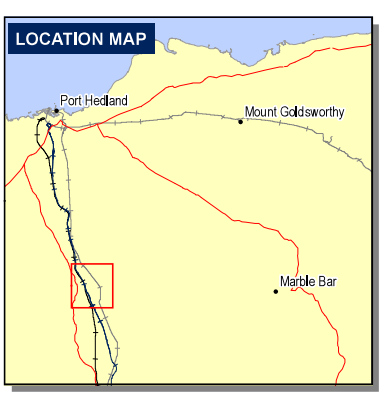

Legend

Proposed Disturbance Area

Vegetation Mapping

- AaTl
- AaTw
- ChAtTe
- NV

N

0 200 400

Meters

Figure 4
Vegetation Communities
Page 4 of 6

Requested By: K. Fox
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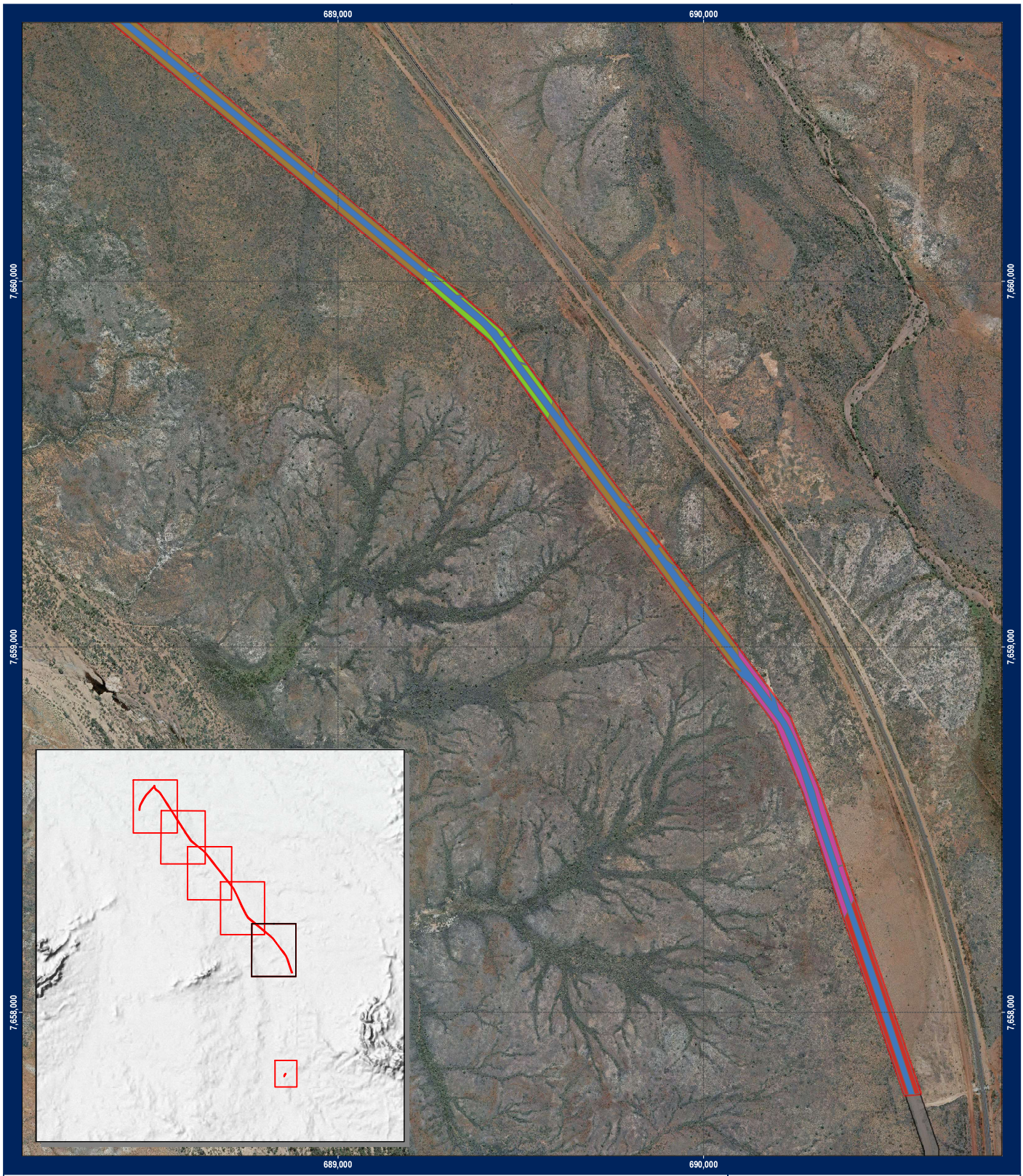
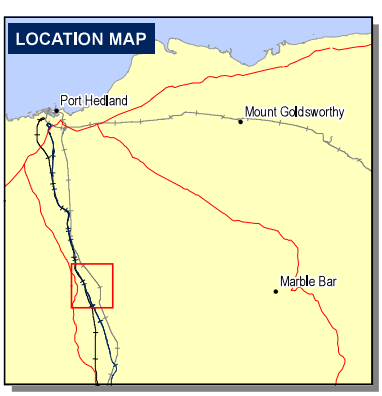
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.004_r0_VegComm

Date: 27/08/2020
Size: A3P
Revision: 0
Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue





Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Vegetation Mapping

- AaTl
- AaTw
- AoTw
- ChAbTc
- NV

N

0 200 400
Meters

Figure 4
Vegetation Communities
Page 5 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.004_r0_VegComml

Date: 27/08/2020
Size: A3P
Revision: 0
Confidentiality: 1

Data Source(s):
All data FMG 2020

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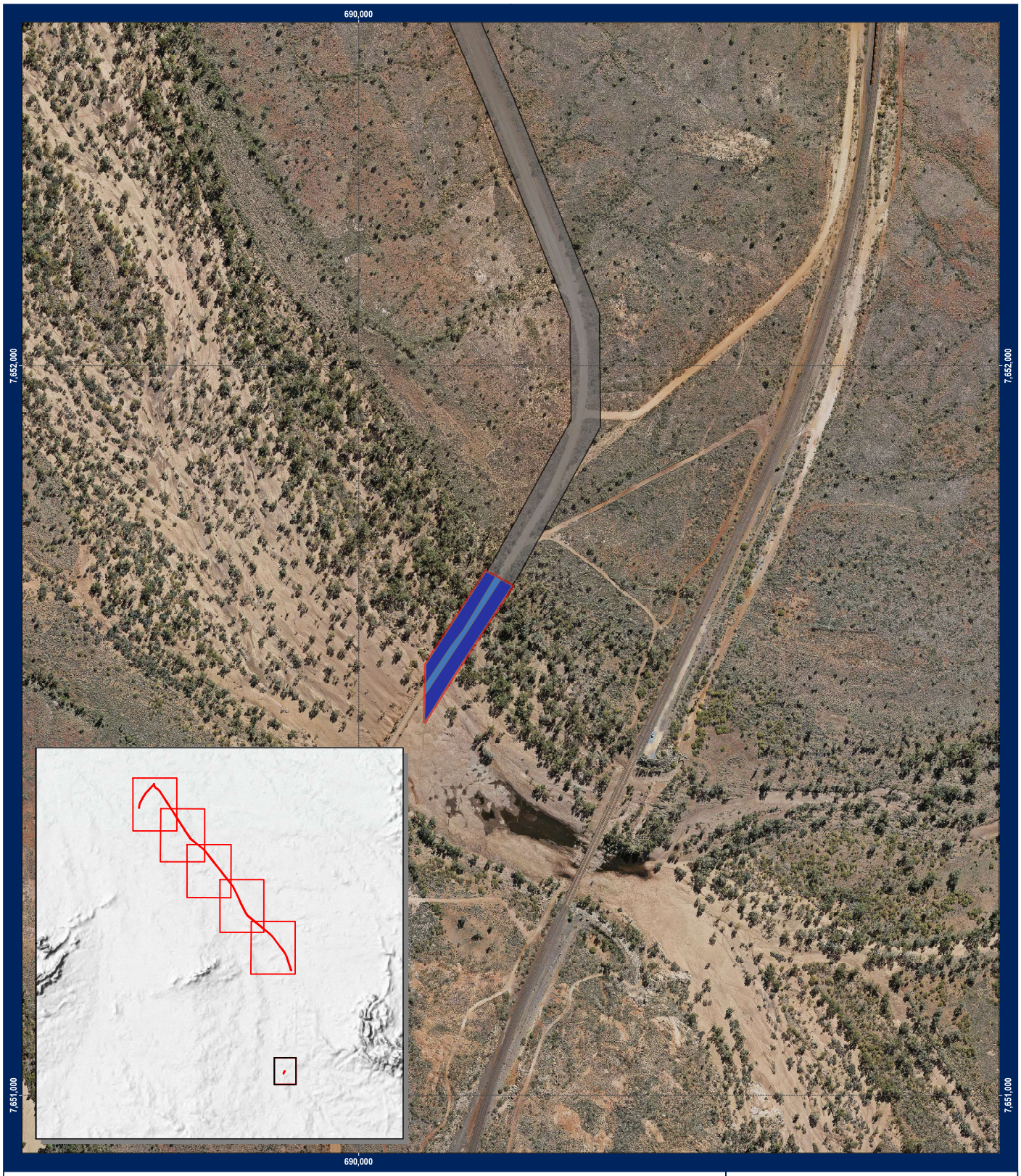

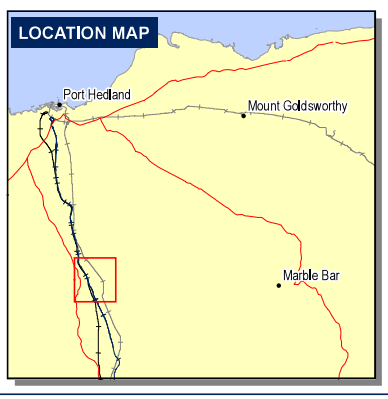

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Vegetation Mapping

- EcAtCc
- NV

N

0 100 200
Meters

Figure 4
Vegetation Communities
Page 6 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:5,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.004_r0_VegComm

Date: 27/08/2020
Size: A3P
Revision: 0
Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue

Figure 5: Fauna Habitat

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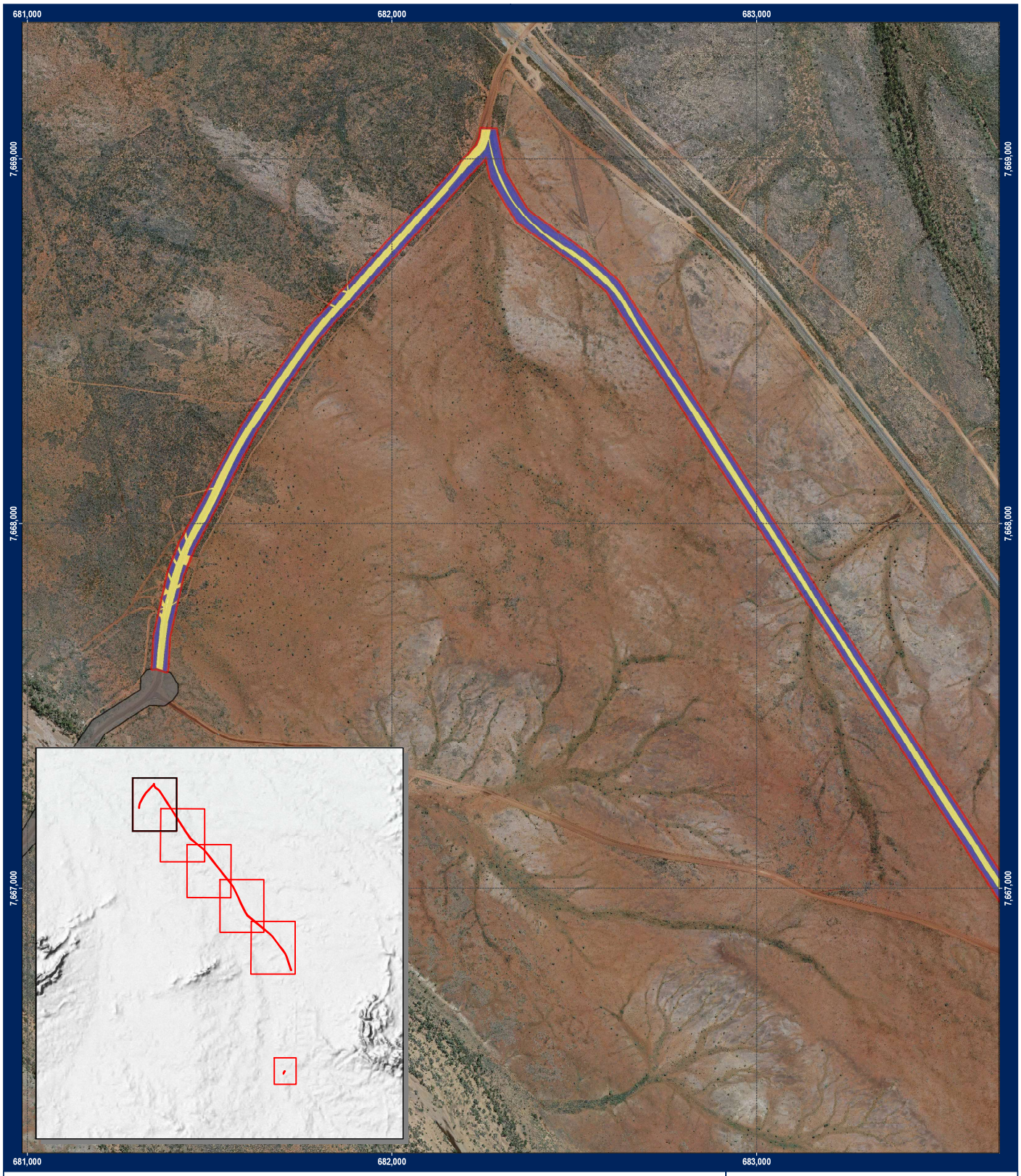

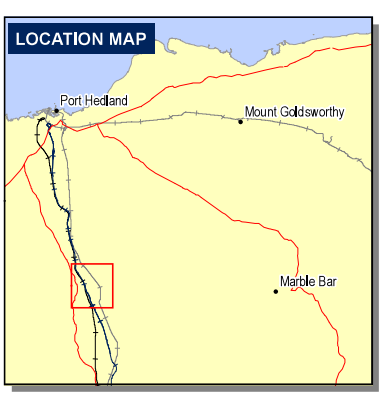

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Fauna Habitat

- Cleared/Not Vegetated
- Hummock Grasslands

N

0 200 400
Meters

Figure 5
Fauna Habitat
Page 1 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.005_r0_FaunaHab

Date: 27/08/2020
Size: A3P
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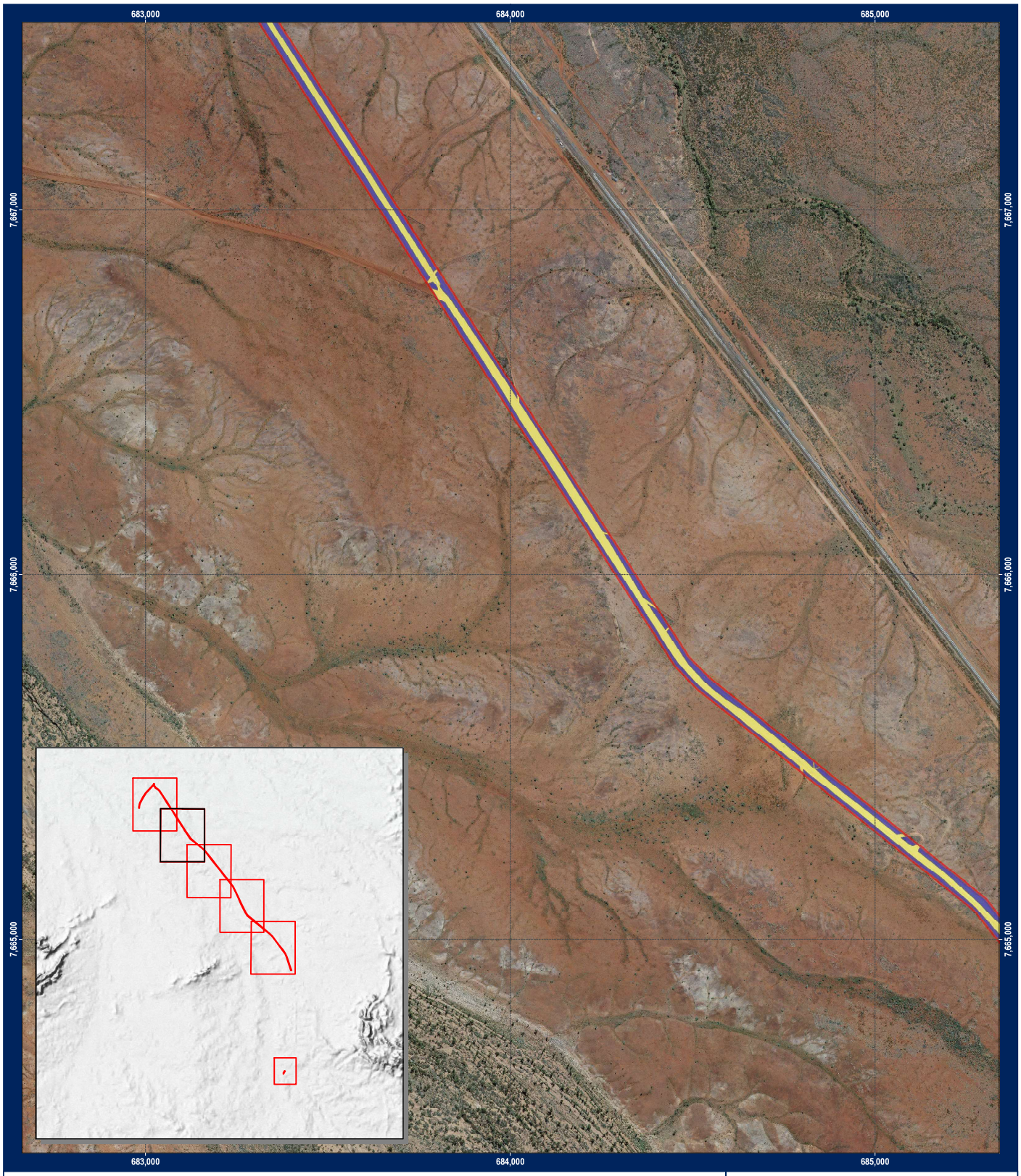
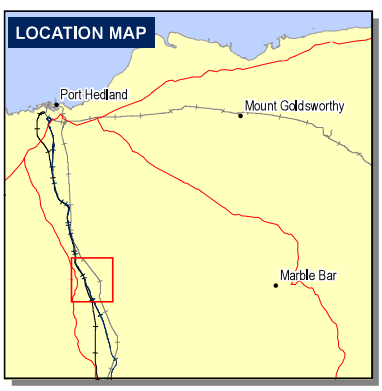
Data Source(s):
All data FMG 2020

Fortescue





Legend

Proposed Disturbance Area

Fauna Habitat

Cleared/Not Vegetated

Hummock Grasslands

N

0 200 400

Meters

Figure 5
Fauna Habitat
Page 2 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
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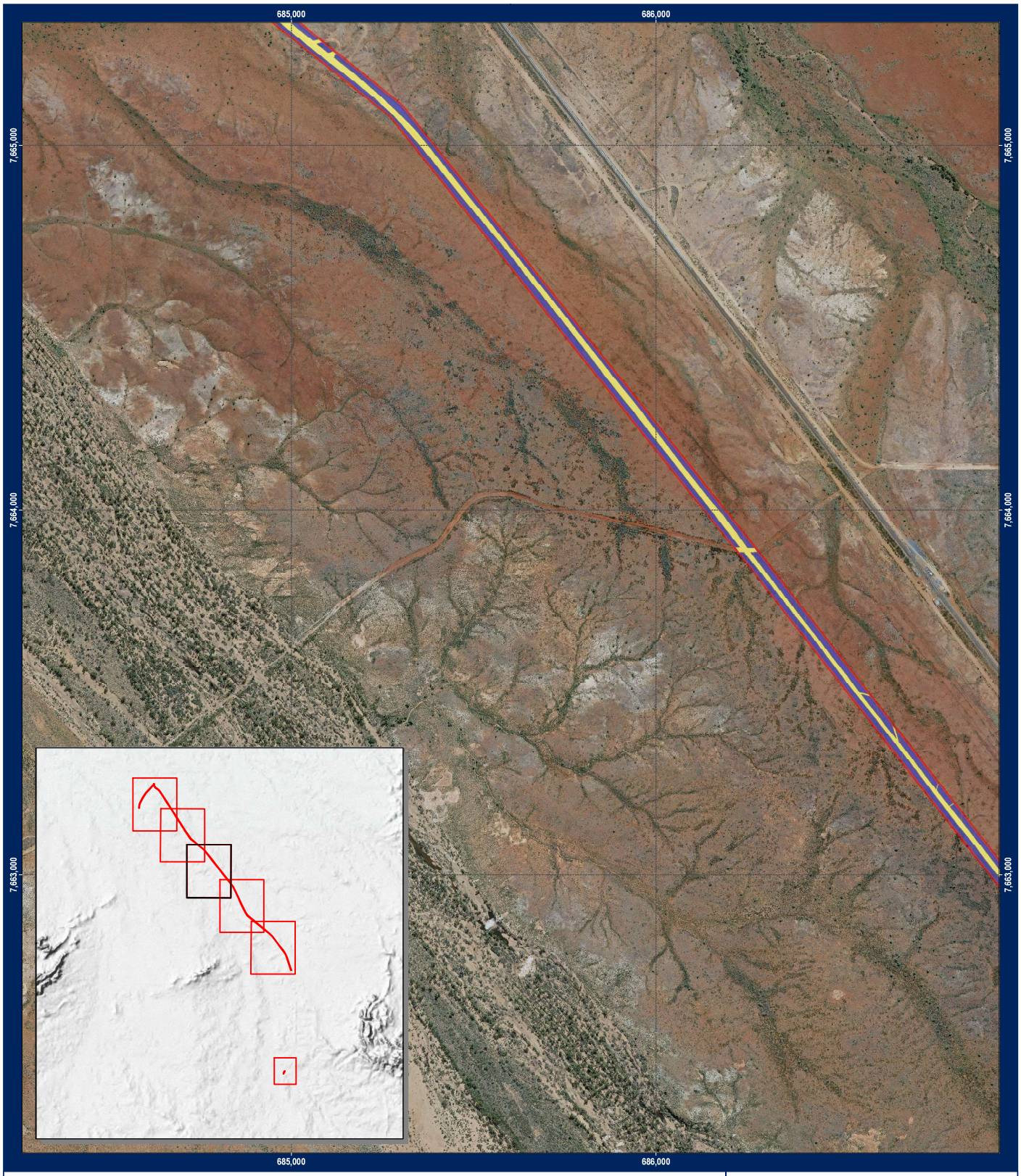

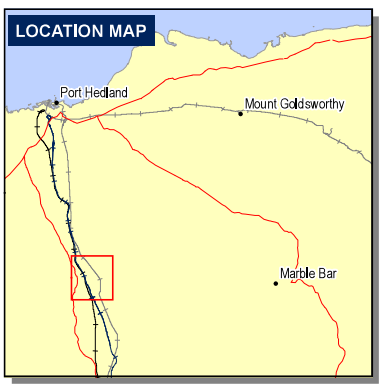

Legend

Proposed Disturbance Area

Fauna Habitat

Cleared/Not Vegetated

Hummock Grasslands

N

0 200 400

Meters

Figure 5
Fauna Habitat
Page 3 of 6

Requested By: K. Fox
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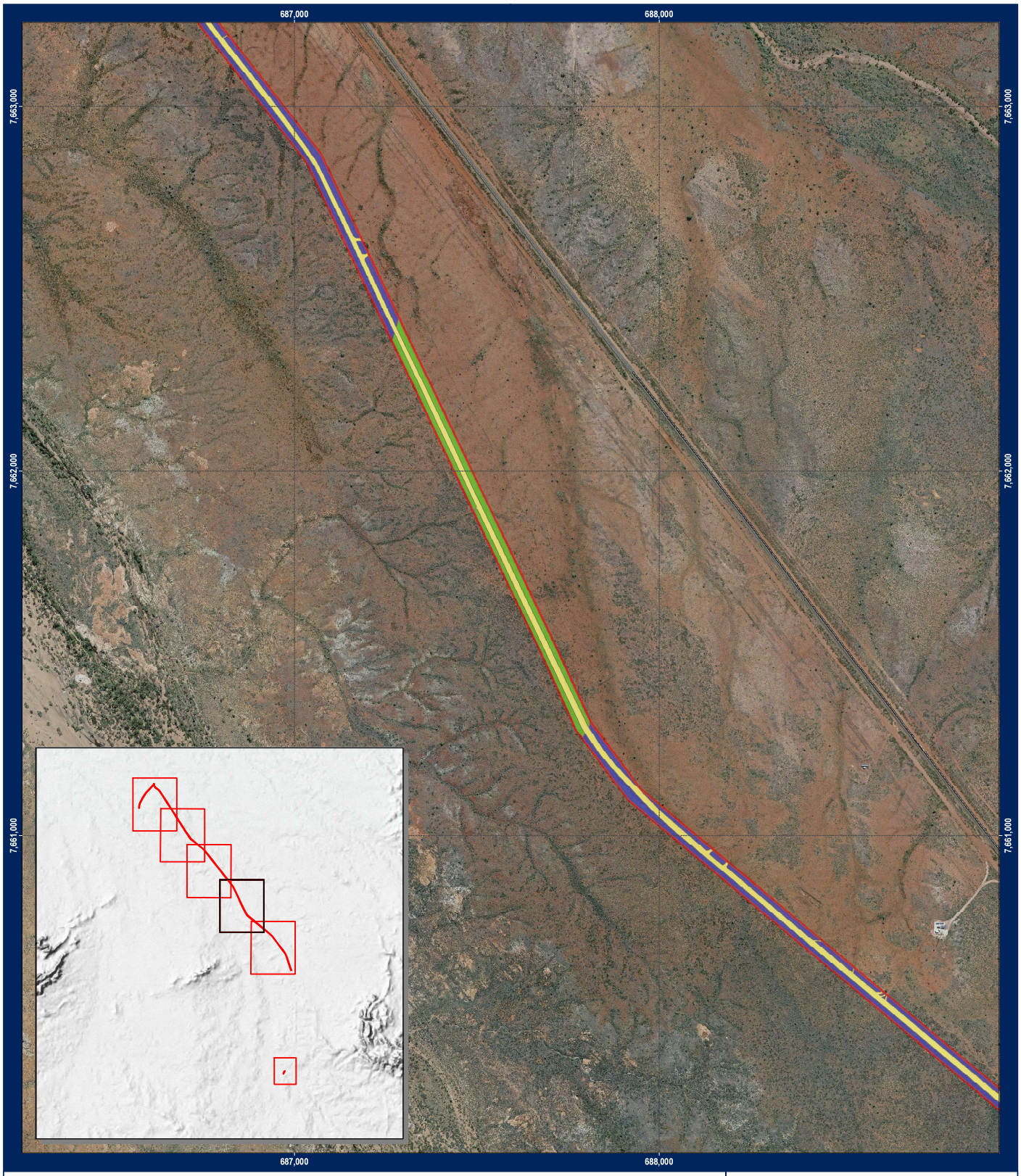

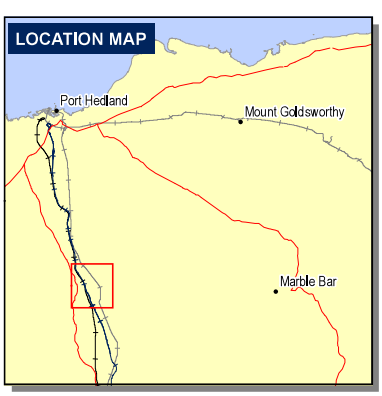

Legend

Proposed Disturbance Area

Fauna Habitat

- Cleared/Not Vegetated
- Creekline
- Hummock Grasslands

N

0 200 400

Meters

Figure 5
Fauna Habitat
Page 4 of 6

Requested By: K. Fox
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Revised By: fdemeo
Approved By:
Scale: 1:10,000
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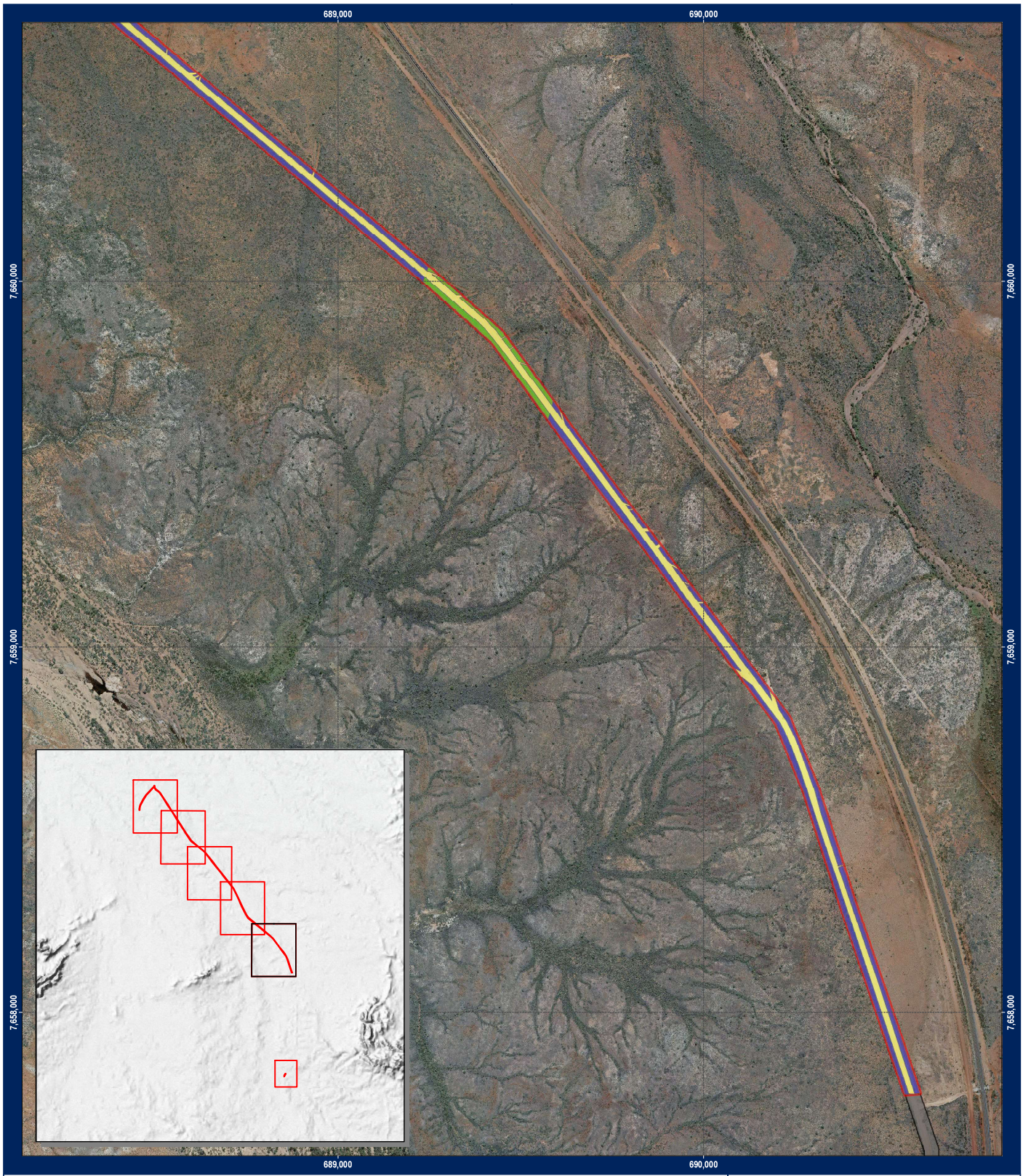
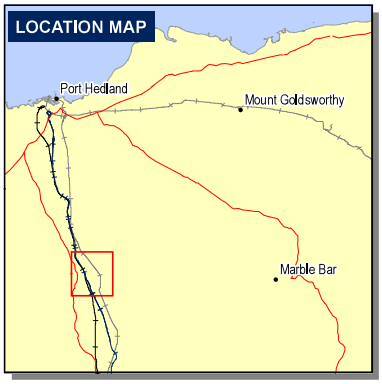


LOCATION MAP



Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Fauna Habitat

- Cleared/Not Vegetated
- Creekline
- Hummock Grasslands

N

0 200 400
Meters

Figure 5
Fauna Habitat
Page 5 of 6

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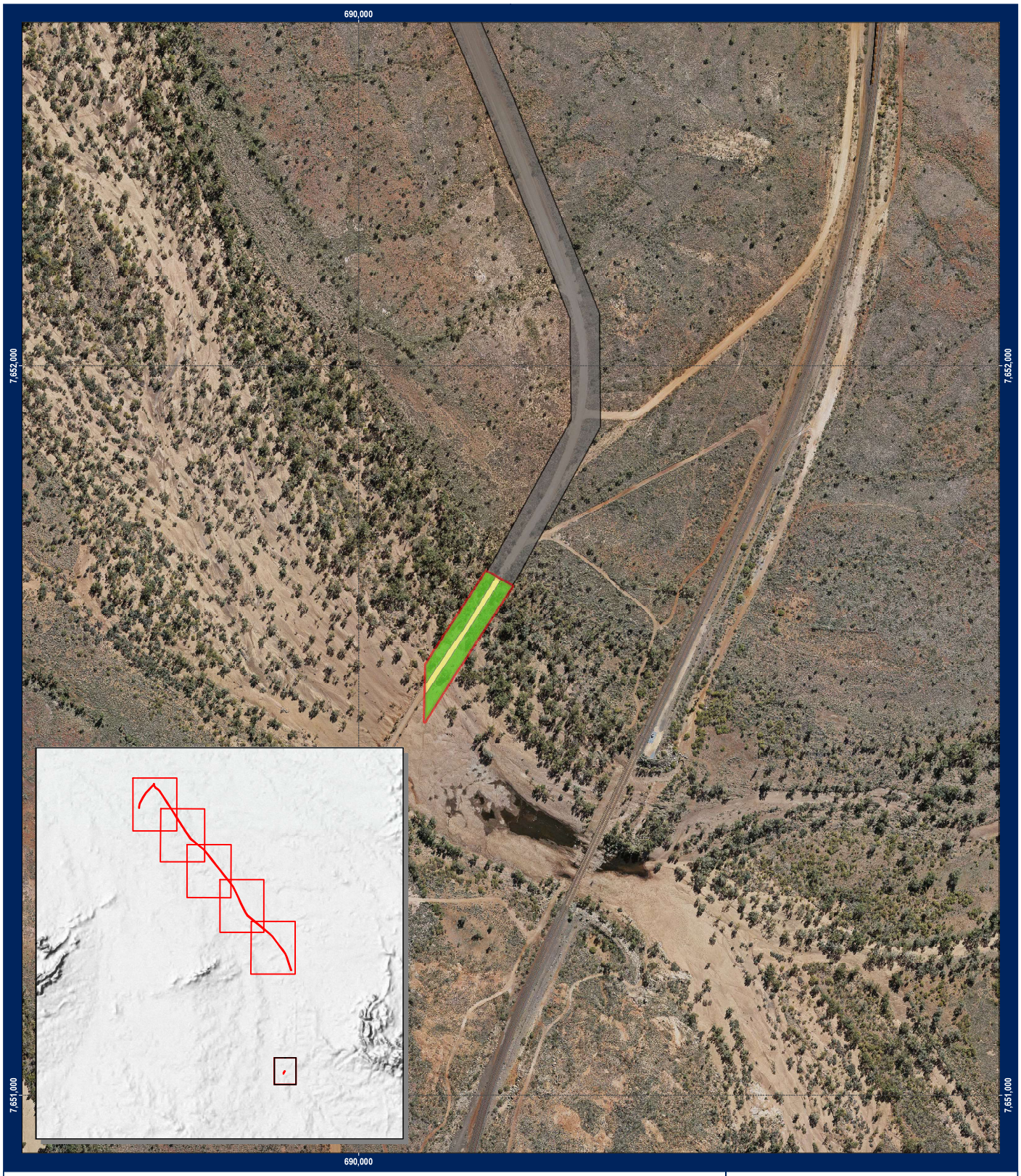

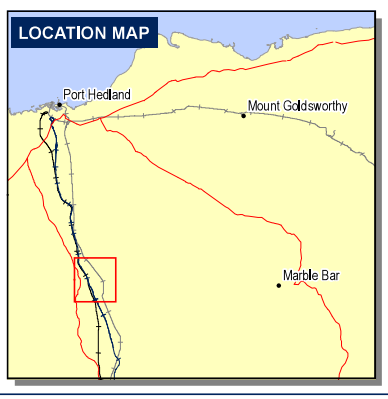

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Fauna Habitat

- Cleared/Not Vegetated
- Creekline

N

0 100 200
Meters

Figure 5
Fauna Habitat
Page 6 of 6

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Date: 27/08/2020
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Revision: 0
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Data Source(s):
All data FMG 2020

Fortescue

Figure 6: Conservation Significant Flora

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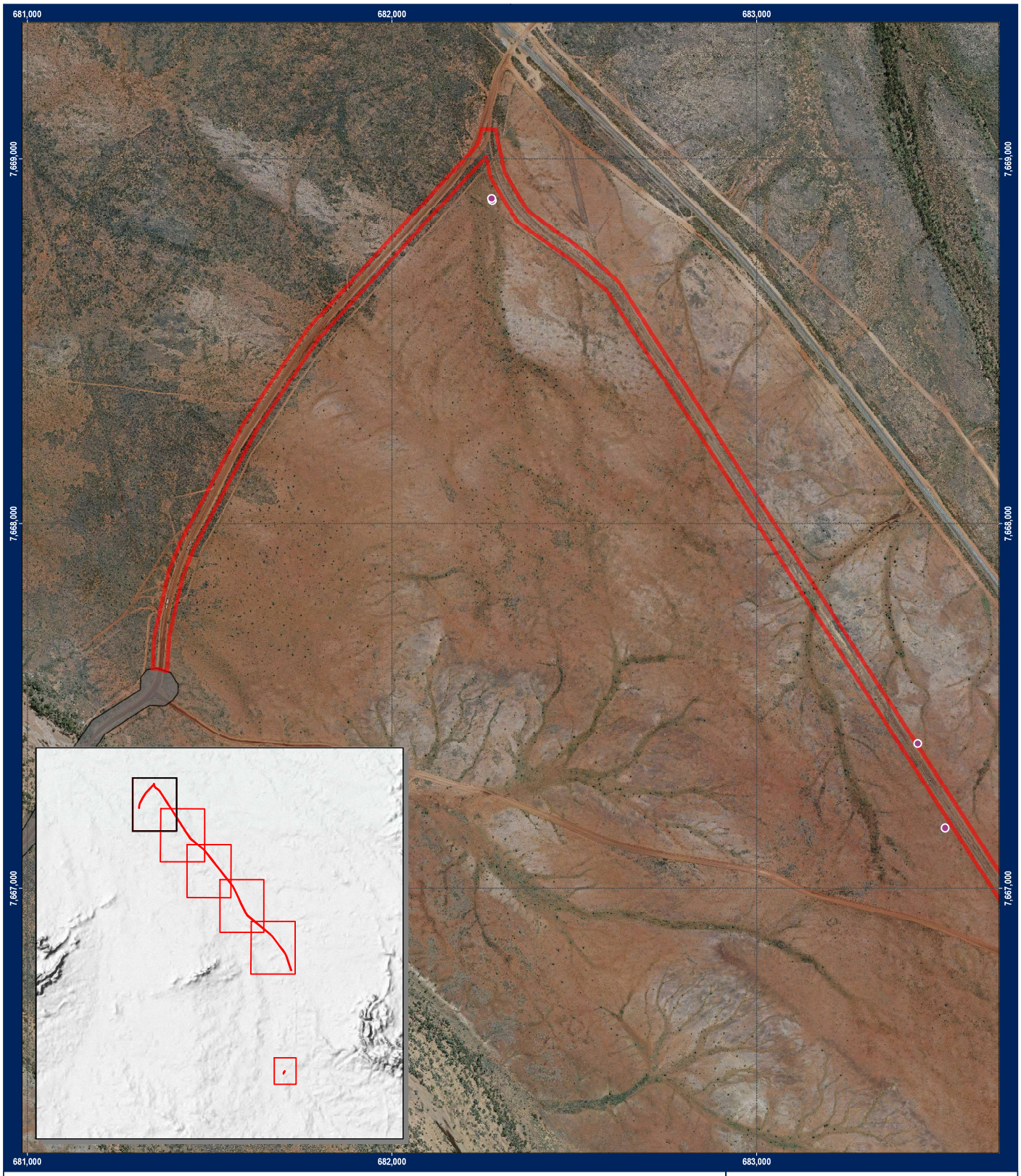

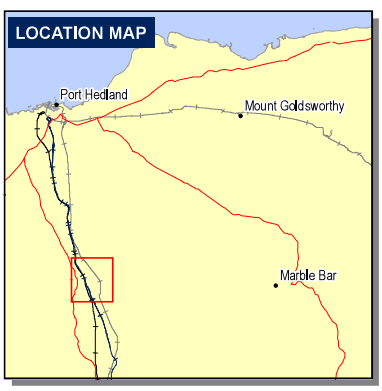

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

Conservation Significant Flora

- Heliotropium muticum

N

0 200 400
Meters

Figure 6
Conservation Significant Flora
Page 1 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.006_r0_ConSigFlora

Date: 27/08/2020
Size: A3P
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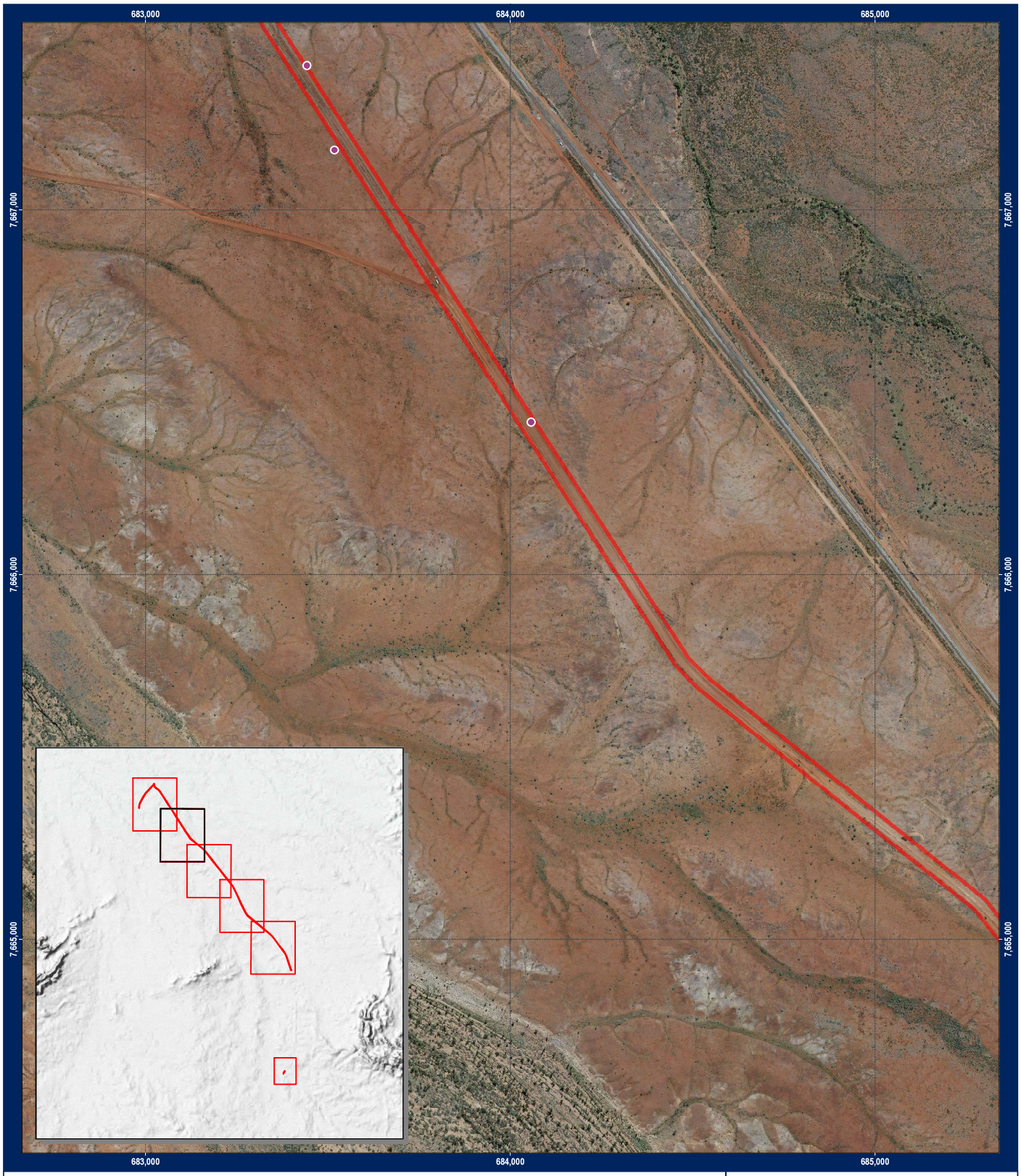
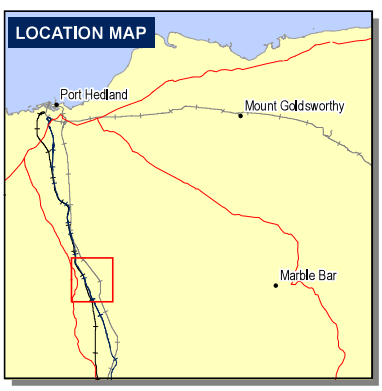
Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue





Legend

Proposed Disturbance Area

Conservation Significant Flora

- Heliotropium muticum

N

0 200 400

Meters

Figure 6
Conservation Significant Flora
Page 2 of 6

Requested By: K. Fox
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Revised By: fdemeo
Approved By:
Scale: 1:10,000
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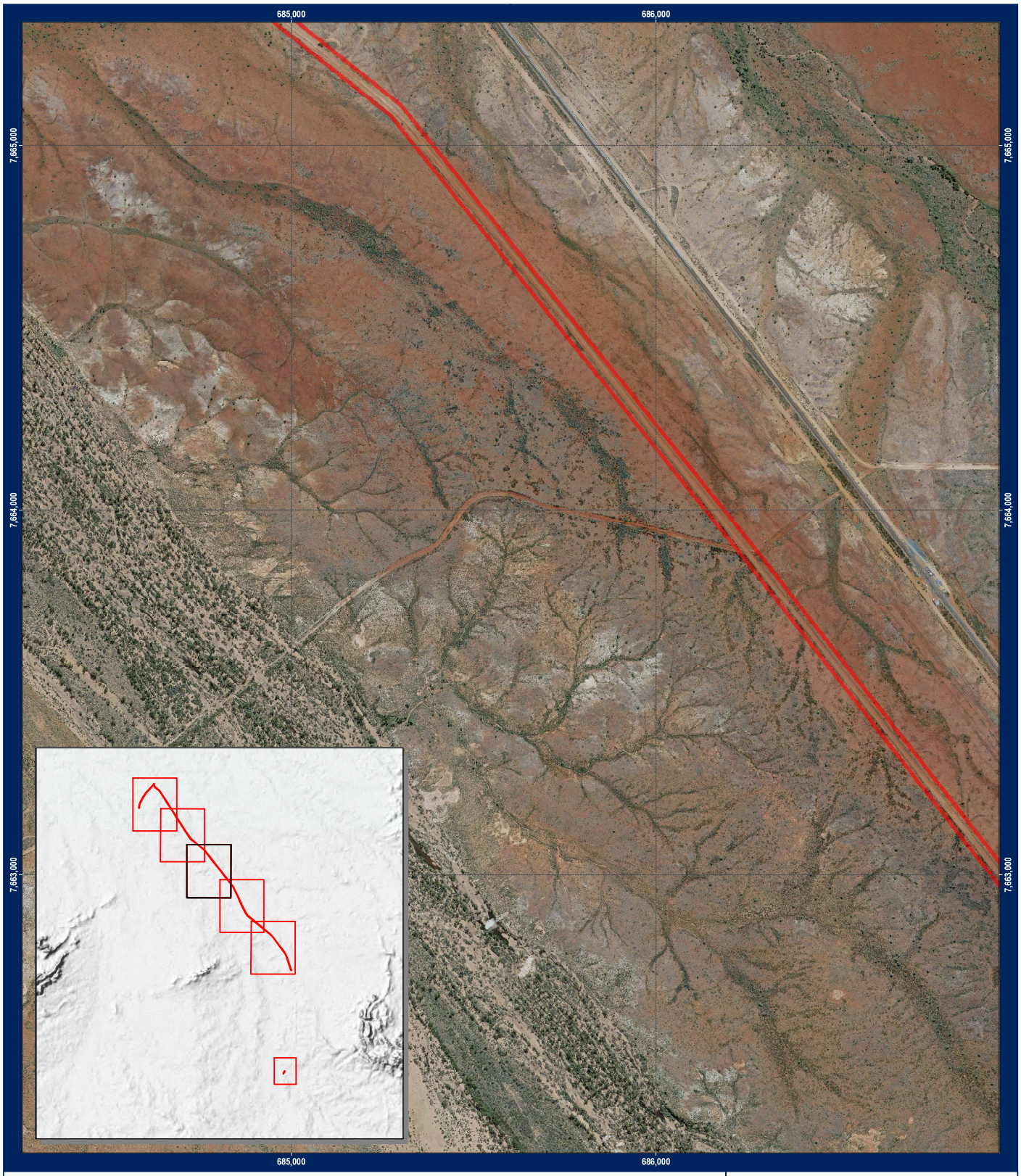

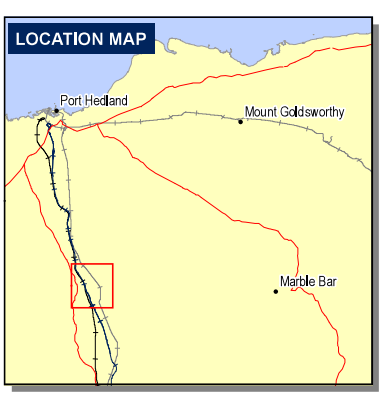

Legend

Proposed Disturbance Area

N

0 200 400

Meters

Figure 6
Conservation Significant Flora
Page 3 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
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Scale: 1:10,000
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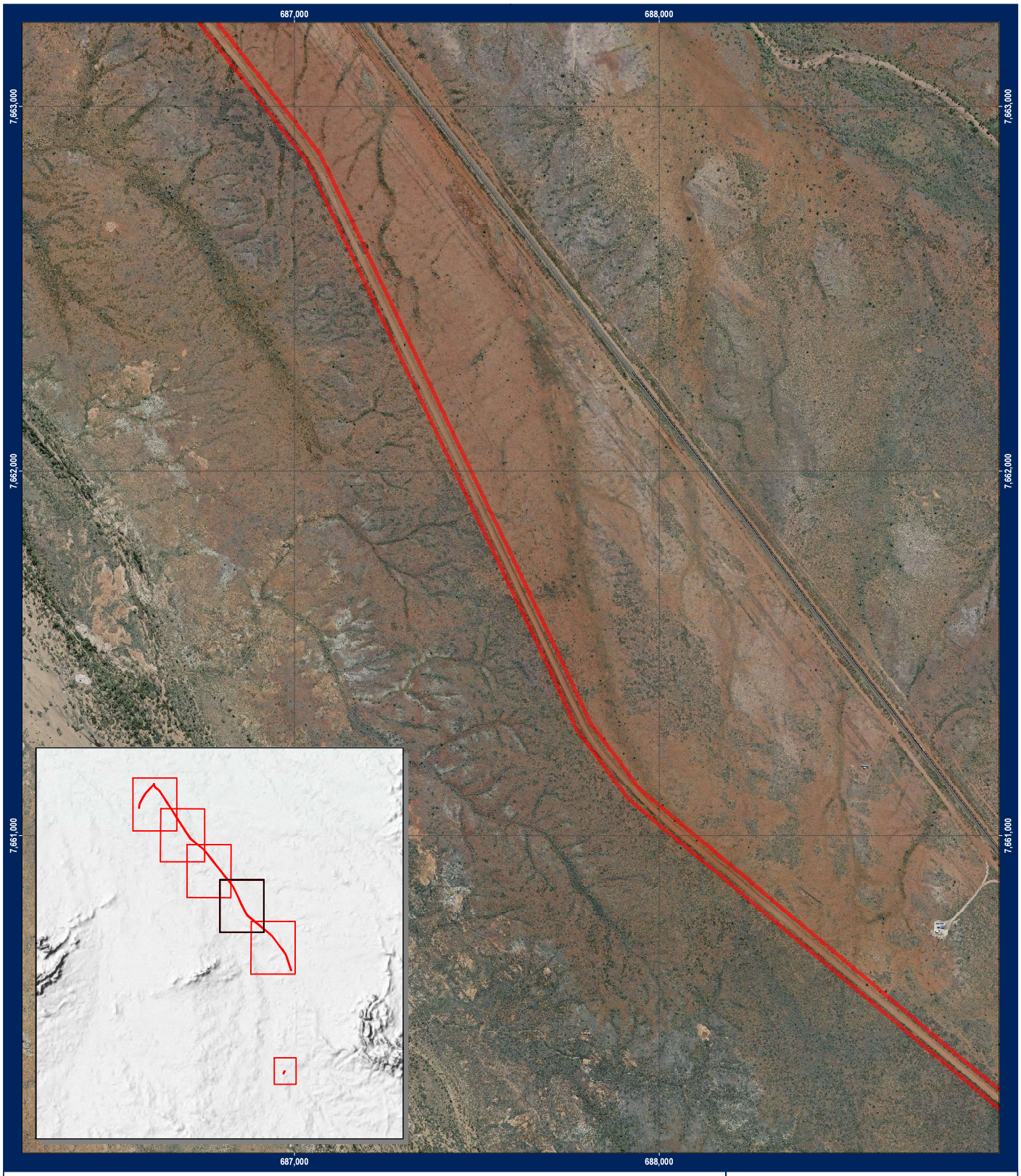

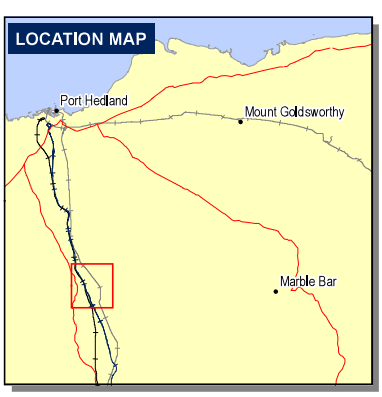

Legend

Proposed Disturbance Area

N

0 200 400

Meters

Figure 6
Conservation Significant Flora
Page 4 of 6

Requested By: K. Fox
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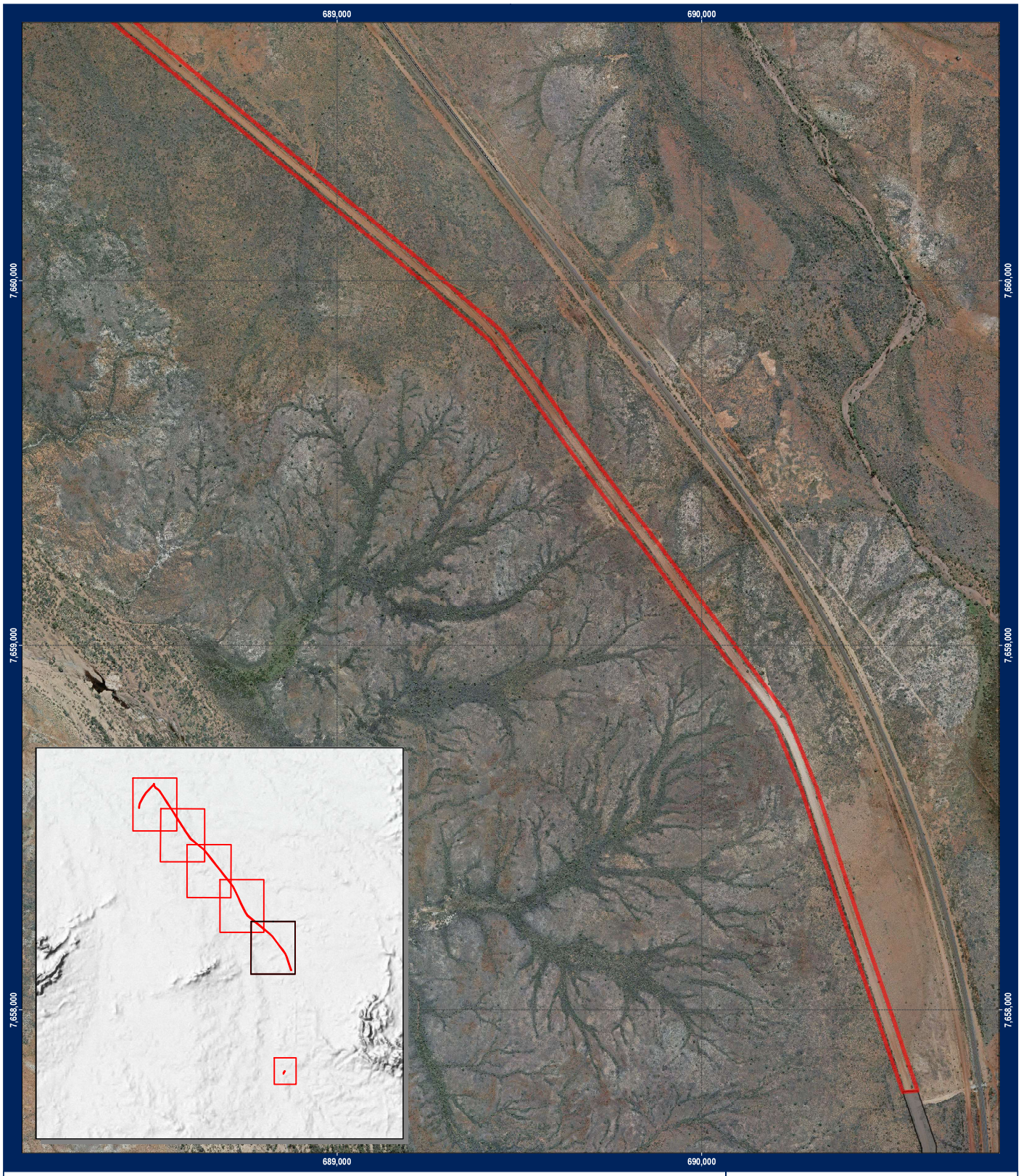

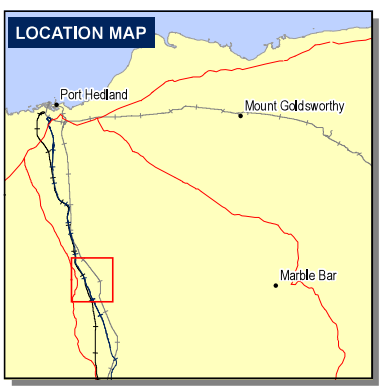

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

N

0 200 400

Meters

Figure 6
Conservation Significant Flora
Page 5 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
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Scale: 1:10,000
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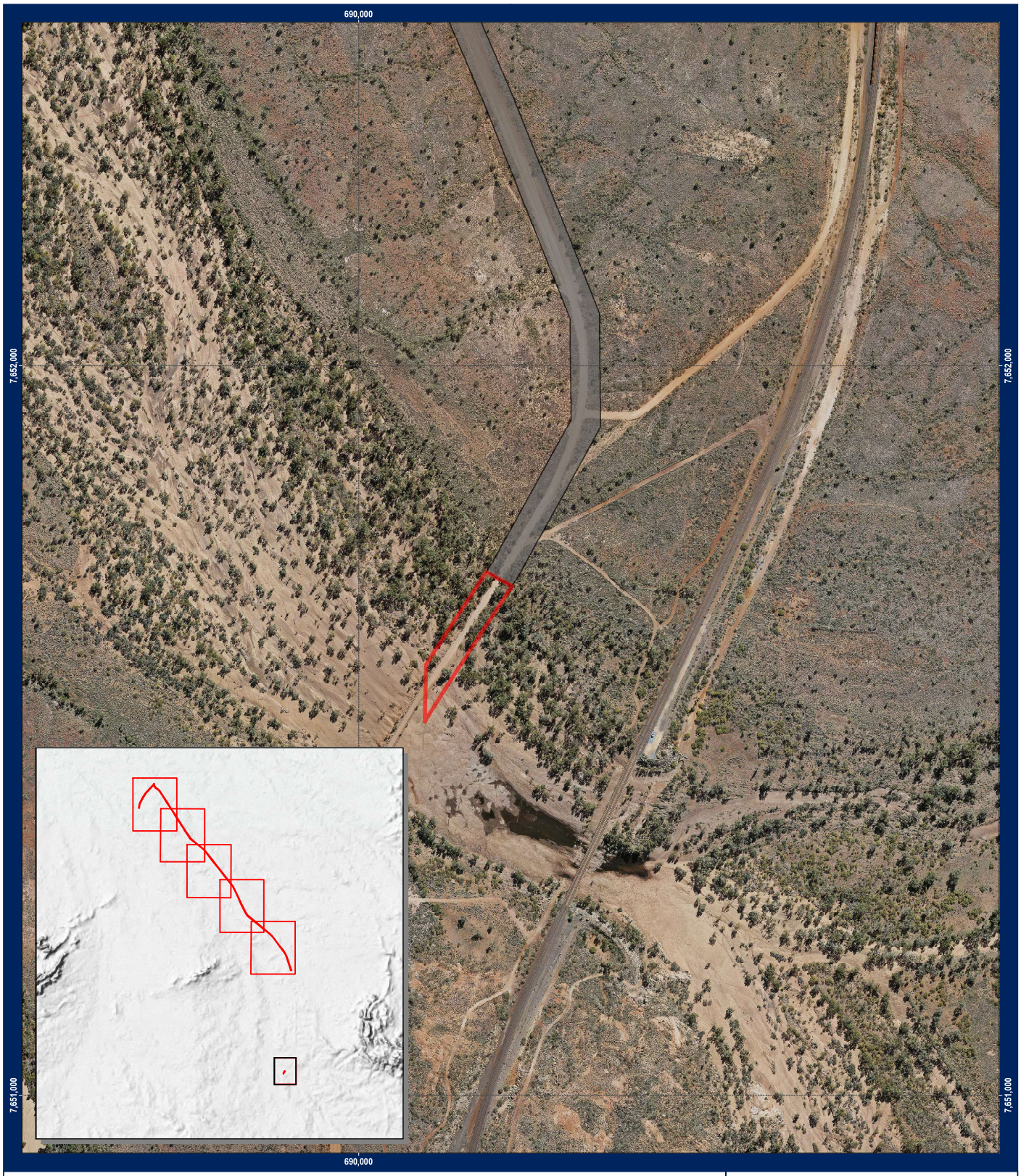

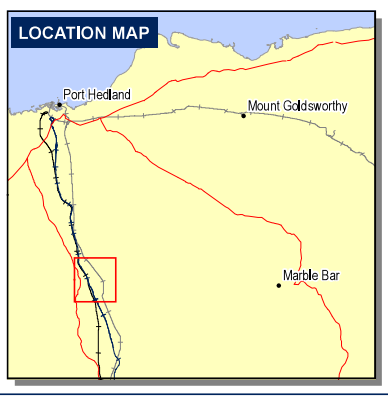

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

N

0 100 200
Meters

Figure 6
Conservation Significant Flora
Page 6 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
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Scale: 1:5,000
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Date: 27/08/2020
Size: A3P
Revision: 0
Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue

Figure 7: Conservation Significant Fauna

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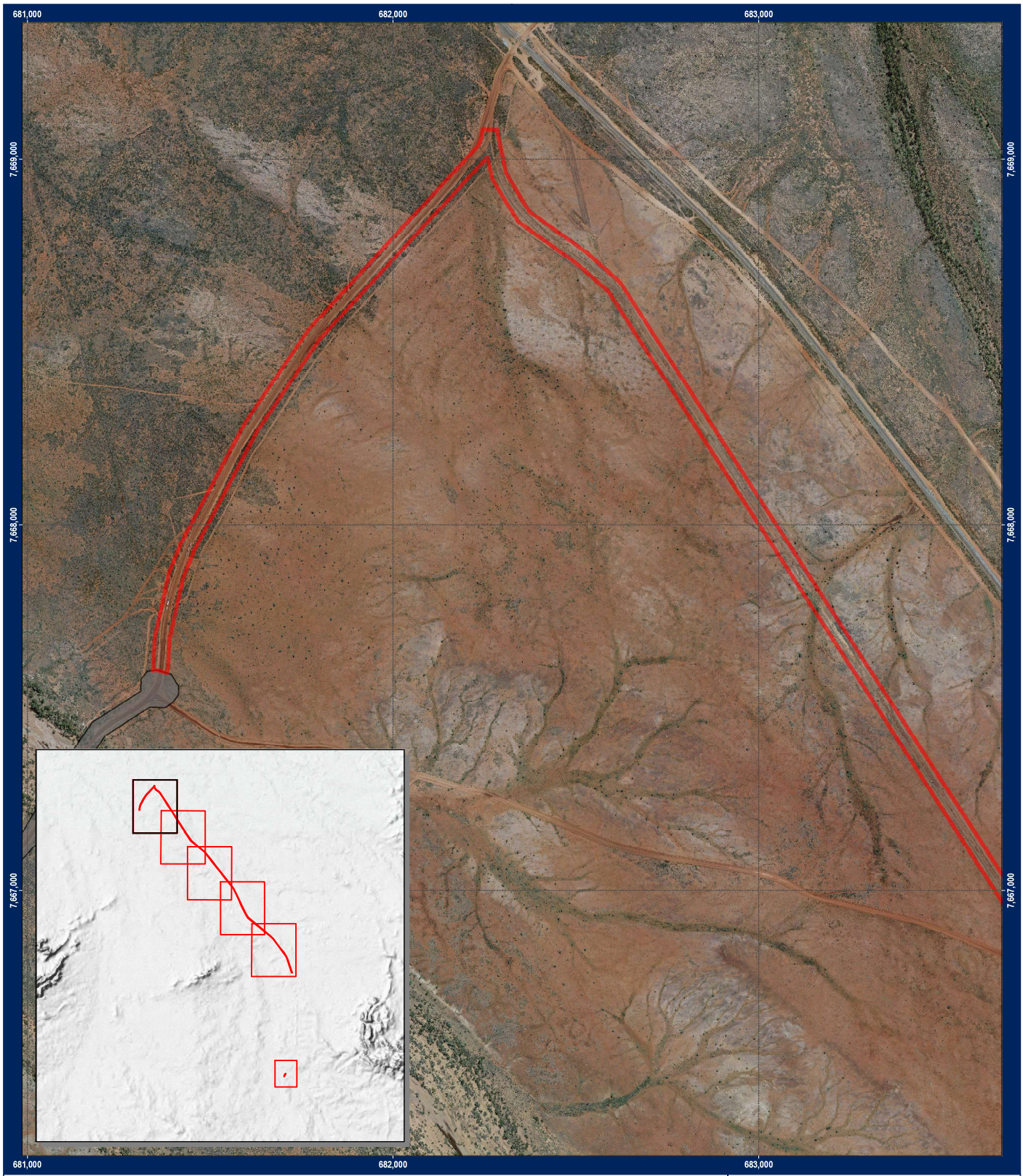

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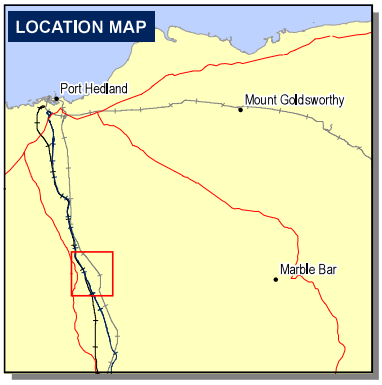

Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

N

0 200 400
Meters

Figure 7
Conservation Significant Fauna
Page 1 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.007_r0_ConSigFauna

Date: 27/08/2020
Size: A3P
Revision: 0
Confidentiality: 1

Data Source(s):
All data FMG 2020

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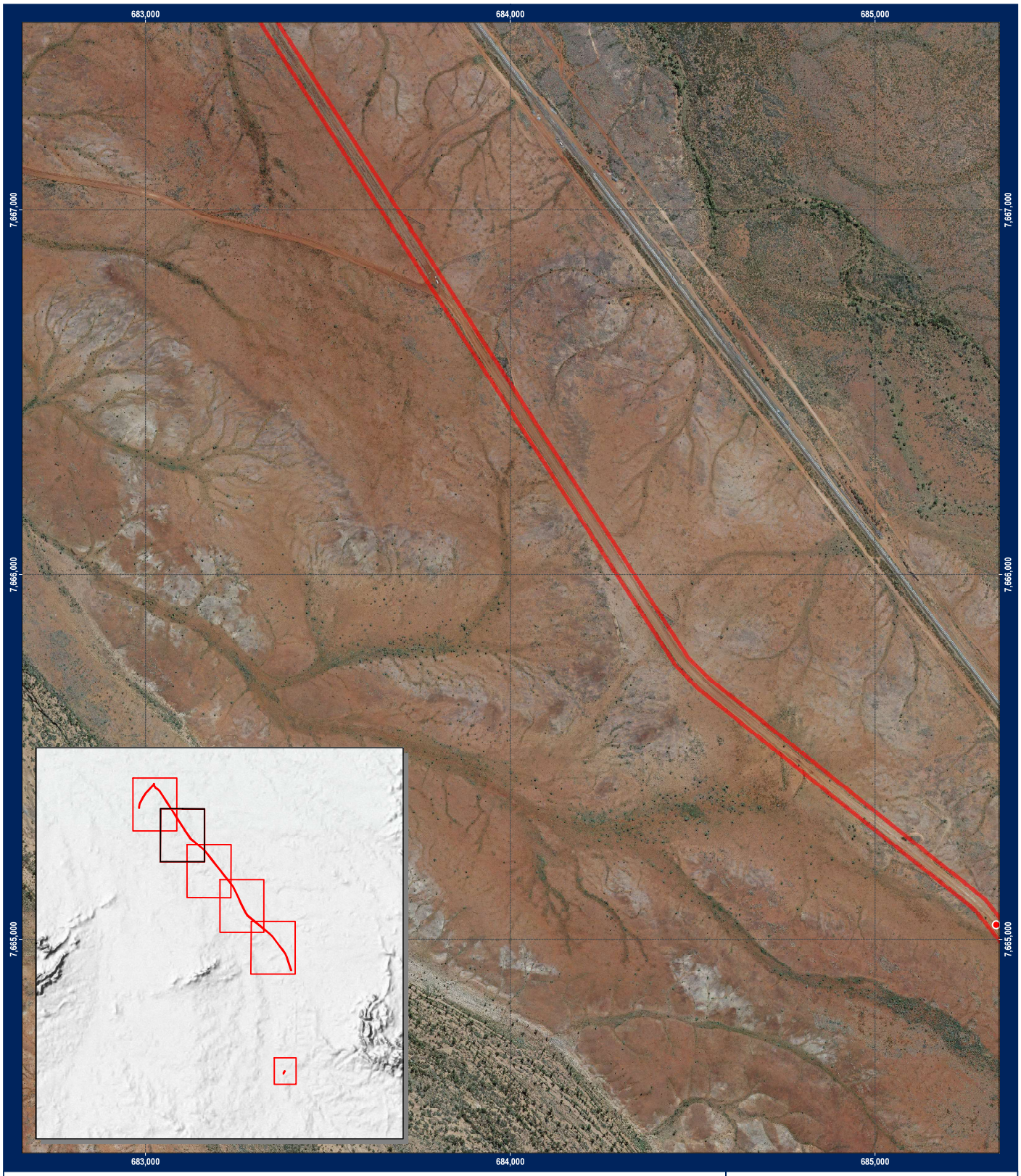

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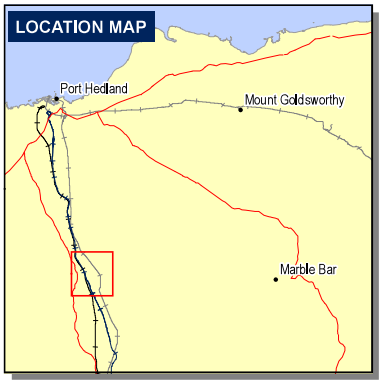

Legend

Proposed Disturbance Area

Conservation Significant Fauna

- Apus pacificus

N

0 200 400

Meters

Figure 7
Conservation Significant Fauna
Page 2 of 6

Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
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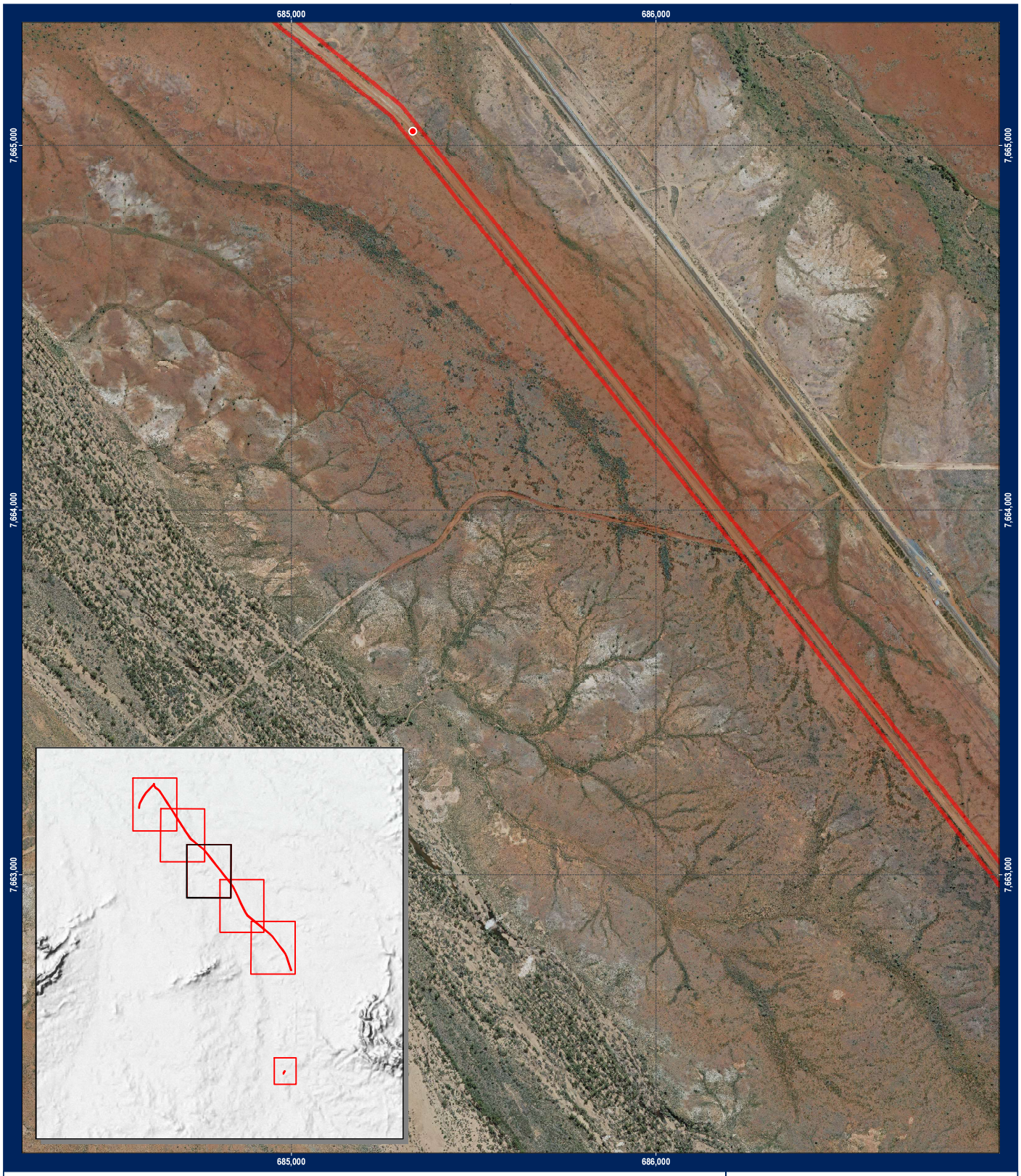

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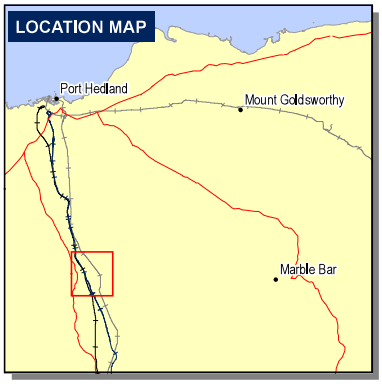

Legend

Proposed Disturbance Area

Conservation Significant Fauna

- Apus pacificus

N

0 200 400

Meters

Figure 7
Conservation Significant Fauna
Page 3 of 6

Requested By: K. Fox
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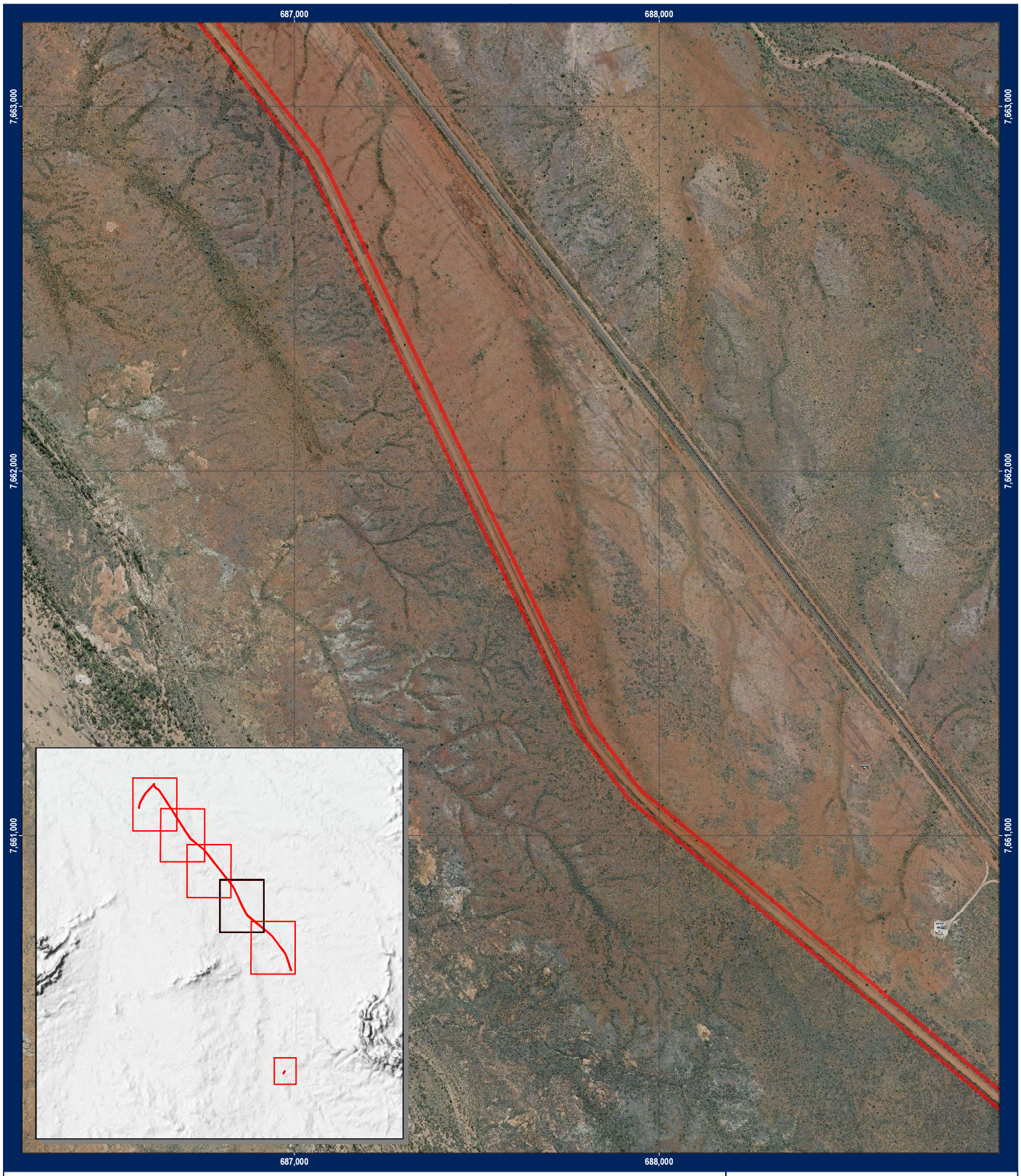
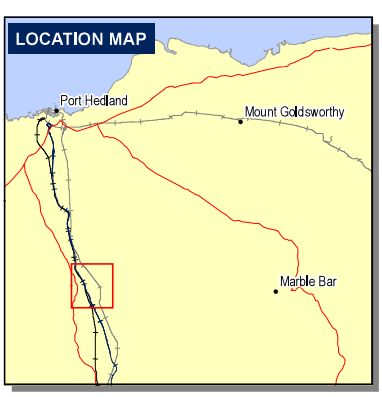




Legend

Proposed Disturbance Area

N

0 200 400

Meters

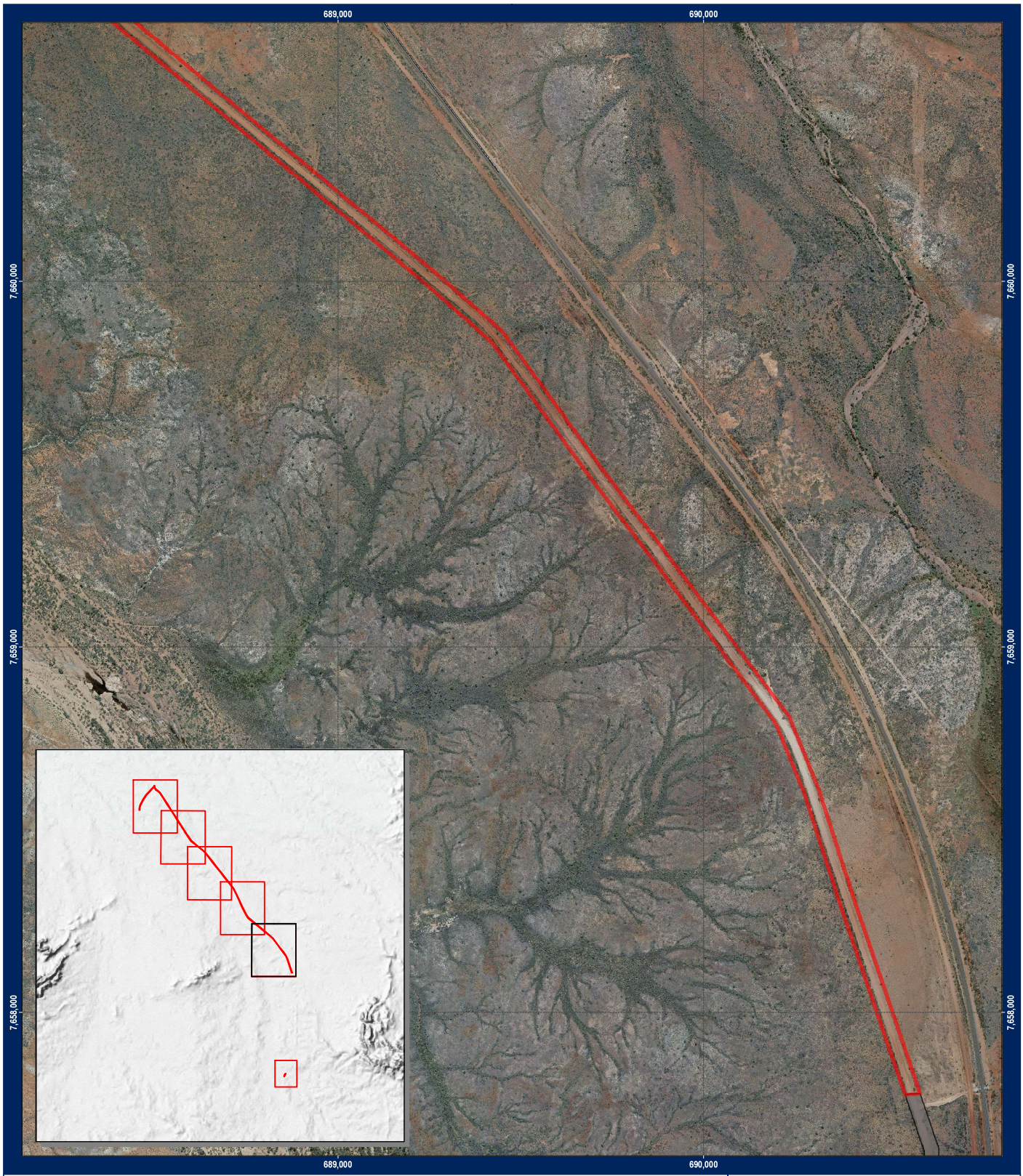
Figure 7
Conservation Significant Fauna
Page 4 of 6

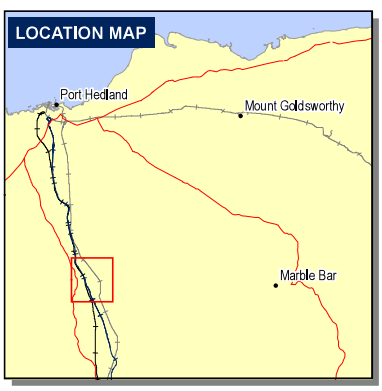
Requested By: K. Fox
Drawn By: FD
Revised By: fdemeo
Approved By:
Scale: 1:10,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0129.007_r0_ConSigFauna

Date: 27/08/2020
Size: A3P
Revision: 0
Confidentiality: 1

Data Source(s):
All data FMG 2020

Fortescue





Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

N

0 200 400
Meters

Figure 7
Conservation Significant Fauna
Page 5 of 6

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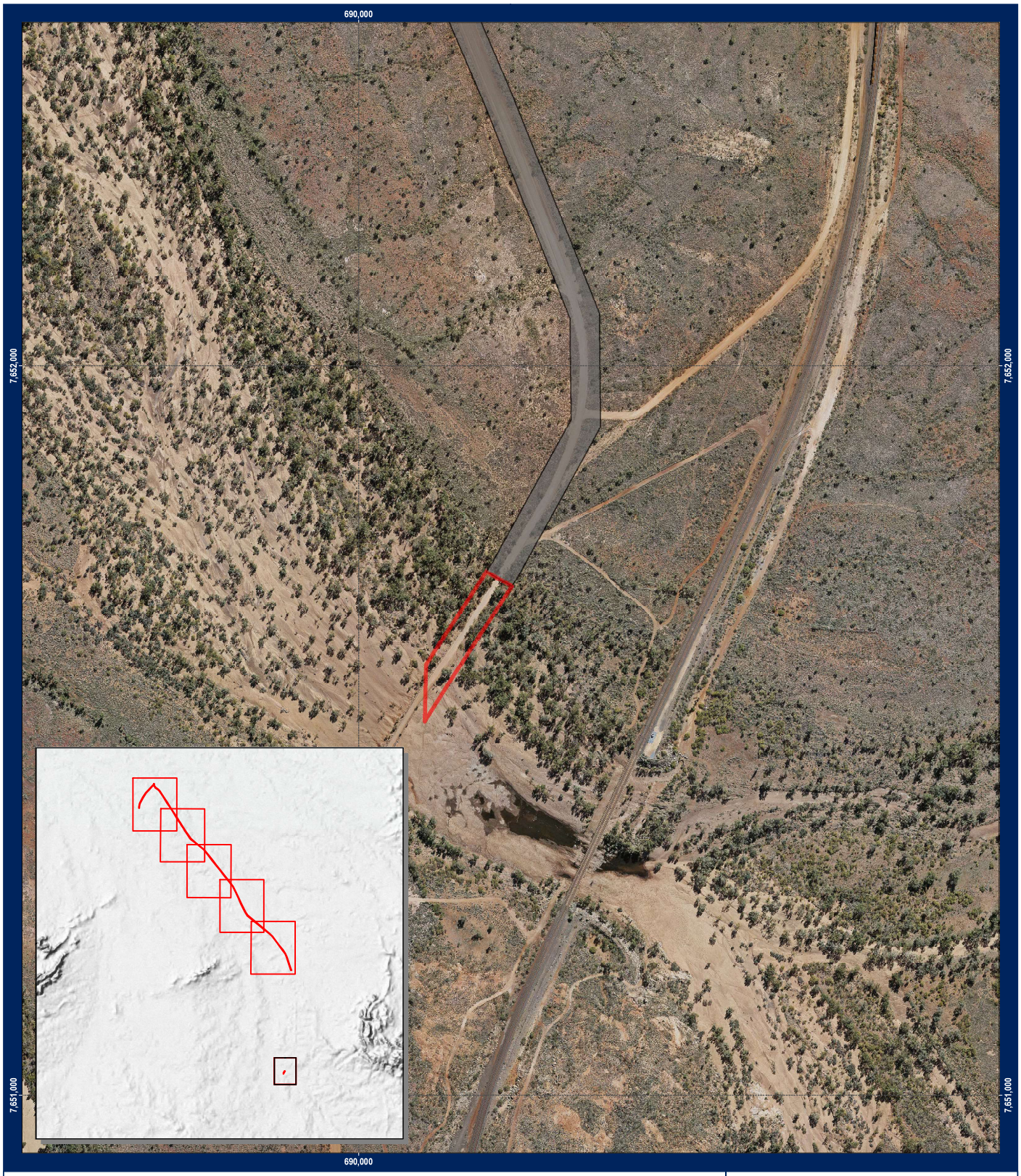
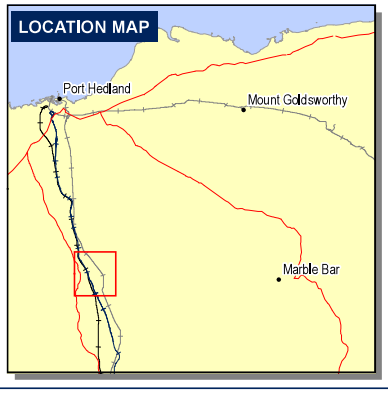


LOCATION MAP



Legend

- Proposed Disturbance Area
- Approved NVCP CPS6687

N

0 100 200

Meters

Figure 7
Conservation Significant Fauna
Page 6 of 6

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Date: 27/08/2020
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Data Source(s):
All data FMG 2020

Fortescue