Memorandum / Filenote

Watercourse / Drainage Feature Determination Supporting Information

To	Waratah Coal
From	Orange Environmental
CC	
Date	20-Dec-2019
Ref	WC-GCP-MM002, Rev 0
Subject	Galilee Power Station

1 Overview

Waratah Coal Proprietary Limited (Waratah Coal), a wholly owned subsidiary of Mineralogy Proprietary Limited, proposes to develop the Galilee Power Station - a proposed 1400 MW power station adjacent to the Mining Lease for their Galilee Coal Project coal mine.

Waratah Coal is seeking approval for the Galilee Power Station under the Queensland *Planning Act 2016* (Qld). As part of the approvals process, pre-lodgement meetings have been held with the State government who have identified, among other things, the need to determine whether an 'unmapped tributary of Lagoon Creek' (the drainage line) meets the definition of a defined waterway under the *Water Act 2000* (Qld) (the Water Act).

This memorandum provides supporting evidence to assist the Department of Natural Resources, Mines and Energy (DNRME) in determining the significance of the drainage line, to support the Project application.

A definition of a 'Watercourse' (i.e. defined waterway) or a 'Drainage Feature' (not a defined waterway) is provided in Section 2 from the Act. Section 3 summarises the evidence from desktop investigations and field work, with mapping provided in Attachment A and Photos from the drainage line in Attachment B. Section 4 summarises the findings of the assessment to assist in the determination.

2 Water Act definitions

Part 2, Section 5 – Meaning of watercourse

(1) A watercourse is a river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events—

  (a) in a natural channel, whether artificially modified or not; or

  (b) in an artificial channel that has changed the course of the stream.

(2) A watercourse includes any of the following located in it—

  (a) in-stream islands;

  (b) benches;

  (c) bars.

(3) However, a watercourse does not include a drainage feature.

(4) Further—

(a) unless there is a contrary intention, a reference to a watercourse in this Act, other than in this part or in the definitions in schedule 4 to the extent they support the operation of this part, is a reference to anywhere that is—

(i) upstream of the downstream limit of the watercourse; and

(ii) between the lateral limits of the watercourse; and

(b) a reference in this Act to, or to a circumstance that involves, land adjoining a watercourse, is a reference to, or to a circumstance that involves, land effectively adjoining a watercourse.

Note for paragraph (b)— Generally, the non-tidal boundary (watercourse) of land bounded by a watercourse, as provided for under the Survey and Mapping Infrastructure Act 2003, would not correspond precisely with the line of the outer bank of a watercourse under this Act.

Schedule 4 Dictionary

drainage feature means—

(a) if a feature is identified on the watercourse identification map as a drainage feature—the feature identified on the map; or

(b) otherwise—a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that—

(i) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events; and

(ii) flows for only a short duration after a rainfall event, regardless of the frequency of flow events; and

(iii) commonly, does not have enough continuing flow to create a riverine environment.

Example for paragraph (b)(iii)—

There is commonly an absence of water favouring riparian vegetation.

3 Supporting Evidence

The drainage line referred to in the 18 November 2019 DSDMIP prelodgment meeting minutes is assumed to be that depicted in Figures A1 and A2 in Attachment A. Examination of the mapped area using the 'Watercourse' (defined by the Water Act) layer and the 'Watercourse Line' layer ('Major' and 'Minor' Watercourses) in the Queensland Globe online interactive tool reveals that this drainage line is not mapped as a watercourse (refer to Figure 1 below). However, watercourses to the immediate north and south of the drainage line in question are mapped as minor watercourses on Queensland Globe, and the dam located along the drainage line in question is also mapped as a 'reservoir' on Queensland Globe (refer to Figure 1 below). This suggests that there has been previous examination of the area for the purpose of watercourse mapping, in which the drainage line in question has not been deemed to be a watercourse for the purposes of the Water Act.

Figure 1. Queensland Globe Extract (white labels added outside of Queensland Globe)

Discussions were held with the landowner of Lot 2 on SP136836, on which the features are located, who confirmed that the channel flows only during and immediately after rainfall. Drainage occurs as overflow from the mapped impoundment, or as minimal inflow from the very gently sloped lands along its path. The upstream catchment was estimated at 90ha (from LiDAR data) to the east of the MCU area boundary and the mapped impoundment, with topography grading very gently toward the drainage line from between 100 – 200m either side of the drainage line.

A site inspection was undertaken with photos and descriptions provided in Attachment B (locations are shown in Figure A2 in Attachment A). Essentially, the field investigations found that the drainage line had two distinct sections:

- Eastern - a sandy and better defined channel draining from the impoundment westwards to a dividing north-south vegetation and fence line ~800m west of the eastern MCU area boundary (nominated on Figure A1 in Attachment A). This comprised a sandy bed and shallow incised banks in places, with some bedrock bars and evidence of erosion indicative of higher velocity flows.
- Western (west of vegetation / fence line) - an indistinct 'delta' comprising two ill-defined channels without consistency, alternating between very small and shallow channels reminiscent of cattle tracks, to areas with no identifiable channel. Soils change to a clayey loam and both observations and discussions with the landowner indicate this area is a larger open depression with water pooling during rainfall periods. No defined channels were identified heading further west from this area, and the channel diverges rather than converges as it heads west. No connection to Lagoon Creek could be identified beyond the observation points and the lines mapped in Figure A2 in Attachment A.

In general, there was no distinct riparian zone along any part of the drainage line, with vegetation close to the channel and on banks (where present) being the same as that on the surrounding landscape. The infrequent and short flow as a direct result of rainfall, divergent nature of the channel in the west and lack of any identified channel heading further west to Lagoon Creek, and the lack of the usual features associated with mapped waterways, particularly the western half with no defined bed and banks or riparian vegetation, indicates that the drainage line does not meet the definition of a defined waterway for the purposes of the Water Act.

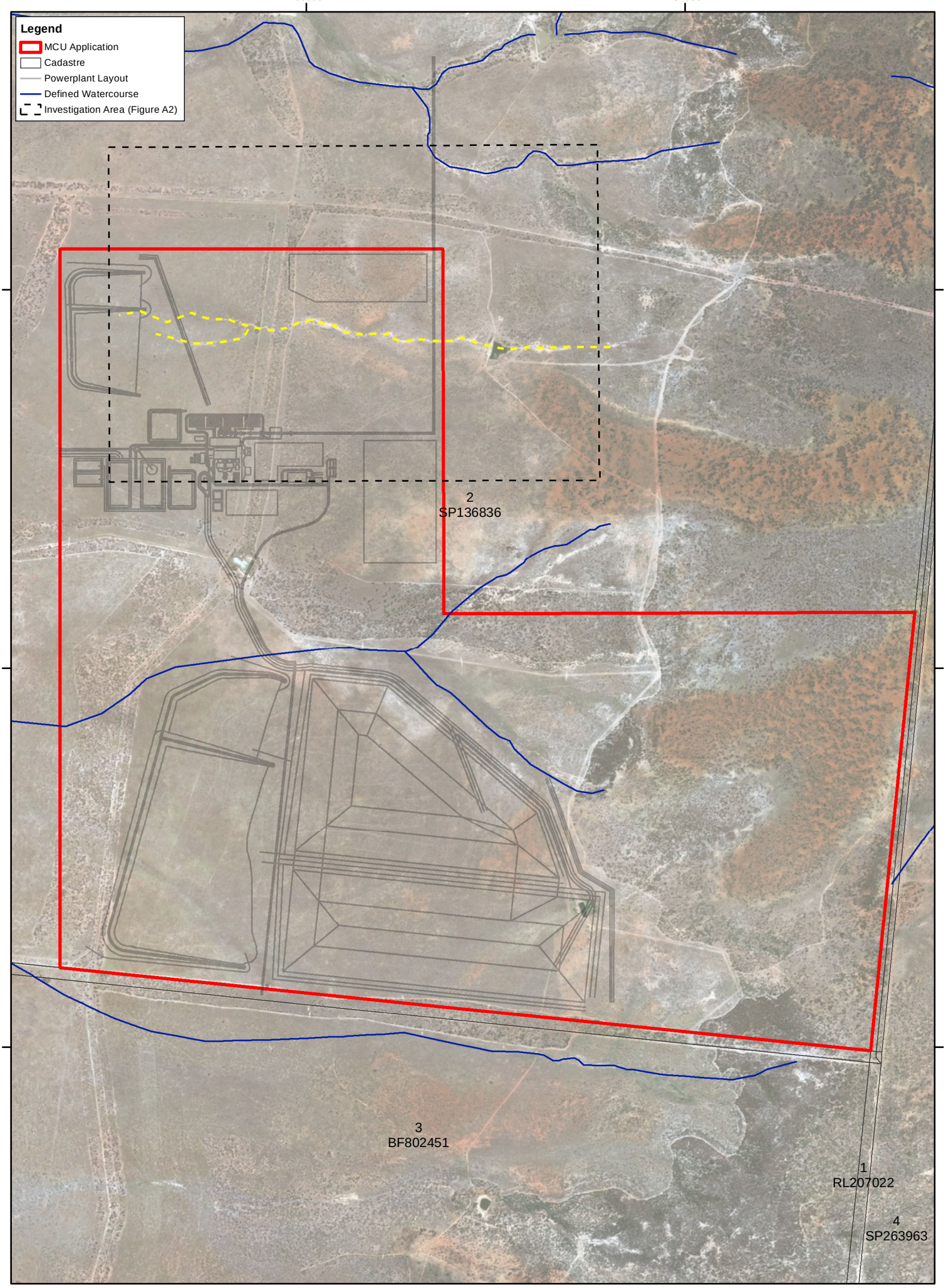
4 Summary

Following identification of a possible unmapped tributary of Lagoon Creek within the Project Area in the minutes of the 19 November 2019 prelodgment meeting, an assessment was conducted, using both desktop approaches with available mapping, and field verification. The data provides the supporting information to assist DNRME in determining whether the drainage line in question meets the criteria to be defined as either a 'Watercourse' or 'Drainage Feature' as defined in Part 2, Section 5 and Schedule 4 of the Water Act.

Based on the information provided, and the existing determinations of watercourses to the north and south of the drainage line, it is considered likely that the feature can be considered a 'Drainage Feature' under the Water Act, and therefore not a defined Watercourse.

Attachment A

Maps



GALILEE POWER STATION

Sources:
DCDB: DNRME 2019 | MCU Area: Waratah Coal, 2019
Basemap: ESRI World Imagery (Clarity)
Watercourses: DNRME, 2018 (mapped); OE/Waratah Coal 2019 (unmapped drainage line)

0 0.5 km

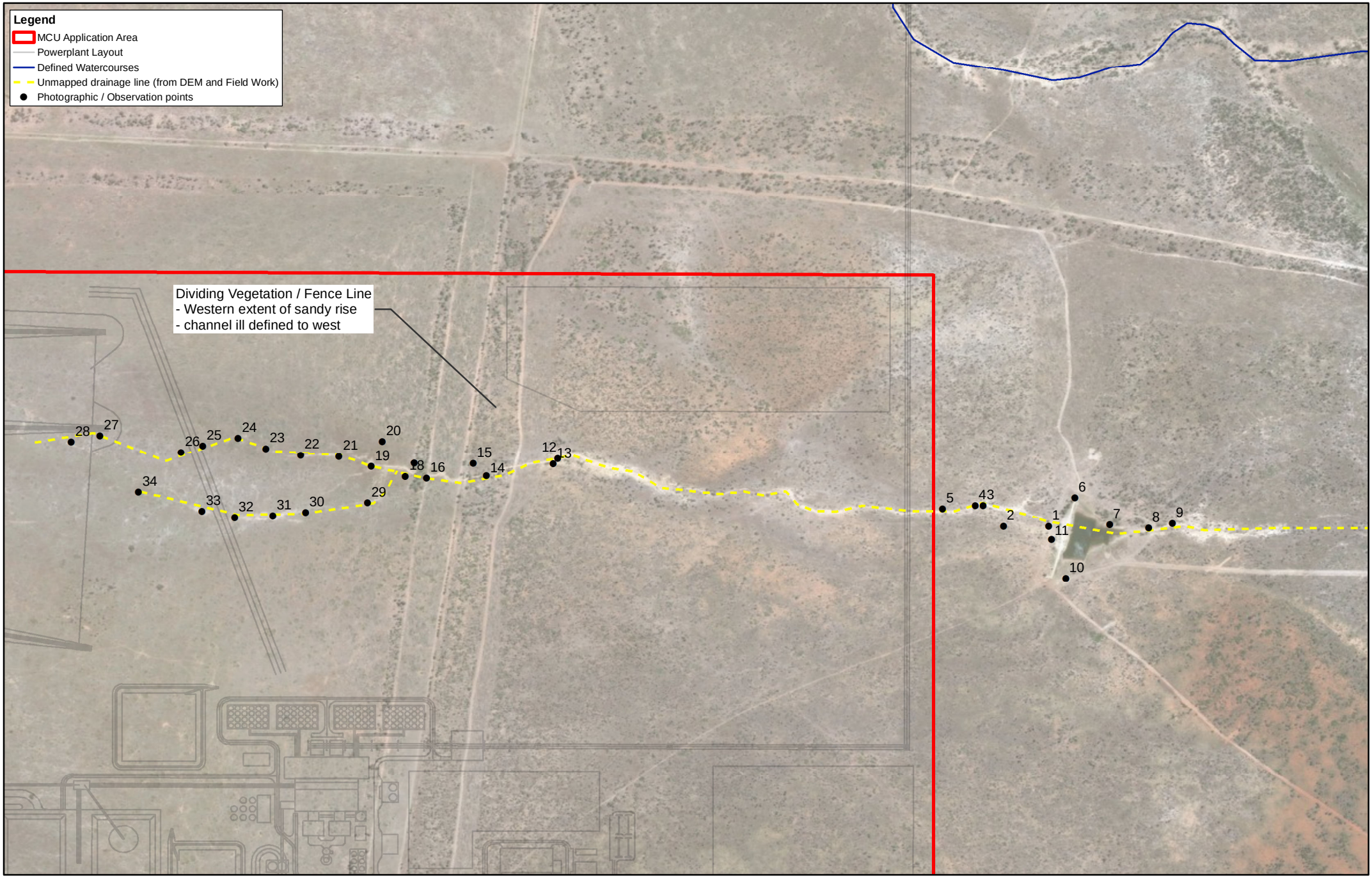
A4 Scale 1:25,000

GDA 1994 MGA Zone 55

N

Figure A1 - Power Station Layout and Watercourses - Overview

WC-GPS-0402b-WaterDetermination-191219, 20 Dec 2019



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Basemap: ESRI World Imagery (Clarity)
Watercourses: DNRME, 2018 (mapped); OE/Waratah Coal 2019 (unmapped drainage line)
Photographic Points: OE 2019

0 0.1 0.2 km
A4 Scale 1:10,000
GCS GDA 1994

N

Figure A2 - Power Station Layout and Watercourses - Investigation Area

WC-GPS-0403b-WaterDeterminationClose-191219, 20 Dec 2019

Attachment B

Field Photos

Location 9 – Channel at easternmost point investigated (2 photos)

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Location 8 - Channel of fine sand, 10 m wide, 1m deep (1 photo)

Location 6 – Mapped impoundment (2 photos)

Location 7 – Mapped impoundment (3 photos)

Location 11 (2 photos)

Location 10 (4 photos)





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Location 1 - Obvious channel but no high bank, 15 m low bank to low bank near dam wall, to 7m at 50m downstream of dam wall. No riparian vegetation (5 photos)




Location 2 - Non remnant regrowth, tall shrubland, *Acacia oswaldii* to 4m with *E. melanophloia, Corymbia sp* (clarksoniana?), *C. dallachiana, P. pubescens*; ground layer containing buffel grass with *E. mucronata, T. pungens, H. contortus*. Alluvial gently undulating plains over shallow sandstone (4 photos)


Location 4 - Channel bank incised 1-1.2m deep, dry, minor riffles and in-stream channelling (2 photos)

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Location 3 - Channel of fine sand over sandstone and siltstone sheets (3 photos)

Location 5 - New dam wall placed across drainage line (2 photos)

Location 12 - Channel drains low rise onto plain at this point, incised 1.7 m at 20m upstream to 40cm at 30m downstream, bed of loose sand, some minor riffles and shallow in-bed channelling, no high bank, no riparian vegetation (2 photos)

Location 13 - *E. melanophloia, G. pteridifolia, Acacia subterete* (2 photos)

Location 14 – Sandy channel, 2-3m wide, 70cm deep (2 photos)

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Location 15 - *E. melanophloia* ,open woodland sandy alluvium gently undulating to level plains (1 photo)

Location 16 - Channel 3-5m wide 20-50 cm deep, sandy (2 photos)

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Location 17 - *E. melanophloia* (no photos)

Location 18 - Channel loses definition at this point, flows SW, no longer has defined banks or bed (2 photos)

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Location 19 - Low mid-delta bank, not a bed (1 photo)

Location 20 - Approximate edge of delta (2 photos)

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Location 21 - Channel restarts in clay loam, 20-40 cm deep to 2-3m wide (3 photos)

Location 22 - *E. melanophloia* , low open woodland non remnant, no riparian vegetation (2 photos)

Location 23 - Channel 30cm deep >1m wide (2 photos)

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Location 24 - Channel is a shallow pan / open depression with no bank (no photos)

Location 25 - Channel is a shallow pan / open depression with no bank (2 photos)

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Location 26 - No channel, broad open depression 50-70m wide (no photo)

Location 27 - *E. melanophloia* regrowth (2 photos)

Location 28 - Edge with *E. melanophloia* regrowth (2 photos)

Location 29 - Shallow gully erosion (2 photos)

Location 30 - Gully erosion 50 cm deep, 1 - 3 m wide (2 photos)

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Location 31 (1 photo)

Location 32 - Gully becomes shallow drain (2 photos)

Location 33 (2 photos

Location 34 - Drain peters out (2 photos)