

Appendix 13.

SLR Consulting Australia (2020d) *WSF Technical Memo on Site Selection*. Memorandum from SLR Consulting Australia to the Department of Primary Industry and Resources, Northern Territory Government, February 2020.



To: Jackie Hartnett
From: Danielle O'Toole
Date: 28 February 2020
Subject: WSF Technical Memo on Site Selection

At: DPIR
At: SLR Consulting Australia Pty Ltd
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1 Introduction

As part of the current rehabilitation strategy (Stage 2A) for the former Rum Jungle mine site, the initial scope of works was to finalise the design of the proposed new Waste Storage Facility (WSF).

The Stage 2 rehabilitation strategy identified the preferred location of the WSF as an area of undisturbed ground on the northern boundary of the site. O'Kane Consulting (OKC) conducted a Multi-Criteria Analysis (MCA) (OKC, October 2015) identifying 3 preferred sites – northern, central and southern. The MCA identified that either the central or northern sites were the preferred site. According to the Failure Mode and Effects Analysis (FMEA) Report (OKC, September 2015) no final decision had been made on the location, however the design at that stage would be based on the northern site owing to “OKC’s current understanding of DPIR and stakeholders preferred location”.

DPIR has requested SLR revisit the site selection process to assess if the northern site is in fact the optimal location for the WSF. The process needs to evaluate:

- Engineering and environmental requirements, including:
 - Geotechnical (foundation) conditions;
 - Groundwater conditions;
 - Surface water flooding impacts;
 - Vegetation disturbance; and
 - Visual amenity.
- Traditional Owner requirements.

2 Potential Sites

The initial 3 sites identified as potential locations were:

- Southern site near the Intermediate Waste Rock Dump (WRD);
- Central site (old stockpile area to north east of Main Pit); and
- Northern site.

DPIR requested that SLR add a further site to the east of the central site (called central east). The four sites are shown in Figure 1.

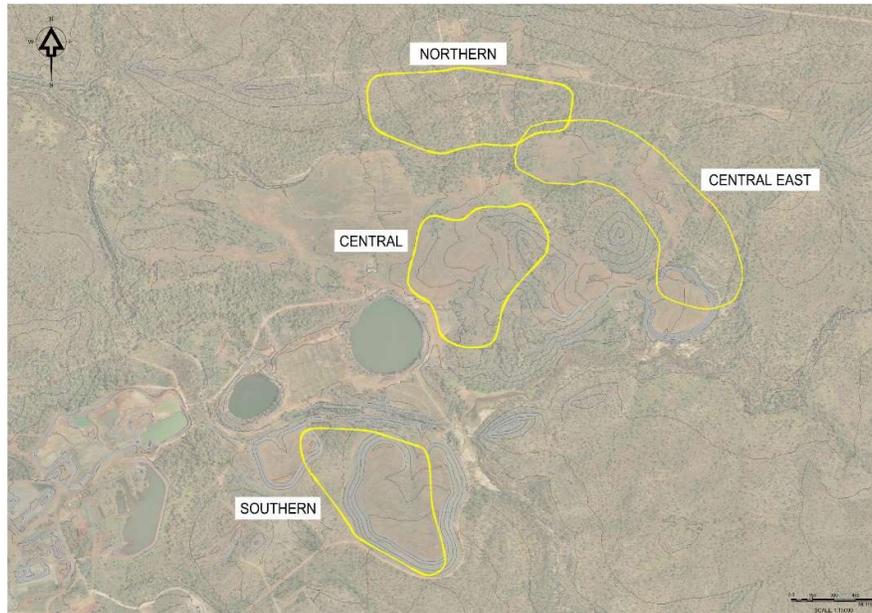


Figure 1 Potential WSF sites

3 Engineering and Environmental Assessment

3.1 Previous MCA by OKC

The OKC Baseline MCA is shown in Table 1 (note Existing = Southern site).

Table 1 OKC Baseline MCA (OKC, October 2015)

	Weighting	Northern	Central	Existing
Traditional Aboriginal Owner Acceptance and Visual Amenity	5	3	1	1
Seepage Collection and Treatment	3	2	3	1
Capital Cost	2	1	2	3
Geotechnical stability	3	1	3	3
Groundwater Contamination Risk	3	2	3	1
Surface Water Management	3	2	3	3
Disturbance and Re-vegetation	1	1	2	3
	Score	39	47	38
	comparative baseline Rank	2	1	3

A sensitivity analysis (i.e. where the weightings of each criteria were varied) was also carried out by OKC. The results, combined with the baseline MCA, clearly ruled out the southern (existing) site and noted that the central and northern sites scores were similar, and no clear alternative could be recommended (based on the information available to them at the time).

3.2 Present MCA by SLR

Building on the OKC MCA, an engineering and environmental high-level MCA has been carried out by SLR considering the northern, central and central east sites. For each criteria, the sites have been ranked qualitatively (1 = best to 3 = worst). The results are summarised in Table 2.

Table 2 High Level Engineering and Environmental MCA

Criteria	Site	Assessment	
Geotechnical	Northern	Underlain by Coomalie Dolostone, encountered as low to high strength, extremely to moderately weathered with variable profile with depth due to groundwater flow paths. Coomalie Dolostone has been known to be karstic. Geophysical surveys in the area were inconclusive but suggested some probability of localised karstic features, which may be subject to collapse under loading. Foundation collapse could compromise the integrity of the WSF landform and capping. Further targeted investigation recommended to validate findings.	3
	Central	Area predominantly underlain by Geolsec formation, described as haematitic breccia, and encountered as extremely to moderately weathered, of extremely low to moderate strength with depth. Geolsec formation is susceptible to weathered soil bands and pockets. Southern portion is underlain by Whites Formation described as calcareous and carbonaceous pyritic mudstone/siltstone, dolomitic mudstone and rare quartzite, and encountered as extremely weathered, extremely low strength becoming readily more competent with depth. Whites Formation is subject to acid generation if exposed and allowed to oxidise. Some foundation compression may occur under WSF loading, but this would predominantly during construction phase and differential settlement is not expected in the long term. It will be important to set back the toe of the WSF an appropriate distance from the Main Pit to ensure it does not influence instability of the Main Pit wall.	1
	Central East	Area is underlain by Coomalie Dolostone (northern portion), Whites Formation (Central portion) and Geolsec Formation (southern portion). The northern portion has been previously stripped of soil deposits (used as borrow). Filter cake from previous rehabilitation works has been backfilled into the borrow area. Surface deposits comprise of weathered bedrock of variable strength and weathering with depth. There is potential for foundation collapse in the dolostone, which could compromise the integrity of the WSF landform and capping. Further targeted investigation recommended to validate findings. Some foundation compression may occur under WSF loading, but this would predominantly during construction phase and differential settlement is not expected in the long term.	2
Groundwater contamination risk	Northern	Dolostone has high copper attenuation properties, which is highly favourable as foundation material, as it will mitigate any contaminant load reaching the East Branch Finnis River (EBFR).	1
	Central	Haematitic breccia has less copper attenuation ability than the dolostone, however modelling (RGC, November 2019) indicates that the attenuation will be sufficient to reduce contamination to below the locally derived water quality objectives (LDWQO) in the EBFR.	3

Criteria	Site	Assessment	
	Central East	The dolostone unit in the north is highly favourable. The rock units in White and Geolsic Formations in the central and southern areas, respectively, have less copper attenuation ability than the dolostone, however modelling (RGC, November 2019) indicates that the attenuation will be sufficient to reduce contamination to below the LDWQO in the EBFR.	2
Surface water and flood conditions	Figure 2 shows the extent of flooding expected on site (after realignment of the EBFR) for a 1:1,000 year flood event (SLR, 2020).		
	Northern	Southern and western toes of the WSF could be impacted by flooding. Substantial bunding along these toes would need to be constructed for protection.	3
	Central	South-west corner toes could be impacted, minor bunding would need to be installed for protection.	1
	Central East	North-west and south-east toes could be impacted, minor bunding would need to be installed for protection.	2
Vegetation disturbance	Northern	Undisturbed, full vegetation clearance required.	3
	Central	Disturbed, no clearance required.	1
	Central East	Predominantly disturbed however some clearance will be required.	2
<i>In situ</i> buried contaminated soils	Northern	Not applicable	3
	Central	Radiation soils is located beneath footprint. Burying these beneath the WSF would be very beneficial.	1
	Central East	Filter cake from previous rehabilitation and water treatment is located beneath footprint. Burying these beneath the WSF would be very beneficial.	2
Visual amenity	Northern	Large dump on relatively flat ground, observable from all parts of site.	3
	Central	Visible from Main Pit but can be shaped to integrate with adjacent hillside.	2
	Central East	Not visible from Main Pit and can be shaped to surrounding hillsides.	1
Access to Dysons WRD		It has been identified that the use of Dysons WRD as an 'oxygen scavenging' layer beneath the WSF capping will provide additional risk mitigation for AMD (RGC & Jones, 2019). Therefore, ongoing access to Dysons WRD will be required throughout the construction.	
	Northern	No impact.	1
	Central	No impact.	1
	Central East	Construction must commence at the northern end.	3
SUMMARY OF SCORES	Northern	Total = 17	3
	Central	Total = 10	1
	Central East	Total = 14	2

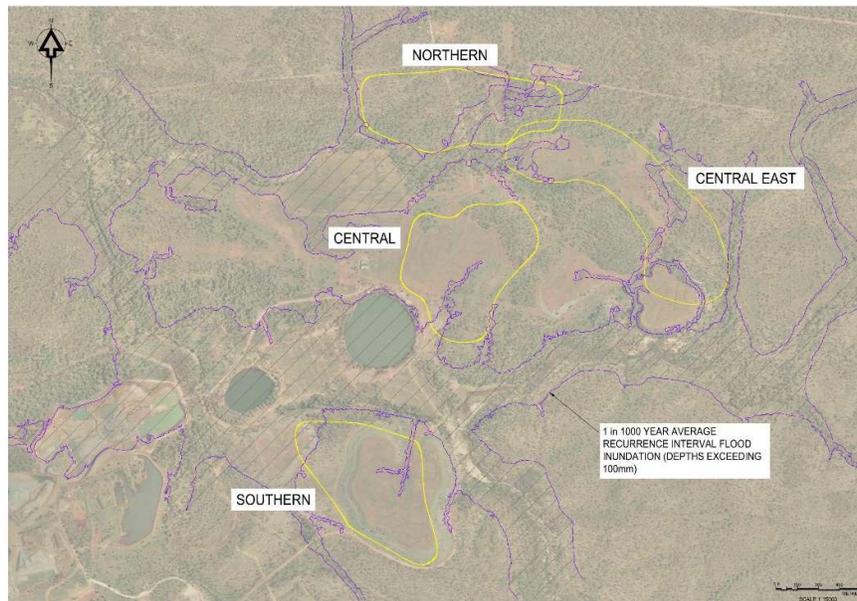


Figure 2 Areas Represented by Hatched Purple Lines Indicate Extent of 1:1,000 Year Flooding

4 Traditional Owner Requirements

The location of the WSFs must also meet Traditional Owner requirements. These include:

- Avoidance of identified sacred sites and objects (as shown on the AAPA certificate issued in October 2019 – not included here as it is culturally sensitive);
- Minimal disturbance of large cycads; and
- No disruption of the site line between 2 sacred sites (nominated on AAPA) – meaning that a maximum height of RL 98m AHD should be maintained.

It is understood that DIPR presented the options of the northern, central and central east locations to the Traditional Owners over a period of several months in 2019, including site visits with interested parties and Darwin and Batchelor based workshops, with agreement being reached that the central and central east locations were acceptable locations.

5 Recommendation

It is recommended that the central site be developed as first priority, with any remaining capacity requirements developed at the central east site, however refinement of block modelling would be required to optimise material haulage and thus reduce costs. No development at the northern site is recommended. In addition to the criteria discussed above, key considerations for the footprint development will be to ensure:

- Appropriate set back from the Main Pit to allow ongoing access for cultural reasons and geotechnical limitations; and
- Appropriate set back from riverine areas.

6 Bibliography

- OKC. (October 2015). *O'Kane Consultants - Rum Jungle WSF Location - Mult-Criteria Analysis*.
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Checked/
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