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Dear Belinda

Tropicana Gold Project - Sandhill Dunnart Assessment Additional Information for DEC

Supplementary information is sought by Department of Environment and Conservation (DEC) on the habitat parameters of each of the study sites listed in Table 1 of Sandhill Dunnart survey of the Proposed Operational Area and Infrastructure Corridors of the Tropicana Gold Project (Gaikhorst and Lambert 2008). Additional information includes vegetation structure, canopy cover, *Triodia* species present and percentage of *Triodia* coverage at each of the Sandhill Dunnart study sites within the operational area and infrastructure corridors (Pinjin and Bypass). The additional data is presented below in a revised *Table 1 - Results of ground truthing potentially suitable sites*. The additional information is discussed below.

Vegetation Structure

Further information was obtained on the vegetation structure at each site. A botanist visited all sites and described in more detail the vegetation structures present.

Canopy Cover

During the site visit the canopy cover was estimated over a 100 m^2 at each site. This is represented as a percentage of cover over the study location.

Triodia Species

Triodia basedowii is the only species of *Triodia* recorded at the sites.

Percentage of *Triodia* cover over sites.

Percentage of *Triodia* cover over the study sites was estimated based on 100 m^2 study area at each site and the amount of *Triodia* cover represented as a percentage.

Gaikhorst and Lambert (2008) discussed habitat types of areas where Sandhill Dunnarts had previously been captured by the consultants in the Great Victoria Desert, however the difference between prime and sub-prime habitat was not made clear. On the 26th October 2009, DEC staff, Belinda Bastow, Felicity Donaldson and Sue Churchill discussed prime versus sub-prime habitats at a meeting.

Prime habitat

Prime is core habitat that is functional and able to meet all the needs of a breeding population. Prime habitat has the highest likelihood of supporting a current population and therefore the highest likelihood of sampling. Note that actual sampling events are rare (high trap effort is usually required), even in the presumed best areas of habitat in the GVD.

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1. The most significant factor for prime Sandhill Dunnart habitat in Western Australia's yellow soil plateau of the Great Victoria Desert is *Triodia* quality. *Triodia* needs to be approximately 70-100 cm in diameter and be within life stages 2-3.5. *Triodia* can be smaller in some areas however patches of suitable spinifex that are connected, within the Sandhill Dunnart's home range, are required. The percentage of *Triodia* cover ranges between 10 – 70 % at capture sites. In Western Australia one historical capture occurred at lower *Triodia* coverage, however details of the surrounding area are not known and it is likely the animals were moving through, between prime habitat areas. *Triodia* species at Western Australia's capture sites tend to be *T. basedowii*, however *Triodia* type seems to vary with captures in South Australia with Sandhill Dunnarts occurring in *T. irritans, T. scariosa* and *T. lanata* communities. Factors influencing the quality of spinifex in an area are fire, rainfall, disturbance and it's positioning in the landscape.
2. An additional feature of prime Sandhill Dunnart habitat in Western Australia's yellow soil plateau of the Great Victoria Desert is the presence of, or an association with, sand dune systems which are usually yellow or yellow /orange in colour. Soils that are yellow to yellow/ orange tend to be a sandy substrate while red soils have more clay and rock content. Red soils also have Mulga association which is not the typical vegetation community of Sandhill Dunnarts.
3. Vegetation communities where Sandhill Dunnarts have been captured in Western Australia's yellow soil plateau of the Great Victoria Desert are tall and low open mallee (<10-30%), mixed shrub lands of 10-30% cover or a combination of both mallee and shrub land. Marble gums (*E. gongylocarpa*) may also be present (<10%). As mentioned previously *Triodia* is required at 10-70% cover. Particular plant species (those found on the yellow soil plateau) don't appear to be important to Sandhill Dunnarts, rather it is the combination of cover they provide for the species that is significant.

Churchill (2009) describes similar vegetation structure within prime habitats, however includes red/orange and orange soils over mixed topographies as additional landform.

Likely Habitat

Likely: Meets the majority of the needs of a breeding population. The area may contain small, disjunct areas of prime habitat within a matrix of lower quality habitat. Medium likelihood of successful sampling.

1. Similar to prime habitat but may have areas of open or very open shrub layers on yellow/orange to orange sandy loams. The percentage of *Triodia* may vary over the site and the quality varies observing more life stage 1 and 4-5 clumps. The area will have connectivity to prime areas and would be used opportunistically for feeding and nesting.
2. Regenerating recent burn areas that lie next to prime areas may also be considered as likely habitat as the animals may move between or utilise these areas for feeding.
3. The area may have connectivity to sand dunes but may also consist of sand plain.

Churchill (2009) recognises likely habitat as having a broader array of vegetation communities on orange-yellow soil on flats and sand plains.

Marginal Habitat

Marginal: Sandhill Dunnarts my opportunistically use marginal habitat, but they will not often live in it. Marginal habitat may be used for movement between patches of higher quality habitat, or for foraging if adjacent to appropriate cover/ breeding habitat. Low likelihood of successful sampling.

1. Burnt lands that do not have the suitable sizes of *Triodia* plants that Sandhill Dunnarts are able to utilize. This is more of an issue where large areas have been burnt with no mosaic pattern, leaving little connectivity to other areas or small remnant patches in which animals can persist.
2. Red soil plains don't appear to hold Sandhill Dunnart populations. Several areas have been trapped: around the north-west corner of Queen Victoria Springs Nature Reserve, Lake Rason, eastern edge of the Western Australia's yellow soil plateau and several small red soil areas within the region, and these have not produced animals. The red soil also tends to support groves of Mulga which appear not to be part of the vegetation community where Dunnarts have been captured.

Churchill (2009) recognises these areas a having a similar description of vegetation community to likely habitat however these areas are primarily associated with orange sandy loams on flats.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Project Area								
Site 1A	647873	6761994	South facing slope of sand dune. Reddish sand.	Open *E. gongylocarpa* / *Callitris* woodland (<10%) over open hummock grassland (10 - 30%) with sparse mixed open shrub layer dominated by *Leptospermum* sp (<10%). The surrounding area is Mulga over *Aluta maisonneuvii* with canopy cover of ~30%. *Triodia basedowii* is a mix of small, well formed clumps plus some older dying from the middle outwards, 60% cover <3m in diameter at life stages 2, 3 and 3.5.	20 - 30 years	Likely	1 4 Trapping nights 56 Pit-nights 80 Elliott-nights	The area to the east of Site 1 grids had too much mulga, and the remainder was too recently burned, particularly along the southern edge, to be considered typical of Sandhill Dunnart habitat. However, as the vegetation gets older, it may become more typical and warrant investigation at a later date.
Site 1B	649551	6762077	North facing slope of sand dune. Orange/red sand.	Open *E. gongylocarpa* woodland (<10%) over open hummock grassland (10 - 30% cover), with a sparse open shrub layer dominated by Acacia (10 - 30%). Canopy cover ~10% *Triodia basedowii* clumps reasonably sized but fairly poor quality, 25% cover ~60cm in Diameter of life stages 3 and 4.	15 - 20 years	Likely	1 4 Trapping nights 56 Pit-nights 80 Elliott-nights	

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 2A	650753	6761308	North facing slope of sand dune. Orange/red sand.	Tall open *E. trivalvis* (<10%) with emergent *E. gongylocarpa* over open hummock grassland (10 - 30%). Mixed low open shrub layer dominated by *Acacia* (<10%). Canopy cover ~10%. *Triodia basedowii* still fairly small, but scattered throughout were some good sized clumps that were quite compact, 45% cover, senescing population, life stages 2 and 3.	15 years	Likely	1 4 Trapping nights 56 Pit-nights 80 Elliott-nights	Most of the area surrounding the Site 2 grids had been too recently burned (5 – 10 years) to be considered typical of Sandhill Dunnart habitat. However, as the vegetation gets older, it may become more typical and warrant investigation at a later date.
Site 2B	650732	6762140	North facing slope of sand dune. Orange sand.	Tall open *E. trivalvis* (<10%) over open hummock grassland (10 - 30%) with low open shrub layer dominated by *Acacia* and *Leptospermum* (10 - 30%). Canopy cover ~15%. Large compact *Triodia basedowii* , 45% cover, senescing population, life stages 3 and 3.5.	At least 30 years	Likely	1 4 Trapping nights 56 Pit-nights 80 Elliott-nights	Site 2B was an isolated dune surrounded by mulga, but was considered possibly Sandhill Dunnart habitat due to the large dense Spinifex clumps with good over-storey.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 3	652500	6761500	Sand ridge Orange sand	Transitional Mallee/Mulga Woodland over *Triodia basedowii* Canopy cover ~25%. *Triodia basedowii* 25% cover, senescing population, life stages 4 and 5.	At least 30 years	Marginal	0	Vegetation too old to be considered typical of Sandhill Dunnart habitat
Site 4A –	649850	6758163	South facing slope of sand dune. Orange/red sand.	Low open mixed shrubland (10 - 30%) dominated by *Acacia* with the occasional *E. trivalvis* and *E. gongylocarpa* over very open hummock grassland (10 - 30%). Canopy cover ~10%. Reasonably sized Spinifex, but not very compact. *Triodia basedowii, 60% cover,* senescing population, life stages 3.5 and 4.	20 years	Likely	1 4 Trapping nights 56 Pit-nights 80 Elliott-nights	The area north of Site 4 had been too recently burned to be typical of Sandhill Dunnart habitat however, as the vegetation gets older, it may become more typical and warrant investigation at a later date.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 4B –	650261	6758532	North facing slope of sand dune. Orange/red sand.	Tall open *E. trivalvis* (<10%) with emergent *E. gongylocarpa* over open hummock grassland (10 - 30%) and a low open shrublayer (<10%). Canopy cover ~15%. *Triodia basedowii* of mixed sizes. 60% cover of 60-80 cm in diameter at life stages 2, 3 and 4.	10 years	Likely	1 4 Trapping nights 56 Pit-nights 60 Elliott-nights	
Site 5A –	646844	6762594	North facing slope of sand dune. Red sand.	*E. gongylocarpa* / *Callitris* woodland (<10%) over open hummock grassland (<10%) with a low open Acacia shrublayer (<10%). Canopy cover ~15%. *Triodia basedowii* in large open rings (some 2m in diameter with odd scattered small compact clumps at 40% cover, life stages 2, 3, 4 and 5.	20 - 30 years	Marginal	1 4 Trapping nights 56 Pit-nights 60 Elliott-nights	Most of the area surrounding the Site 5 grids had been burnt within the last 5 – 10 years, so was not considered typical of Sandhill Dunnart habitat. However, as the vegetation gets older, it may become more typical and warrant investigation at a later date. Neither of the trapping grids were particularly typical either, as

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 5B –	646894	6762662	South facing slope of sand dune. Red sand.	*E. gongylocarpa* woodland with *Callitris* (<10%) over open hummock grassland (10 - 30%) and a mixed open *Acacia* shrub layer (10 - 30%). Canopy cover ~5%. *Triodia basedowii* some quite small with 30-50cm diameter, 45% cover, life stages 2 reaching 3.	10 years	Marginal	1 4 Trapping nights 56 Pit-nights 60 Elliott-nights	
Site 6 –	645000	6767000	Dune complex. Yellow/orange sand.	Based on recent burn history, difficult to describe vegetation. Primarily Mulga. Canopy cover ~40%. *Triodia basedowii,* 25% cover life stage 1.	5 - 10 years	Marginal*	0	There were isolated patches of young burnt and approximately 30 years unburnt habitat, but these were considered too old to support a Sandhill Dunnart population. Although this site is not currently typical of Sandhill Dunnart habitat, as the burnt vegetation gets older, it may warrant investigation at a later date.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 7 –	647000	6766500	Dune complex. Yellow/orange sand. Stony ridge and protruding into dune field.	Based on recent burn history, difficult to describe vegetation. Area on edge of Mulga area with canopy cover ~30%. *Triodia basedowii,* 20% cover life stage 1 but healthy population.	5 - 10 years	Marginal*	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant investigation at a later date.
Site 8 –	644000	6762000	Dune system. Yellow sand.	Based on recent burn history, difficult to describe vegetation. Appears to be transitional Mulga/Mallee woodland over *A. maisonneuvii*, *Baeckea sp. GVD* and *G. juncifolia*. Canopy cover ~10%. *Triodia basedowii,* 30% cover, ~25 cm in diameter at life stage 1.	5 – 10 years	Marginal*	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant further investigation.
Pinjin Infrastructure Corridor								
Site 9 (Map 2)	646853	6758371	Dune system. Yellow/orange sand.	*E. gongylocarpa* and *A. burkittii* woodland over *E. forrestiana*. Canopy Cover ~15%. *Triodia basedowii*, 45% cover with 15-80cm diameter at life stages 2 and 3.	At least 10 – 15 years	Likely	0	Although this area is typical of other Sandhill Dunnart capture sites, it was right on the edge of the 400m buffer zone, and if the road corridor stays within the 100m proposed zone, this area would not be disturbed.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 10 (Map 2)	645608	6757362	Small sand ridge. Yellow/orange sand.	Based on recent burn history, difficult to describe vegetation. But appears to be *E. leptopoda* and *A. maisonneuvii* woodland over *Sida sp*. Canopy cover ~15% *Triodia basedowii,* 35% cover at life stage 1.	5 – 10 years	Marginal*	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant further investigation.
Site 11 (Map 2)	645368	6757096	Dune system. Yellow/orange sand.	Based on recent burn history, difficult to describe vegetation. But appears to be Mulga with Canopy cover ~30%. *Triodia basedowii,* 25% cover with mixed sizes of 15-30 cm diameter at life stage 1.	5 – 10 years	Marginal*	0	
Site 12 (Map 3)	642000	6752500	Small sand dune. Yellow sand.	Based on recent burn history, difficult to describe vegetation. Regenerating *E. gongylocarpa, C. artemisiodes ssp, filifolia*. Canopy cover ~5%. *Triodia basedowii,* 40% cover at life stage 1.	5 – 10 years	Marginal*	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant investigation at a later date.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 13 (Map 3)	640090	6752272	Small sand dune. Yellow sand.	Based on recent burn history, difficult to describe vegetation. Appears to be *A. aneura over E. forrestiana*. Canopy cover ~5%. *Triodia basedowii,* 25% cover at life stage 1. However odd scattered plants at ~80 cm in diameter and ~40 cm high.	5 – 10 years	Marginal*	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant investigation at a later date.
Site 14 (Map 3)	638321	6751991	Extensive dune. Yellow sand.	Based on recent burn history, difficult to describe vegetation, but appears to be mainly Mulga woodland. Canopy cover ~15%. There are also long unburned areas with hummocks of poor quality. *Triodia basedowii,* 40% cover at life stage 1, patches of 5.	5 – 10 years plus patches of long unburned	Marginal*	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant investigation at a later date.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 15 (Map 3)	636894	6752081	Sand dune. Yellow sand.	Transitional woodland of *E. gongylocarpa* and *A. aneura*. Canopy cover ~10%. *Triodia basedowii,* 50% cover, ~30 cm diameter life stages 1,2,3,4 and 5 (but very patchy).	At least 30 years, with patches of more recently burned vegetation.	Marginal*	0	Although this area had patches of habitat similar to other Sandhill Dunnart capture sites, it was considered too fragmented to warrant trapping. It was also right on the edge of the 400m buffer zone, and if the road corridor stays within the 100m proposed zone, this area would not be disturbed. As the vegetation of the burnt areas gets older, it may warrant investigation at a later date.
Site 16 (Map 3)	635374	6751924	Sand dune. Yellow sand.	*E. youngiana* over *G. juncifolia.* Canopy cover ~10%. *Triodia basedowii,* 30% cover, 30 cm diameter not compact enough to be typical, life stages 4 and 5.	At least 30 years	Marginal	0	This area had been too long unburned to be considered typical of Sandhill Dunnart habitat.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 17A (Map 3)	633985	6751806	North facing sand dune and associated sand plain. Yellow/orange sand.	Low open *E. gongylocarpa* woodland (<10%), with some *Callitris* and *E. trivalvis* over open hummock grassland (10 - 30%), with a mixed open shrub layer (<10%) including *Grevillea*. *Triodia basedowii*, 25% cover, some quite good up to 50 cm diameter, many large broken rings with bare sand in the middle, although quite good big compact clumps, life stages 3, 4 and 5.	At least 30 years	Likely	1 7 Trapping nights 98 Pit-nights 100 Elliot-nights	The area of dune to the east of the Site 17 grids has been burned within 5 – 10 years, and although not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant investigation at a later date. The area of dune to the west of the Site 17 grids, Although this area had patches of habitat similar to other Sandhill Dunnart capture sites, it was considered too fragmented to warrant trapping.
Site 17B (Map 3)	634294	6751894	North facing sand dune. Yellow/orange sand.	Tall open *E. gongylocarpa* and *E. leptopoda* (<10%) over open hummock grassland (10 - 30%). Mixed shrub layer including *A. maisonneuvii* and *Baeckea sp GVD* (<10%). Canopy cover ~10 %. *Triodia basedowii,* 45% cover large broken rings with bare sand in the middle (up to 2m) to quite good big compact clumps 40 cm in diameter, life stages 3, 4 and 5.	At least 30 years	Likely	1 7 Trapping nights 98 Pit-nights 100 Elliot-nights	

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 18 (Map 5 - 6)	619743 6738383 TO 617447 6738383		Extensive dune system. Yellow sand.	Based on recent burn history, difficult to describe vegetation. Transitional woodland of *E. gongylocarpa, Callitris* and *A. aneura*. Canopy cover ~10%. *Triodia basedowii,* 35% cover, 30 cm in diameter, life stage 1.	5 – 10 years plus patches a little older.	Marginal*	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant investigation at a later date.
Site 19A (Map 6)	618076	6738570	South facing sand dune. Yellow/orange sand.	Low open *E. gongylocarpa and E. youngiana* (<10%), over open hummock grassland (10 - 30%), with a tall open shrub layer (<10%) dominated by *Casuarina*, with some *Acacia* and *Xanthorrhoea*. Canopy Cover 5%. *Triodia basedowii,* 20% cover, with many large rings with bare sand in the middle, although good compact clumps as well, life stages 3, 4 and 5.	At least 30 years	Prime	1 6 Trapping nights 84 Pit-nights 100 Elliot-nights	The remainder of Site 19 surrounding the trapping grids was also quite typical of Sandhill Dunnart habitat, however we consider the area to have been sufficiently sampled.

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 19B (Map 6)	618244	6738669	South facing sand dune. Yellow/orange sand.	*E. gongylocarpa* over *Callitris sp., Casuarina sp* shrub layer (<10%) over open hummock grassland (10 - 30%), with a mid shrub layer dominated by *Leptospermum* (<10%). Canopy cover 5%. *Triodia basedowii,* 30%, with many large rings with bare sand in the middle, although quite good compact clumps of 20-30 cm in diameter, life stages 3, 4 and 5.	At least 30 years	Prime	1 6 Trapping nights 84 Pit-nights 80 Elliot-nights	
Site 19C (Map 6)	618387	6738711	South facing sand dune Yellow/orange sand.	*E. gongylocarpa and E. youngiana* (<10%) over hummock grassland (10 - 30%), with a low shrub layer of mostly *Grevillea sp.* and *Acacia sp.*, *L. desertii* with some *Xanthorrhoea sp.*(<10%). *Triodia basedowii,* 30% cover, in some areas in good condition and size, and quite compact 20-30 cm in diameter, life stages 3 and 3.5.	15 - 20 years	Prime	1 6 Trapping nights 65 Pit-nights 80 Elliot-nights	

Map Reference	Centre Easting	Centre Northing	Landform	Vegetation condition/description	Approximate years since fire	Potentially suitable habitat (Prime, Likely, Marginal)	Number of trap grids set up	Comments
Site 19D (Map 6)	618563	6738730	South facing sand dune. Yellow/orange sand.	Low open *E. gongylocarpa* and mallee woodland (<10%) over open hummock grassland (10 - 30%) and *G. juncifolia* and *C. todii*. Canopy cover 10% *Triodia basedowii,* 30% cover, in good condition and size, 40 cm in diameter, life stages 3 and 3.5.	15 – 20 years	Prime	1 5 Trapping nights 70 Pit-nights 80 Elliot-nights	
Site 20 (Map 12)	564000	6712000	Isolated sand dune	Based on recent burn history, difficult to describe vegetation. Transitional woodland of *E. gongylocarpa* and Callitris sp. *Triodia basedowii,* 25% cover, < 25 cm diameter life stage 1.	0 – 5 years	Marginal*	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant investigation at a later date.
Site 21 (Map 16)	539000	6702000	Isolated sand dune	Based on recent burn history, difficult to describe vegetation. Transitional woodland of mallee and mulga. Canopy cover 15%. *Triodia basedowii,* 40% cover, 40 cm in diameter life stage 1.	0 – 5 years	Marginal	0	Although this site is not currently typical of Sandhill Dunnart habitat, as the vegetation gets older, it may warrant investigation at a later date.

Note: Site coordinates represent a central point of the potential habitat.

* Represents sites that are too recently burned to currently be considered typical of Sandhill Dunnart habitat, but which may have potential in another 5 – 10 years

Fire History estimation

In Gaikhorst and Lambert (2008) fire age was estimated for each of the study sites. Estimates were based on information from databases such as Sentinel fire history and Landgate fire scar data. However this data is limited and only available between 1995 to 2009. Beyond this data set, timeline fire activity at each site was estimated. Field surveys determined that fire scar information presented as a block polygon (from Sentinel and Landgate) fails to take into account fire scar runs or spot fires ahead of the main fire scar, limiting the usefulness of the fire information. Because of this, field estimates were made on the history of the fire scars within each study site using the polygon data but also allowing for observations made on the ground, particularly those that sat on the edge of fire scaring. Regrowth of previously burnt areas will vary across sites depending on environmental factors such as rainfall, positioning in the landscape and fire intensity. Therefore, predictions of fire history may be influenced and skewed by environmental factors. Fire scar data is presented in Table 2, comparing our estimates in *Table 1 - Results of Ground truthing at potentially suitable sites* (Gaikhorst and Lambert 2008) with Landgate data dating back to 1995. This data is also presented in Figure 1 as polygons within the operational and infrastructure corridors. The ground-truthed and trapping sites are also represented.

Small or mosaic fires in the GVD are potentially good for Sandhill Dunnart populations. This is due to the available habit that remains around the burn scar as long as the remaining *Triodia* patches are of a suitable structure. The main concern regarding Sandhill Dunnart habitat fires is the occurrence of large unchecked fires that remove large areas of habitat such as those in years 1996-1997, 1999, 2003, 2005, 2006 and 2007 (see Figure 1).

Another concern with fires is the frequency with which they occur on a specific area of habitat. If fire frequency is too often then *Triodia* patches cannot reach the optimum size suitable for Sandhill Dunnart habitation. Due to the limited dataset timeframes that were used to generate Figure 1, there is limited information on repeat-fire frequency across to surveyed area. However, overlap can be seen between the 1997/1998 and 2007 fires.

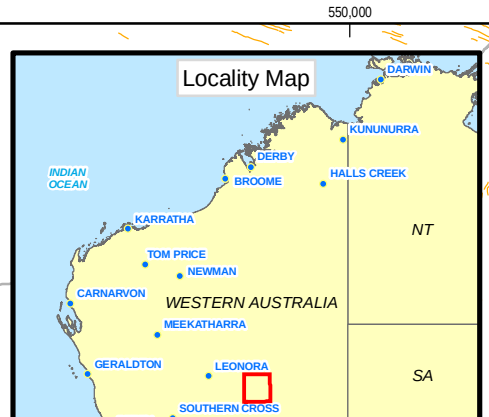
Table 1 Comparison between Gaikhorst and Lambert (2008) fire predictions and Landgate data (2009).

Site	Gaikhorst and Lambert (2008) Predictions	Fire History (Years) Data from Landgate 2009.	Comments
1A	20-30 years	1996 to 1997 (11-12 years)	This site sits on the boundary of long unburnt habitat and a burn in 1996 to 1997 (11-12 years age). The study area is in a small patch with 'No Data' (pre 1995) This means the best accurate prediction of fire scar for site 1A is greater than 13 years.
1B	15-20 years	1996 to 1997 (11-12 years)	This site sits on the boundary of long unburnt habitat and a burn in 1996 to 1997 (11-12 years age). The study area is in a small patch with 'No Data' (pre 1995) This means the best accurate prediction of fire scar for site 1B is greater than 13 years.
2A	15 years	1996 to 1997 (11-12 years)	Probably accurate and burnt 11-12 years.

Site	Gaikhorst and Lambert (2008) Predictions	Fire History (Years) Data from Landgate 2009.	Comments
2B	30 years	1996 to 1997 (11-12 years)	This site sits on the boundary of long unburnt habitat and a burn in 1996 to 1997 (11-12 years age). The study area is in a small patch with 'No Data' (pre 1995) This means the best accurate prediction of fire scar for site 2B is greater than 13 years.
3	30 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 3 is greater than 13 years.
4A	20 years	1996 to 1997 (11-12 years)	This site sits on the boundary of long unburnt habitat and a burn in 1996 to 1997 (11-12 years age). The study area is in a small patch with 'No Data' (pre 1995) This means the best accurate prediction of fire scar for site 4A is greater than 13 years.
4B	10 years	1996 to 1997 (11-12 years)	Probably accurate and burnt 11-12 years.
5A	20-30 years	1996 to 1997 (11-12 years)	This site sits on the boundary of long unburnt habitat and a burn in 1996 to 1997 (11-12 years age). The study area is in a small patch with 'No Data' (pre 1995) This means the best accurate prediction of fire scar for site 5A is greater than 13 years.
5B	10 years	1996 to 1997 (11-12 years)	Probably accurate and burnt 11-12 years.
6	5-10 years	2003 (5 years)	Probably accurate and burnt 5 years.
7	5-10 years	2003 (5 years)	Probably accurate and burnt 5 years.
8	5-10 years	On the edge of 1996 to 1997 and No data or pre 1995 (> 13 years)	This site is actually in the 1996 to 1997 (11-12 years) burn although boundaries long unburnt areas. Therefore 11-12 years is probably accurate, the area may not have received adequate rains and is under developed reflecting the low predictions.
9	10-15 years	1996 to 1997 (11-12 years)	Probably accurate and burnt 11-12 years.
10	5-10 years	1996 to 1997 (11-12 years)	Probably accurate and burnt 11-12 years, the area may not have received adequate rains and under developed reflecting the low predictions.
11	5-10 years	1996 to 1997 (11-12 years)	Probably accurate and burnt 11-12 years, the area may not have received adequate rains and under developed reflecting the low predictions.
12	5-10 years	1996 to 1997 (11-12 years)	Probably accurate and burnt 11-12 years, the area may not have received adequate rains and under

Site	Gaikhorst and Lambert (2008) Predictions	Fire History (Years) Data from Landgate 2009.	Comments
			developed reflecting the low predictions.
13	5-10 years	No data or pre 1995 (> 13 years)	This site is in an area of a small burn scar, probably from the 1996 to 1997 (11-12 years) fire in the immediate area. The fire data does not show small spot fire burnt areas. Probably burnt scar 11-12 years, the area may not have received adequate rains and under developed reflecting the low predictions.
14	5-10 years	No data or pre 1995 (> 13 years)	This site is in an area of a small burn scar probably from the 1996 to 1997 (11-12 years) fire in the immediate area. The fire data does not show small spot fire burnt areas. Probably burnt scar 11-12 years, the area may not have received adequate rains and under developed reflecting the low predictions.
15	30 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 15 is greater than 13 years.
16	30 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 16 is greater than 13 years.
17A	30 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 17A is greater than 13 years.
17B	30 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 17B is greater than 13 years.
18	5-10 years	No data or pre 1995 (> 13 years)	This site is in an area of a small burn scar probably from the 2001 (7 years) fire. The fire data does not show small spot fire burnt areas.
19A	30 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 19A is greater than 13 years.
19B	30 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 19B is greater than 13 years.
19C	15-20 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 19C is greater than 13 years.
19D	15-20 years	No data or pre 1995 (> 13 years)	There is no data pre 1995 therefore the best accurate prediction of fire scar for site 19D is greater than 13 years.

Site	Gaikhorst and Lambert (2008) Predictions	Fire History (Years) Data from Landgate 2009.	Comments
20	0-5 years	2008 (<1 year)	Accurate 1 year burn.
21	0-5 years	2008 (<1 year)	Accurate 1 year burn



550,000 600,000 650,000

6,800,000 6,750,000 6,700,000 6,650,000

RASON LAKE RD

Plumridge Lakes Nature Reserve

CENTRAL EAST GOLDFIELDS PEOPLE

Queen Victoria Spring Nature Reserve

LEGEND

- Spinifex Assessment Sites
- Road
- Sand Ridge
- Aboriginal Heritage Site
- Tropicana Gold Project Tenements
- National Native Title Boundary
- DEC Estate

Fire Scars

- July 1995 - June 1996
- July 1996 - June 1997
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- July 2007 - June 2008
- July 2008 - June 2009

1:500,000 (at A3)

0 2.5 5 10 15 20

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 51

N

CLIENTS | PEOPLE | PERFORMANCE

Tropicana Joint Venture

Historical Fire Scars July 1995 to 2009 Great Victoria Desert

Job Number 61-23549
Revision 0
Date 19 JAN 2010

Figure 1

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Data Source: GHD: Spinifex Assessment Areas - 20090925; Landgate: NOAA Fire Affected Areas: 1997 - 2006 (SLIP) - 20090924, NOAA Fire Affected Areas: 1995, 1996, 1997, 2008 and 2009 - 20091001; Landgate: Native Title (NNTT) - 20100115; DIA: Aboriginal Heritage Sites - 20100115; Department of Mines and Petroleum: Mining Tenements - 20100114; AngloGold Ashanti Australia: Sand Ridges near Tropicana Minesite - 20091110; DEC: DEC Estate - 20091217. Created by: KDIRAIU