MEMORANDUM			
TO	Alastair Trolove – Principal Environment - Energy, Mineral Resources		
FROM	Danae Snell – Environmental Consultant, Eco Logical Australia Rebecca Overs – Principal Environmental Consultant, Eco Logical Australia		
DATE	4 December 2023	PURPOSE	For Information
SUBJECT	Lockyer Conventional Gas Development Visual Impact Assessment – Summary of preliminary findings		

Energy Resources Limited (ERL), a wholly owned subsidiary of Mineral Resources Limited (MRL) are currently undertaking an environmental impact assessment for the Lockyer Conventional Gas Development (the Proposal). Eco Logical Australia (ELA) has been engaged to undertake a Visual Impact Assessment (VIA) of the proposed development on the existing views from the surrounding landscape, with particular consideration of sensitive receptors identified through stakeholder consultation and desktop assessment. A detailed VIA is currently being completed which includes the following:

- Identification and mapping of the proposed development design
- Identification of the existing visual landscape characteristics of the site and surrounds (prior to development of the Proposal)
- Assessment of the visual impact of the proposed development, through viewshed analysis and site assessment, and identification of key views of the site.

A detailed VIA report is being prepared. This memorandum provides a preliminary summary of the findings of the viewshed analysis and site assessment. It is understood this summary will be used to support a Development Application for the central processing facility (CPF) associated with the Proposal.

PROPOSAL AND SITE DESCRIPTION

ERL is proposing to construct and operate six natural gas production wells, Central and Northern Hub Sites, and a Central Processing Facility located within the Lockyer gas field. The raw gas collected from the wells will be directed via an infield gathering system to the CPF, where it will be treated and then routed to the Dampier Bunbury Natural Gas Pipeline for sale. The Proposal will include a consolidated stabilisation, storage, and offloading system to support road transport of liquid product, and additional on-site infrastructure to support the operation phase including power generation, warehousing, workshops, switch room infrastructure and accommodation buildings.

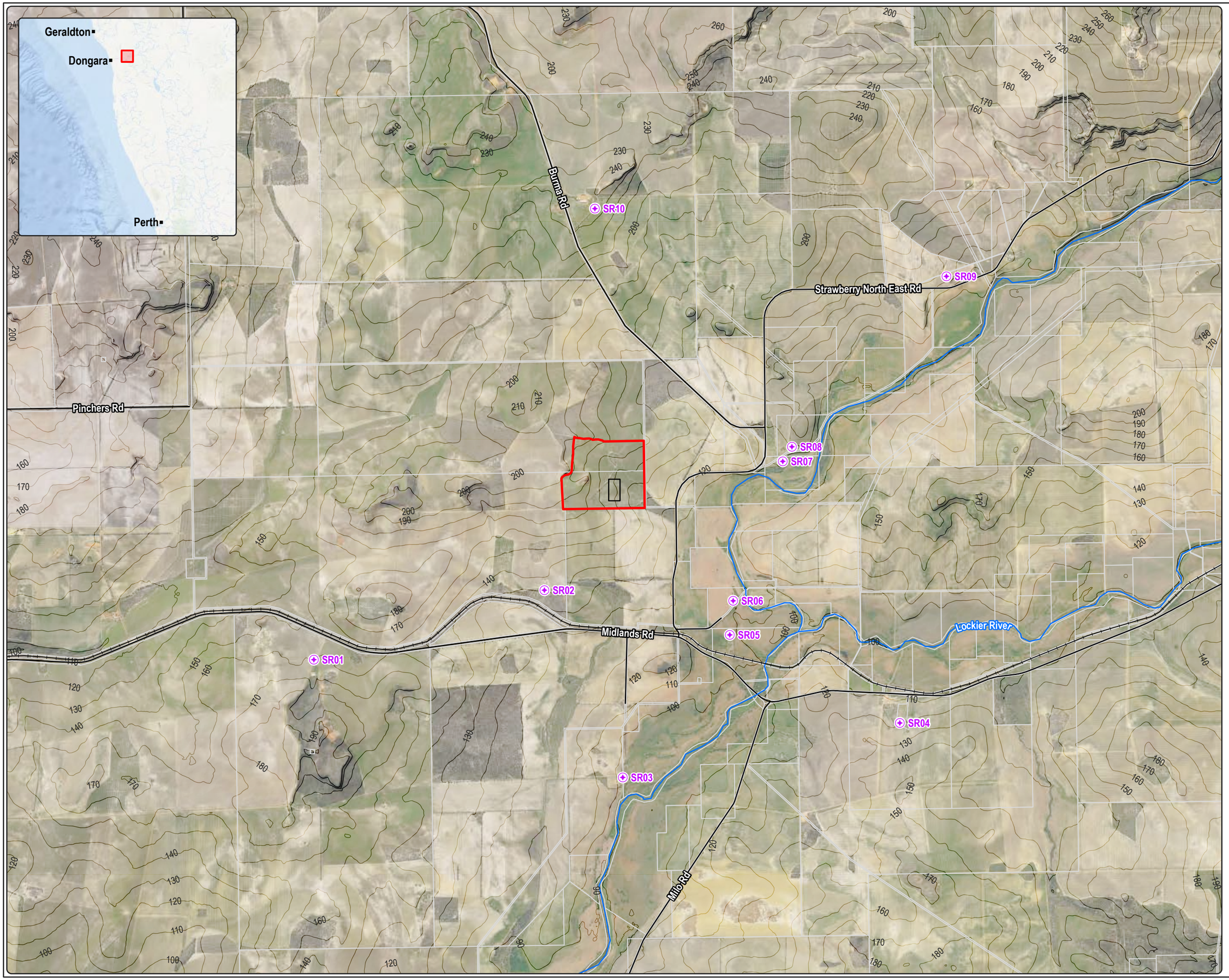
The Lockyer gas field is located in the Perth Basin approximately 350 km north of Perth, , in the mid-west region of Western Australia (Figure 1). The CPF will be located approximately 2 km north of Midlands Road, the main road between Dongara and Mingenew, approximately 18 km west of Mingenew.

The CPF and downstream pipeline network is located within the Shire of Irwin. The site is zoned as general farming land under the Shire of Irwin's local planning scheme and is within the Bundi Yamatji Aboriginal Corporation (BYAC) representative area. The main economic industry within the Shire of Irwin is agricultural farming, with additional industries including fisheries (primarily rock lobsters), mineral sands mining and oil and gas developments. The land surrounding the CPF location is currently used for broadacre agriculture with a mixture of cropping and grazing. The nearest populated centres

include Mingenew and Dongara, located approximately 18 km east and 30 km west from the CPF, respectively.

Infrastructure proposed to be constructed within the CPF, includes the following(Figure 2):

- Amine regeneration system (18 m high)
- Amine contractor tower (18 m high)
- Still column tank (18 m high)
- Thermal oxidiser (39.6 m high)
- HP/LP flare (69.7 m high)
- Other infrastructure (average 5 m high).



Legend

- Sensitive receptor
- Road
- Railway
- Watercourse
- Cadastre
- Contours 10-meter interval (mAHD)
- CPF plant boundary
- Site boundary

Figure 1
Site location

0 500 1,000 2,000
Metres

Datum/Projection:
GDA2020 MGA Zone 50

600-23PER5100 Date: 22/11/2023

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Legend

- Site layout
- Site boundary
- Cadastre

Figure 2
Site layout

0 25 50 100 150
Metres

Datum/Projection:
GDA2020 MGA Zone 50

600-23PER5100 Date: 4/12/2023

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VIEWSHED ANALYSIS – METHODOLGY AND PRELIMINARY RESULTS

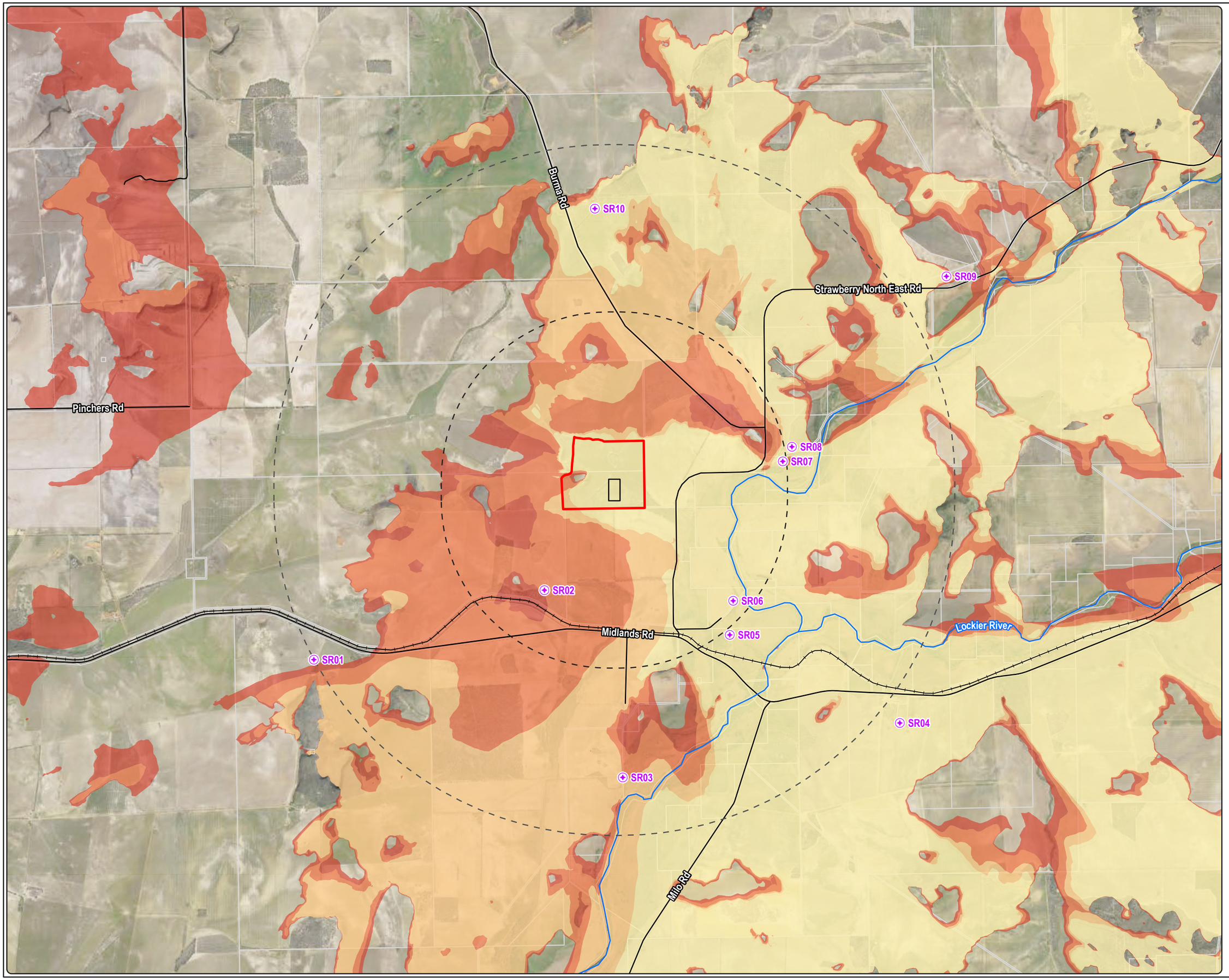
A viewshed analysis was performed using a 3-dimensionsal digital elevation model for the site and visualisation software (3DS Max) to determine which locations within the vicinity of the Proposal would have potential views of the site and to determine the viewshed or 'seen area' of key infrastructure to be located within the CPF, based on proposed maximum heights. A viewshed or 'seen area' is defined as '*a portion of the landscape that can be seen from one or more observer positions. The extent of the area that can be viewed is normally limited by landform, vegetation and distance*' (WAPC 2007).

Sensitive receptors were overlaid with the viewshed to determine whether these locations would have a view of the proposed development. The preliminary outcomes of the viewshed analysis for key infrastructure components are shown in Figure 3. In summary:

- The HP/LP flare (height 69.7 m) will be at least partly visible from nine of the ten identified sensitive receptors.
- The thermal oxidiser (height 39.6 m) will be at least partly visible from nine of the ten identified sensitive receptors
- Some or all of the amine contractor tower, amine regeneration system and still column tank (height 18 m) will be visible from eight of the ten identified sensitive receptors
- Other CPF infrastructure (average height 5 m) will be visible to varying degrees from seven of the ten identified sensitive receptors

It is noted that vegetation has not been considered at this stage of the viewshed analysis and is likely to play a role at a local scale in decreasing the 'seen area'.

Given the fact that infrastructure is likely to be viewed to varying degrees from a number of sensitive receptors and surrounding public roads, further analysis has been completed to assess the extent and nature of visual impacts at various locations within the landscape. Viewpoint analysis is described in the following section.



Legend

- Sensitive receptor
- Road
- Railway
- Watercourse

Distance from CPF plant boundary

- 2.5 km
- 5 km
- CPF plant boundary
- Site boundary
- Cadastre

Visibility analysis

- CPF plant boundary visibility (average height 5m)
- Amine contactor tower, amine regeneration system and still column tank visibility (height 18m)
- Thermal oxidiser visibility (height 40m)
- HP/LP flare visibility (height 70m)

Figure 3:
Viewshed analysis

0 500 1,000 2,000
Metres

Datum/Projection:
GDA2020 MGA Zone 50

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VIEWPOINT ANALYSIS – METHODOLOGY AND PRELIMINARY RESULTS

Based on the identified sensitive receptors, viewpoints were selected at various locations within approximately 4 km of the site, generally selected to coincide with worst case scenarios including hillcrests or gaps in roadside vegetation. Photos were taken at each of the viewpoint locations in the direction of the proposed CPF. Using 3-dimensional terrain modelling and visualisation software (3DS Max), these photos were overlayed with the location and indicative maximum height of the Proposal infrastructure to demonstrate infrastructure visibility from the various viewpoints. Each viewpoint location and montages of CPF infrastructure is shown in Figure 4 to Figure 12.

It is noted that apart from key infrastructure at heights of 69.7 m (flare), 39.6 m (thermal oxidiser) and 18 m (amine contractor tower, amine regeneration system and still column tank), other CPF infrastructure has been modelled and displayed in the viewpoint analysis figures as 5 m high rectangular block. This provides an average of the height of the majority of the facility (not including the tall towers shown separately). In reality, this infrastructure will not be in a solid block, and therefore likely visibility has been conservatively over estimated in this analysis.

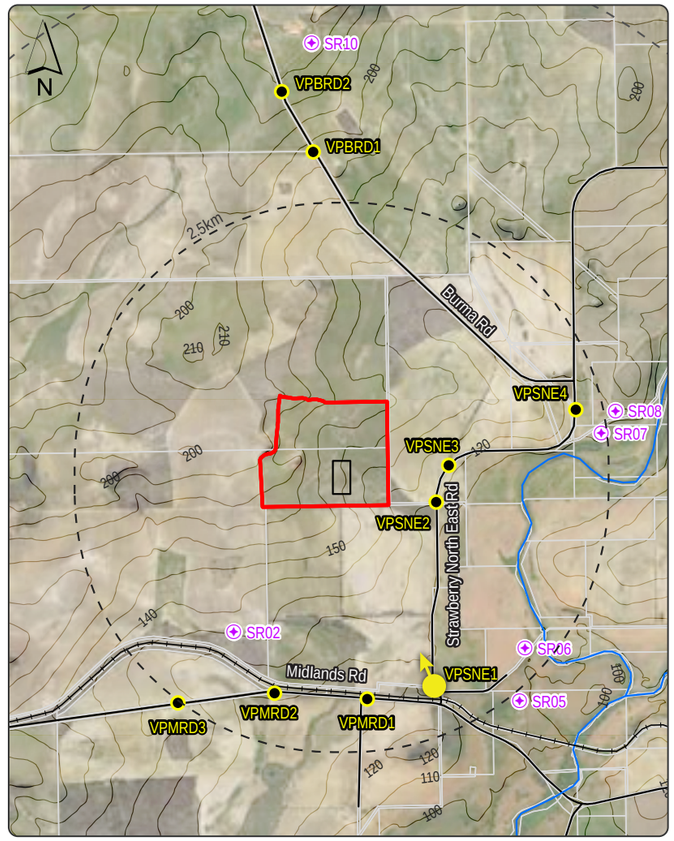
Table 1 provides a summary of whether the proposed development is likely to be visible from each of the viewpoints.

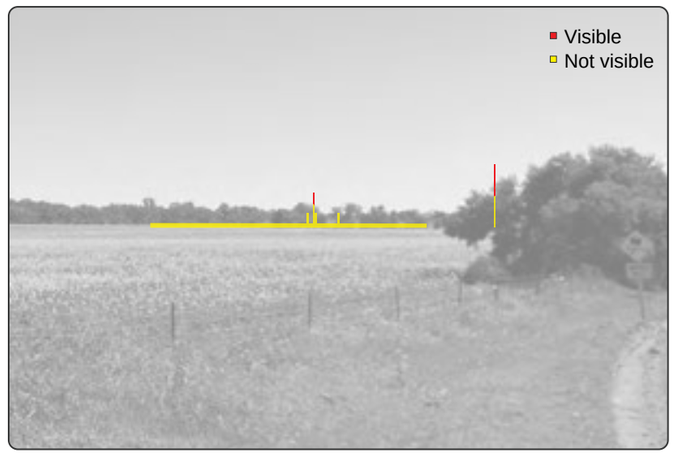
Table 1: Likely visibility of the CPF infrastructure at selected locations

Viewpoint Location	Viewpoint distance from CPF	Summary of likely visibility
Strawberry NE Road Viewpoint 1 (Figure 4)	2 km	The flare and thermal oxidiser are likely to be partially visible from this location. Other infrastructure is not likely to be visible as it lies below the tree line.
Strawberry NE Road Viewpoint 2 (Figure 5)	0.85 km	The flare and thermal oxidiser are likely to be partially visible from this location above the tree line. The bulk of the CPF is not likely to be visible as it lies below the tree line. This is the closest modelled viewpoint to the CPF.
Strawberry NE Road Viewpoint 3 (Figure 6)	1 km	The flare and thermal oxidiser are likely to be visible from this location. Other CPF infrastructure is likely to be partially visible, although it is largely obscured by vegetation or sits in front of the ridgeline lessening the visual impact.
Strawberry NE Road Viewpoint 4 (Figure 7)	2.25 km	This viewpoint is located on the nearest public road to two residences, SR07 and SR08. The flare is likely to be partially visible from this location, with the top protruding above the hill line. No other CPF infrastructure is likely to be visible above the ridge.
Burma Road Viewpoint 1 (Figure 8)	3 km	The flare and thermal oxidiser are likely to be partially visible from this location. The thermal oxidiser sits in front of the ridgeline in the horizon, reducing the visual impact. The remainder of the CPF infrastructure is not likely to be visible as it sits within the valley of the undulating surrounding hills.
Burma Road Viewpoint 2 (Figure 9)	3.75 km	This viewpoint is located on the nearest public road to a residence on Burma Road, SR10. The flare and thermal oxidiser are likely to be partially visible from this location. Each of these towers sit in front of the ridgeline in the horizon, reducing the visual impact of these features.

Viewpoint Location	Viewpoint distance from CPF	Summary of likely visibility
Midlands Road Viewpoint 1 (Figure 10)	2 km	The flare is likely to be partially visible from this location but is mostly obscured by roadside vegetation. The thermal oxidiser and other infrastructure sit behind the ridge/tree line and are unlikely to be visible.
Midlands Road Viewpoint 2 (Figure 11)	2 km	This viewpoint is located on the nearest public road to a residence on Midlands Road, SR02. The flare is likely to be partially visible from this location but is mostly obscured by roadside vegetation. The thermal oxidiser and other infrastructure sit behind the ridge/tree line and are unlikely to be visible.
Midlands Road Viewpoint 3 (Figure 12)	2.5 km	The flare is likely to be partially visible from this location. The thermal oxidiser and other infrastructure sit behind the ridge/tree line and are unlikely to be visible.

While the viewshed analysis indicates that the proposed development may be visible at a number of locations (based on topography alone), the viewpoint analysis demonstrates that existing vegetation and topography largely shields the views of the bulk of the proposed development. Where the proposed development is likely to be visible, the infrastructure is typically far away (i.e. ≥2 km) and is generally not an overwhelming feature of the view, blending in with the topographical features of the landscape such as hills and tree lines. At a number of locations, the tallest infrastructure (flare and thermal oxidiser) will be noticeable above the existing landscape and tree lines.





Thermal oxidizer (39.6m)

Flare (69.7m)

CPF Plant extent
(Average 5m height of infrastructure)

Figure 4: Indicative CPF Plant visibility
Strawberry NE Road Viewpoint 1 (2km from CPF)

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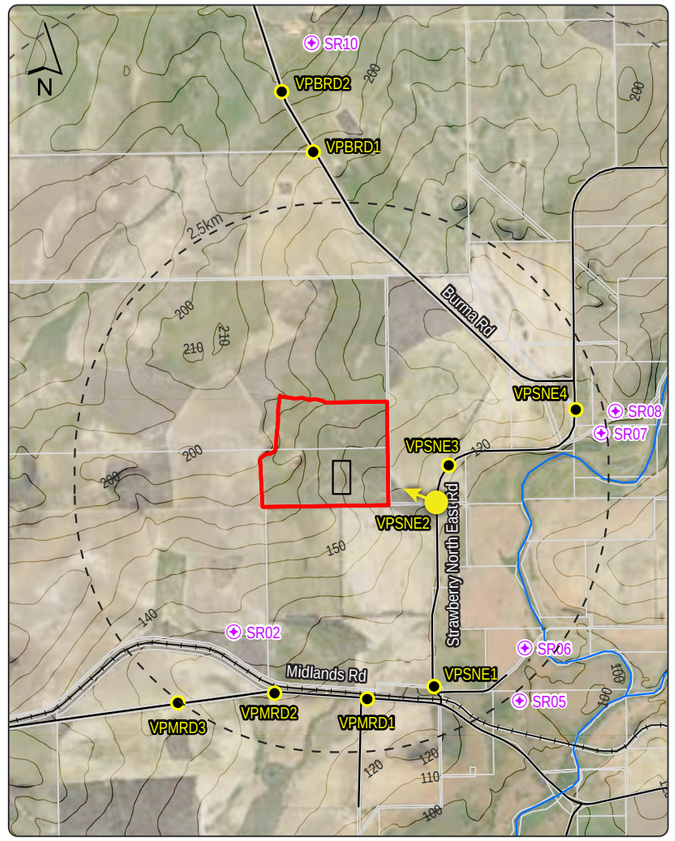

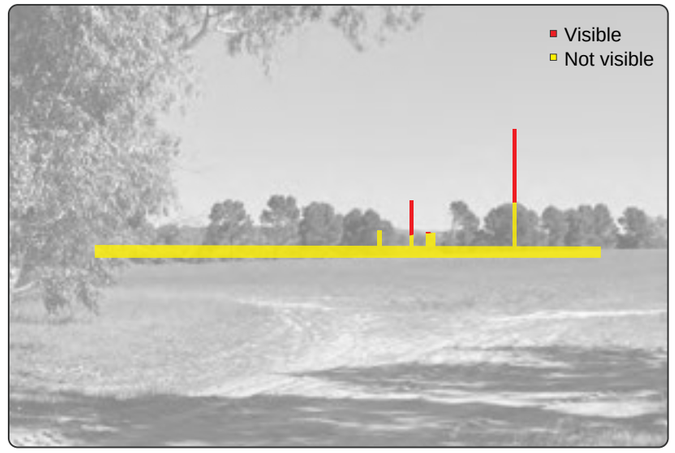

Thermal oxidizer (39.6m)

Flare (69.7m)

CPF Plant extent
(Average 5m height of infrastructure)

Figure 5: Indicative CPF Plant visibility
Strawberry NE Road Viewpoint 2 (850m from CPF)

Lockyer Conventional Gas Development
Visual Impact Assessment
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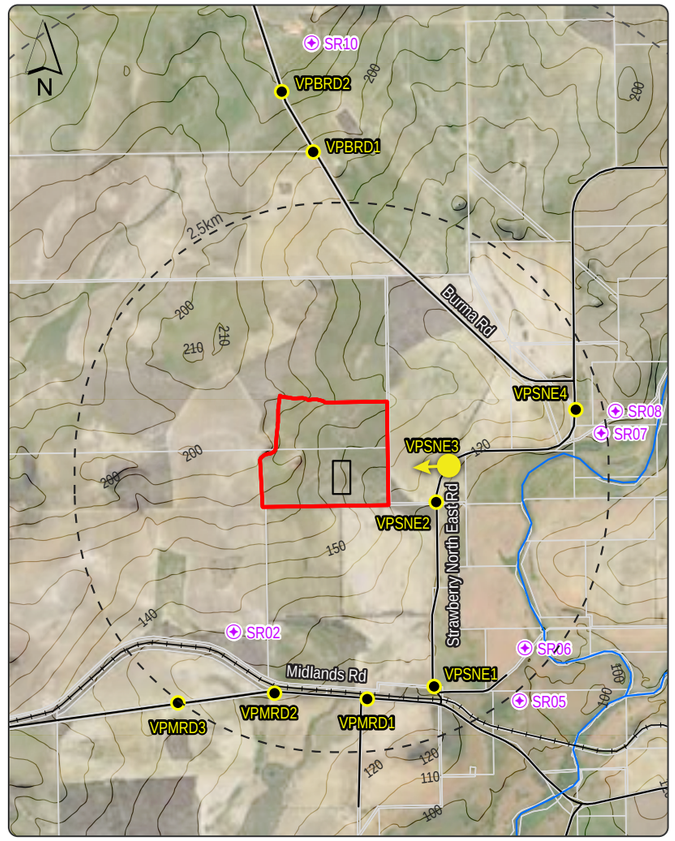

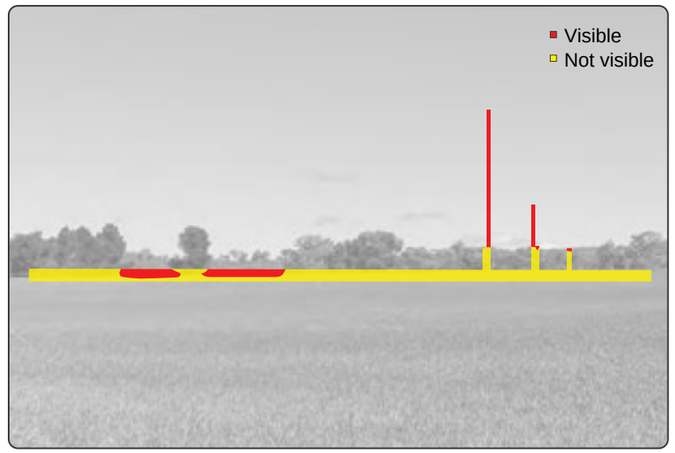

Figure 6: Indicative CPF Plant visibility
Strawberry NE Road Viewpoint 3 (1km from CPF)

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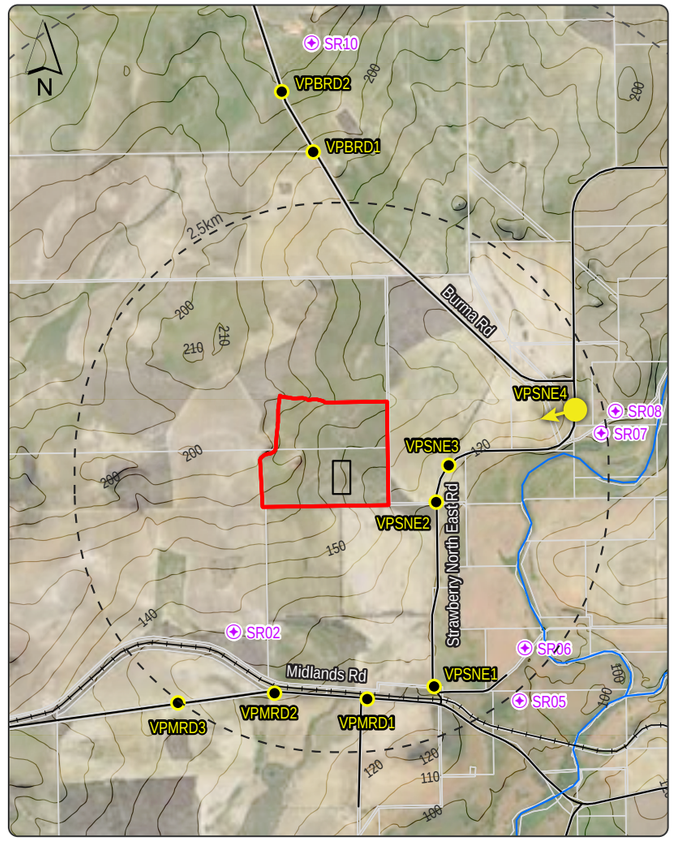

Flare
(69.7m)

CPF Plant extent
(Average 5m height of infrastructure)

Figure 7: Indicative CPF Plant visibility Strawberry NE Road Viewpoint 4 (2.25km from CPF)

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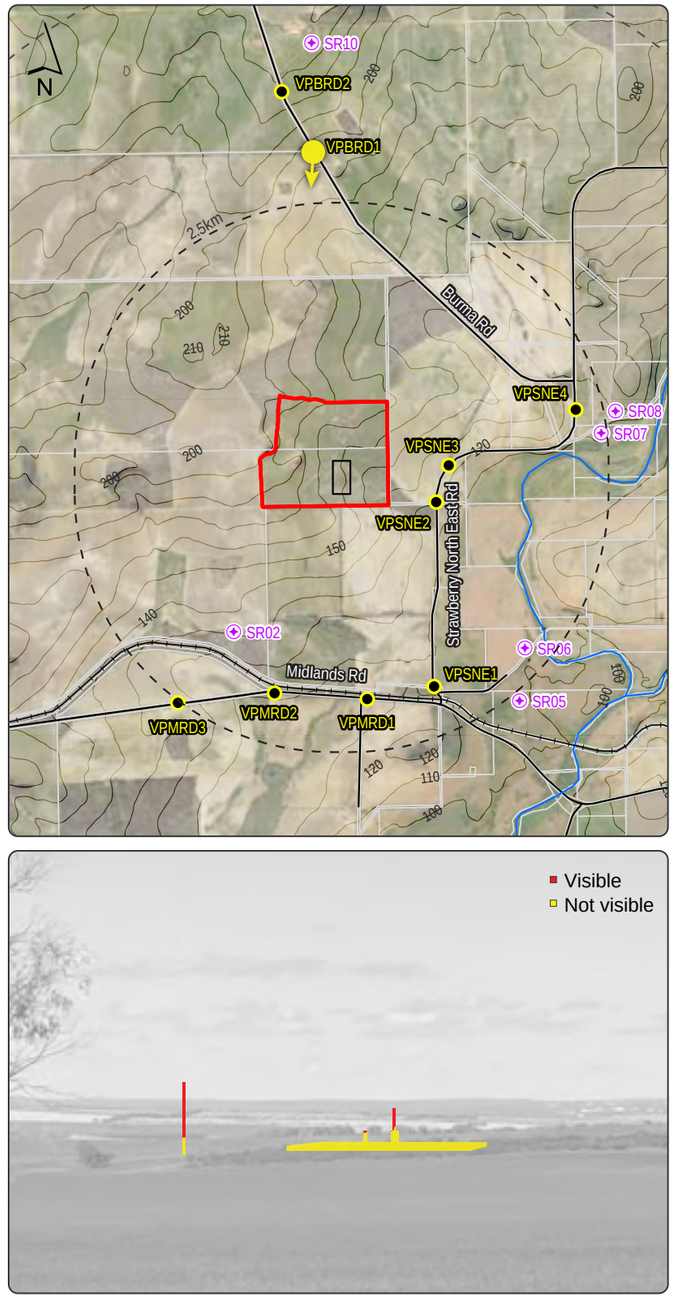

Figure 8: Indicative CPF Plant visibility
Burma Road Viewpoint 1 (3km from CPF)

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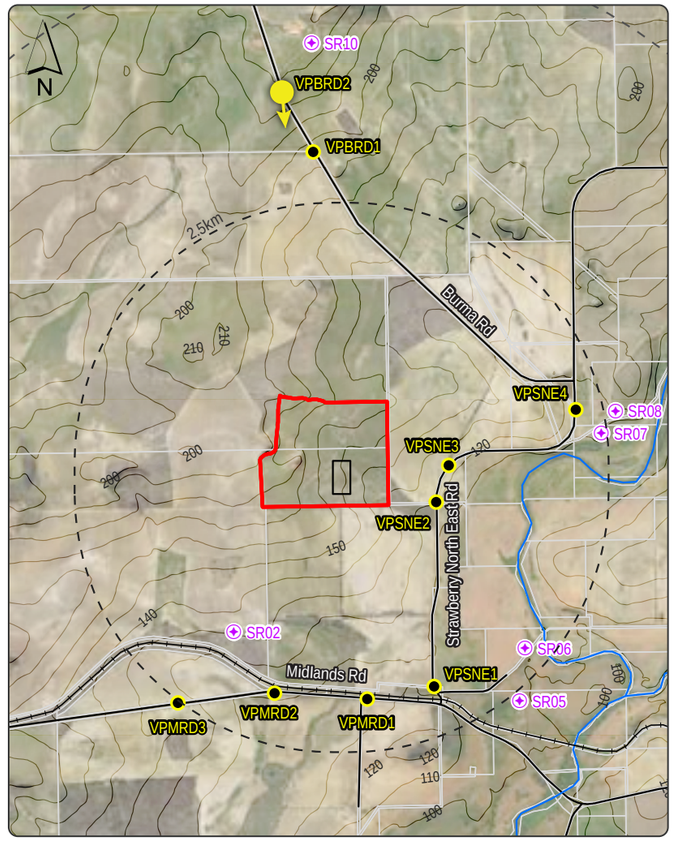

Flare (69.7m)

Thermal oxidizer (39.6m)

CPF Plant extent
(Average 5m height of infrastructure)

Figure 9: Indicative CPF Plant visibility
Burma Road Viewpoint 2 (3.75km from CPF)

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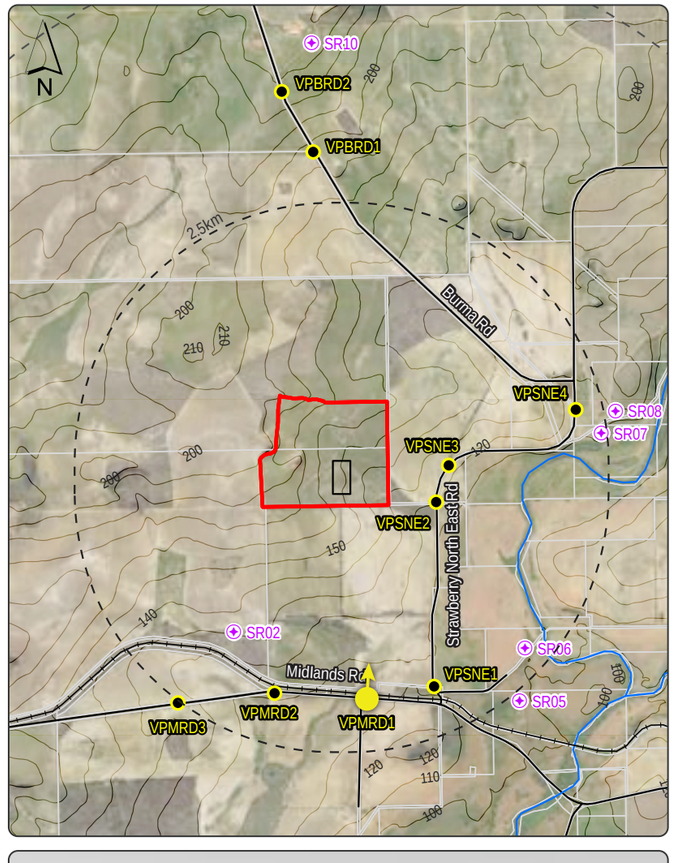

Thermal oxidizer (39.6m)

Flare (69.7m)

CPF Plant extent
(Average 5m height of infrastructure)

Figure 10: Indicative CPF Plant visibility
Midlands Road Viewpoint 1 (2km from CPF)

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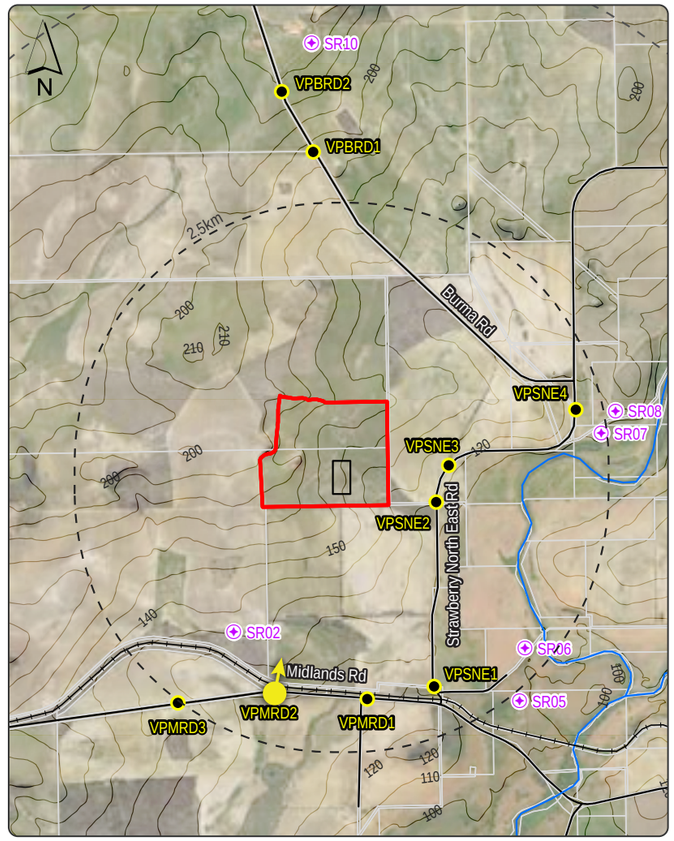

Thermal oxidizer (39.6m)

Flare (69.7m)

CPF Plant extent
(Average 5m height of infrastructure)

Figure 11: Indicative CPF Plant visibility
Midlands Road Viewpoint 2 (2km from CPF)

Lockyer Conventional Gas Development
Visual Impact Assessment
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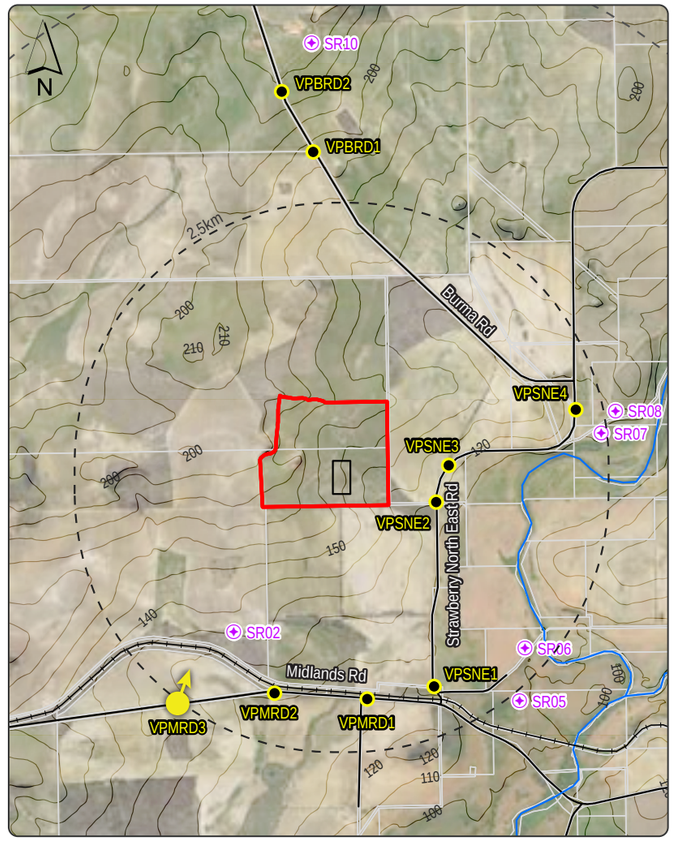

Thermal oxidizer (39.6m)

Flare (69.7m)

CPF Plant extent
(Average 5m height of infrastructure)

Figure 12: Indicative CPF Plant visibility
Midlands Road Viewpoint 3 (2.5km from CPF)

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REFERENCES

Western Australian Planning Commission (WAPC) 2007. *Visual Landscape Planning in Western Australia: A manual for evaluation, assessment, siting and design.* Available from: https://www.wa.gov.au/system/files/2021-06/ML_Visual-landscape-planning-in-Western-Australia.pdf