

Tronox Management Pty Ltd



**Osprey Mineral Sands Deposit
2024 Infill Exploratory Drilling
Clearing Permit Application **AMENDMENT**
Supporting Information**

July 2024

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1 INTRODUCTION

Tronox Management Pty Ltd (Tronox) has conducted mineral sands exploration activities in the Swan Coastal Plain sub-region and Northern Sandplains region of Western Australia (WA) since 2000. This includes the Cooljarloo Exploration Area which incorporates numerous tenements located from south of Cataby in the south to near Jurien Bay in the north.

Tronox plans on undertaking exploratory drilling on tenement M70/1413 in Q3 2024. M70/1413 is immediately adjacent to the existing Cooljarloo mine on M70/1398.

1.1 Application overview

Tronox Management Pty Ltd (Tronox) is seeking approval TO AMEND CLEARING PERMIT CPS 10481 to clear and additional **0.07 hectares**. CPS 10481 was granted in June 2024 and allows clearing of **0.63 ha** remnant native vegetation in order to undertake infill exploratory drilling at the Osprey Deposit on M70/1413, immediately adjacent to the existing Cooljarloo Mineral Sands Mine (M70/1398).

1.2 Environmental Approvals

1.2.1 Clearing permit

CPS 10481 was lodged in January 2024 and granted in June 2024. This permit allows clearing of **0.63 ha** remnant native vegetation in order to undertake infill exploratory drilling at the Osprey Deposit on M70/1413.

CPS 10352 was lodged in October 2023 and granted in June 2024. This allows clearing of **0.75 ha** remnant native vegetation in order to undertake infill exploratory drilling at the Osprey Deposit on M70/1413. A review shortly after CPS 10841 was granted identified a gap between CPS 10352 and CPS 10841, refer to Figure 1. The gap is between 9m and 13m in length.

Tronox is applying to amend CPS 10481 to fill the gaps.

In addition, field reconnaissance has identified that three proposed drill lines approved for clearing under CPS 10352 will require widening to allow for the track to deviate around trees so tree clearing can be avoided, refer to Figure 2.

Figure 1 CPS 10481 and 10352 Gaps



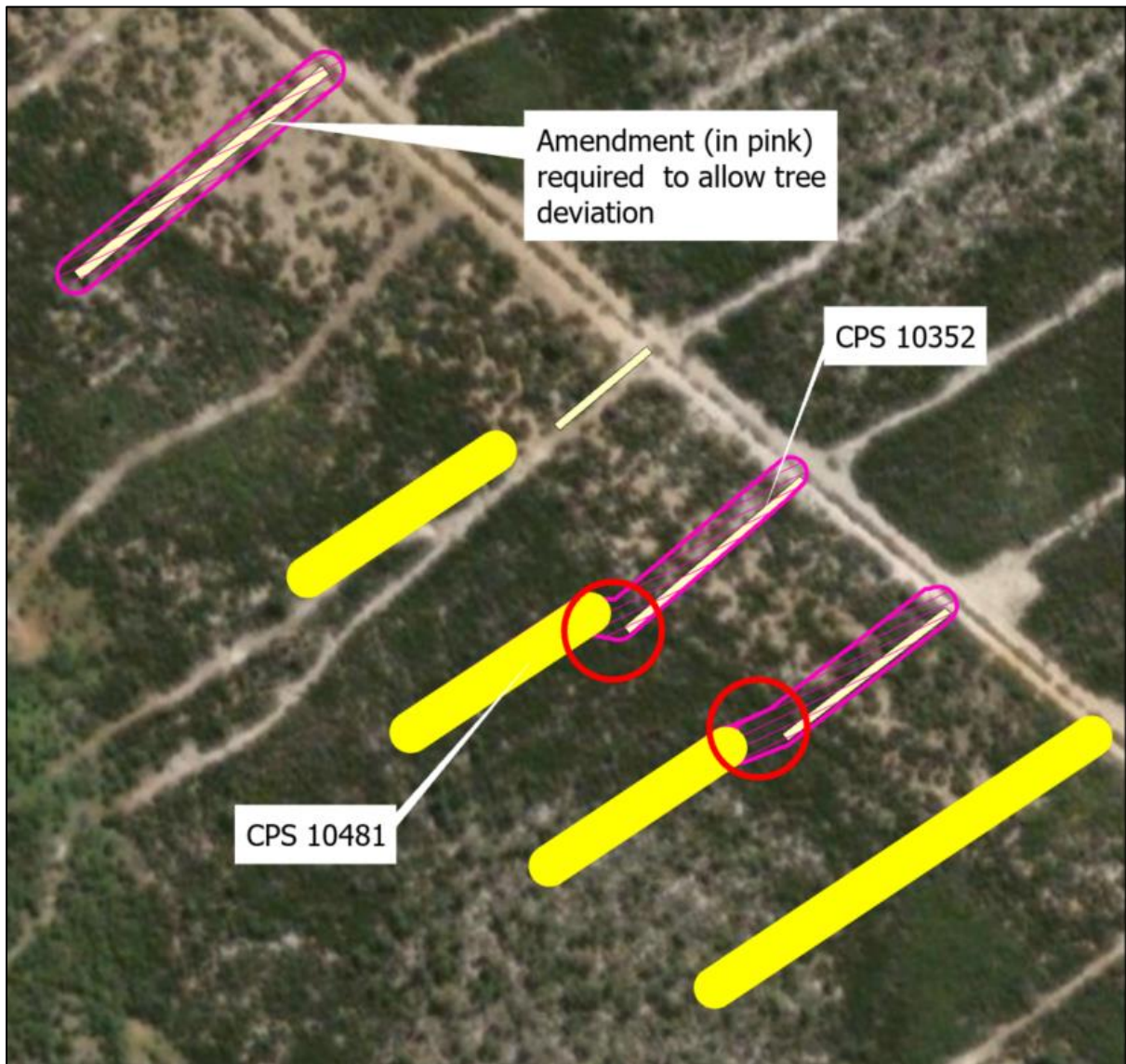
Figure 2 CPS 10481 additional areas

Figure 2 outlines three additional areas highlighted in pink. Tronox is requesting these three areas be incorporated into CPS 10481. The majority of these pink area has already been approved for clearing under CPS 10352.

Accordingly, whilst the purpose permit area is requested to be increased by 0.23 hectares, the additional clearing is 0.07 hectares, of which 0.05 has already been approved. The net increase in vegetation clearing sought is 0.02 hectares.

No additional Priority Flora are within the additional purpose permit area.

There are no TECs or PECs in the additional area proposed (Umwelt, 2024).

2 EXISTING ENVIRONMENT

2.1 Land Use

The land of the Osprey tenement (M70/1413) is remnant vegetation on unallocated crown land. The land is largely undisturbed apart from:

- exploratory drilling tracks
- 4WD / motorbike tracks
- Apiarist access tracks

Surrounding land use is unallocated crown land and mining.

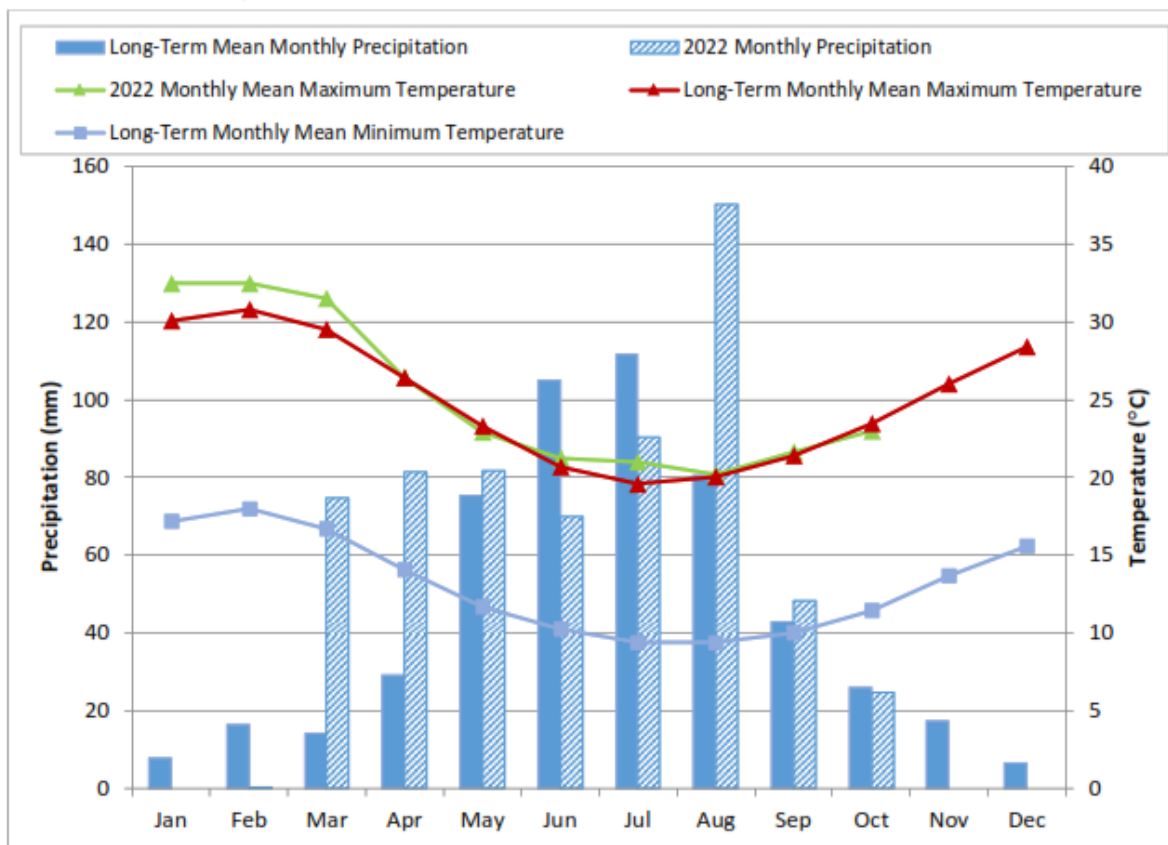
The land of the Osprey tenement (M70/1413) has minimal disturbance and is in very good condition.

2.2 Climate

The Osprey tenement is located on the northern edge of the Swan Coastal Plain sub-region in the southwest of WA, near the southern border of the Northern Sandplains region (Beard 1990). The Swan Coastal Plain subregion is equivalent to the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) region, while the Northern Sandplains region is equivalent to the Geraldton Sandplains IBRA region (Commonwealth of Australia 2012). The area experiences a dry, warm Mediterranean climate with predominantly winter rainfall (300 – 500mm) and 7 to 8 dry months per year (Beard 1990).

Figure 4 presents key climatic information from Jurien Bay station (Bureau of Meteorology 2022), the most relevant meteorological station to the Osprey tenement recording long term (and 2022) data.

Figure 3 Monthly Temperature and Precipitation Data for Jurien Bay



(Source: BoM, 2022 in Umwelt, 2023).

2.3 Vegetation and Flora

2.3.1 Vegetation

Shepherd et al. (2002) mapped and described vegetation system associations in WA related to physiognomy, expanding on mapping originally undertaken by Beard (1974-1980). Mapping of these vegetation system associations was most recently refined in 2019 (Government of Western Australia 2019).

The 2024 Proposed Exploration program to which CPS 10481 application applied is located in the Bassendean 1030 Vegetation System Association, summarised in Table 1.

Table 1 Vegetation System Association for application area

Vegetation System Association	Description	Pre-European Extent (ha)	Current Extent (ha)	Percentage of Pre-European Extent Remaining	Percentage of Current Extent held in IUCN Class II Reserves
Bassendean 1030	Low woodland; <i>Banksia attenuata</i> and <i>B. menziesii</i>	116,062	80,191	69.1%	13.8%

Threatened Ecological Communities

No known locations of any threatened ecological communities (TECs) as endorsed by the WA Minister for the Environment are known to occur within the application amendment area (DBCA 2007-2021). A review of the most recent WA lists of such TECs indicates that no new communities have been listed as TECs that could occur in the application area (Woodman, 2023).

Woodman Environmental (2014a) found that none of the VTs mapped in the CLW Study Area represent any such State TEC. This was confirmed by Umwelt in 2024.

Priority Ecological Communities

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the priority ecological community list under priorities 1, 2 and 3. One known location of the DBCA-classified priority ecological communities (PECs) 'Banksia Woodlands of the Swan Coastal Plain' (P3) is known to occur within the general Cooljarloo area (DBCA 2007-2021). A review of the most recent lists of such PECs indicates that no new communities have been listed as PECs that could occur in the application area (Woodman, 2023).

Description of the Banksia woodlands of the Swan Coastal Plain PEC

The canopy of this PEC is most commonly dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. Other *Banksia* species that can dominate in the community are *B. prionotes* or *B. ilicifolia*. It typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands; it is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau and, in other less common scenarios. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to the State PEC (DBCA, 2023).

There is no *Banksia woodlands of the Swan Coastal Plain* PEC occurring within the amendment area.

2.3.2 Flora

Umwelt (including as Woodman Environmental) has previously undertaken numerous flora and vegetation studies within portions of the Osprey Tenement (Woodman Environmental 2006, 2009a, 2009b, 2014a, 2014b, 2015a, 2016, 2017a, 2018a, 2019, 2021; Umwelt 2022a, Umwelt, 2023, Umwelt, 2024) including baseline flora surveys and survey of drill lines for significant flora taxa.

The flora of the area is therefore considered to be relatively well known. Additional flora studies undertaken on behalf of Tronox by other companies include studies by Mattiske Consulting Pty Ltd (Mattiske) (1996, 1997, 2010, 2012, 2017), Rockwater (2008) and Astron (2013a, 2013b, 2013c). All significant flora data recorded by these surveys is held in the Tronox – Iluka Resources Ltd (Iluka) significant flora database, a jointly managed database containing records covering a large portion of the Northern Sandplains region and northern Swan Coastal Plain sub-region, for use in future planning and impact assessments.

Over 50 significant flora taxa (including Threatened flora taxa, DBCA-classified Priority flora taxa and other taxa of conservation concern) have been recorded during surveys conducted within the greater Cooljarloo area between 2000 and 2023, according to the Tronox – Iluka significant flora database alone.

Targeted Flora surveys were undertaken across the larger osprey deposit in spring 2023 (Umwelt, 2024b). This survey indicates there are no Threatened Flora or Priority Flora in the proposed amended clearing area (Umwelt, 2024b). The spring 2023 targeted flora survey report is currently in preparation. This report will be lodged on IBSA as soon as possible. It is expected to be lodged in August 2024.

2.3.3 Black Cockatoo Habitat Species

No trees that offer roosting and breeding potential for the Carnaby's Black Cockatoo will be affected by the exploration program. Only feeding habitat for this species will be affected (low heath and Banksia spp. trees); however, the impact is not considered significant as birds generally cover a wider area of the habitat; hence the local and regional impact of clearing will be low and does not require referral at a state or federal level.

The impact to Carnaby's Black Cockatoo, flora, fauna and other environmental features is considered to be low and does not require a Federal referral.

2.4 Baseline studies

Tronox has a very strong understanding of the ecology on its tenements at Cooljarloo, including Osprey.

Tronox's predecessor, Tiwest, started the Cooljarloo mine over 30 years ago. There has been continuous environmental survey activity (including botanical and zoological) on existing mine area and surrounding exploration tenements for many decades.

The bulk of the work has been undertaken by Woodman Environmental Consulting (now known as Umwelt), Bamford Consulting Ecologists and other specialised experts as required, including Mattiske and Syrinx. Many of the locations of conservation significant flora in the Cataby / Cooljarloo area due to the botanical survey effort that Tronox and Tiwest have undertaken over the years. As a demonstration of the survey efforts, a list of some (not all) key environmental studies that include the Osprey project are outlined in Table 2.

Table 2 Supporting baseline environmental surveys and investigations Osprey tenement

Factor	Local Study	Year	Study Description
Vegetation and flora	Flora survey for Cooljarloo West Exploration Drilling Programme	2007	Botanical survey along the proposed drill lines within exploration tenements EL 70/2345 and EL 70/2346 for the Cooljarloo West POW to identify whether conservation significant flora or vegetation is present within the areas likely to be impacted by the program. Field work conducted between 30 th October and 7 th December 2007. Specifically, the presence of any DRF, Priority listed or undescribed flora species was noted and describe broad habitat. Study by Rockwater
Conservation Significant Flora	Survey for <i>Schoenus</i> Species of Conservation Significance November 2007	2007	Literature review and field searches for the two <i>Schoenus</i> species in order to confirm the distribution locally and in the broader region. Study by Helena Holdings WA Pty Ltd
Vegetation and flora	Cooljarloo West Project Flora and Vegetation Assessment	2009	Structural plant community mapping commencing spring 2008. A total of 22 structural plant communities were described and mapped within the project area. Study by Woodman Environmental Consulting
Flora	Cooljarloo West Project Drilling Program 2010 Significant Flora Assessment	2010	Significant flora search of proposed drill lines within the Cooljarloo West exploration leases (E70/2345, E70/2346) to assess potential environmental impacts for a proposed exploration program and to provide information to mitigate impacts. Study by Woodman Environmental Consulting
Vegetation and flora	Flora And Vegetation Survey Of Exploration Access and Drill Lines in Cooljarloo West and Cooljarloo North West	2010	A flora and vegetation survey of the exploration access and drill lines in the Cooljarloo West and North West areas. Seven botanists from Mattiske Consulting Pty Ltd completed the surveys over six trips from September to December 2010. Study by Mattiske Consulting
Declared Rare Flora	Assessment of Rehabilitation of Declared Rare Flora Cleared Under Permits To Take (2007 To 2010)	2010	An assessment on areas of Declared Rare Flora species disturbed by clearing for exploration drill lines. The Declared Rare Flora species, <i>Andersonia gracilis</i> and <i>Macarthuria keigheryi</i> , were the subject of Permits to Take for the period between 2007 to 2010. Seven locations where either of the Declared Rare Flora species was taken were searched for regeneration of the species. Study by Mattiske Consulting
Fauna Values	Fauna Values of Tiwest's Cooljarloo West Project Area	2010	An assessment of the potential impact of the proposed mining activities on terrestrial fauna and fauna habitats of this area, based on a site inspection and review of data collected on fauna at Cooljarloo and Falcon over a period of some 20 years. Study by Bamford Consulting Ecologists

Factor	Local Study	Year	Study Description
Vegetation and flora	Cooljarloo West Titanium Minerals Project Flora and Vegetation Assessment. Unpublished report	2013	Assessment of the Cooljarloo West project area detailed vegetation mapping (report in prep) Study by Woodman Environmental Consulting
Vegetation and flora	Botanical Survey of 2014/2015 Cooljarloo Drill and Access Lines.	2013	Assessment of the potential impacts of the 2014/15 exploration drilling program, including the initial desktop review component of the works, and the subsequent field survey and impact assessment component. Study by Woodman Environmental Consulting
Vegetation and flora	Botanical Survey of 2015 Cooljarloo Drill and Access Lines.	2014	Assessment of the potential impacts of the 2015 exploration drilling program, including the initial desktop review component of the works, and the subsequent field survey and impact assessment component. Study by Woodman Environmental Consulting
Conservation Significant Flora	Cooljarloo West Project Conservation Significant Flora Risk Assessment.	2015	Assessment of the potential impacts and risks of the Cooljarloo West Project on Conservation Significant Flora Study by Woodman Environmental Consulting
Vegetation and flora	Cooljarloo Exploration Area – Exploration Environmental Assessment 2016	2015	Assessment of the potential impacts of the 2016 exploration drilling program, including the initial desktop review component of the works, and the subsequent field survey and impact assessment component. Study by Woodman Environmental Consulting
Vegetation and flora	Cooljarloo Exploration Area – Exploration Environmental Assessment 2017	2016	Assessment of the potential impacts of the 2017 exploration drilling program, including the initial desktop review component of the works, and the subsequent field survey and impact assessment component. Study by Woodman Environmental Consulting
Vegetation and flora	Review of Post-Exploration Monitoring of Threatened Flora – Cooljarloo West, Cooljarloo South-West and Dongara.	2017	Review of Post-Exploration Monitoring of Threatened Flora – Cooljarloo West, Cooljarloo South-West and Dongara Study by Woodman Environmental Consulting
Vegetation and flora	Cooljarloo Exploration Area – Exploration Environmental Assessment 2018	2017	Assessment of the potential impacts of the 2018 exploration drilling program, including the initial desktop review component of the works, and the subsequent field survey and impact assessment component. Study by Woodman Environmental Consulting

Factor	Local Study	Year	Study Description
Vegetation and flora	Cooljarloo Exploration Area – Exploration Environmental Assessment 2019	2018	Assessment of the potential impacts of the 2019 exploration drilling program, including the initial desktop review component of the works, and the subsequent field survey and impact assessment component. Study by Woodman Environmental Consulting
Vegetation and flora	Cooljarloo 2020 Exploration Areas Environmental Assessment	2020	Flora and vegetation assessment of the 2020 exploration drill lines and access tracks within three Cooljarloo Exploration Areas (CEAs): Cooljarloo South West (approx. 9.5 km south of Cataby), Cooljarloo West (15 – 20 km northwest of Cataby) and Cooljarloo North West (~15 km southeast of Jurien). The aim of the study was twofold; to identify vegetation and flora of high conservation significance, and to assess the potential impact of exploration activities on significant flora and vegetation communities. The impact to wetlands and the habitat of significant fauna species, particularly Carnaby's Black Cockatoo also needed to be addressed. Study by Syrinx
Vegetation and flora	Cooljarloo Exploration Area Exploration Environmental Assessment 2022	2021	Assessment of the potential impacts of the 2022 exploration drilling program, including the initial desktop review component of the works, and the subsequent field survey and impact assessment component. Study by Umwelt (formerly Woodman Environmental Consulting)
Vegetation and flora	Osprey and Lone South Mining Deposits	2022	Assessment of the Osprey and Lone South Mining Deposits and detailed vegetation mapping (report in prep) Study by Umwelt (formerly Woodman Environmental Consulting)
Vegetation and flora	Cooljarloo Exploration Area Exploration Environmental Assessment 2023	2022	Desktop Review and Risk Assessment, Field Survey and Impact Assessment
Vegetation and flora	Osprey and Lone South Mining Deposits	2023	Assessment of the Osprey and Lone South Mining Deposits targeted flora surveys (Umwelt, 2024a) Study by Umwelt (formerly Woodman Environmental Consulting)
Targeted Flora	Osprey Deposit	2024	Targeted Flora Assessment Osprey Project Area (Umwelt, 2024b) Study by Umwelt (formerly Woodman Environmental Consulting)

3 PROPOSED PROGRAM AND MANAGEMENT

3.1 Exploration Description

Tronox conduct mineral sands exploration activities in the Swan Coastal Plain and Northern Sandplains regions of Western Australia (WA). This includes the Cooljarloo, Cooljarloo West and Osprey Exploration Areas, which incorporates numerous tenements located from south of Cataby in the south to the vicinity of Jurien in the north.

Exploration involves:

- Clearing (in areas of native vegetation) narrow (approximately 2.4 to 2.7 m width) tracks via either a light vehicle (Landcruiser) or where required a rubber tyred loader with raised blade (at least 200mm above ground), to access drilling locations;
- drilling small diameter (~90mm) vertical holes to depths of 40-60m below ground within a light truck (canter) or Landcruiser mounted aircore rig to obtain samples for geological testing; and
- plugging the hole and backfilling above the plug.

3.1.1 Standard Pre-Exploration Assessment

The Tronox exploration Environmental Management Plan (EMP) (Tronox 2023) outlines the controls Tronox employ to manage the environmental impacts associated with exploration. The EMP requires an assessment of the potential impacts of exploration drilling programs on significant flora (including Threatened flora) and vegetation communities and other matters of environmental significance, to identify how such impacts may be avoided or minimised during exploration. The assessment involves:

- Desktop review and risk assessment, to determine if field survey of proposed exploration drill lines and access tracks is required, and the appropriate approach to such a survey, accounting for significant flora, significant vegetation communities and other matters of environmental significance;
- Field survey in areas where it was determined to be required in the desktop review;
- Application of the impact mitigation hierarchy to ensure impacts on significant flora, significant vegetation communities and other matters of environmental significance are avoided or minimised; and

Assessment of potential impacts of the proposed exploration.

Tronox's methods for survey outlined in the EMP (Tronox 2023) have been agreed with DBCA and the Department of Minerals and Petroleum (DMP) (now Department of Mines, Energy, Industry Regulation and Safety [DEMIRS]). Exploration lines (either drill lines or access tracks) are surveyed to a width of 10 m, and the centreline of the surveyed area is clearly flagged, such that it can be followed by personnel clearing the exploration lines. The centreline is also generated as a GPS track. When commencing or crossing a major access route (e.g. public road, major track), a dog-leg is established to attempt to obscure the entrance to the exploration line. If Threatened flora taxa are encountered, survey is extended to a 20 m width, with all individuals within this width recorded with a GPS. All individuals within the 10 m survey width are clearly flagged, so that their location is obvious to personnel clearing the exploration lines.

Following this, the possibility of avoiding all Threatened flora individuals by deviating the exploration lines is investigated. Deviations with a buffer of 50 m from the nearest Threatened flora individual are initially surveyed, with the centreline of the deviation flagged. If a 50 m deviation is not possible because further Threatened flora individuals are encountered, a deviation with the largest buffer possible within 50 m of the nearest Threatened flora individual is investigated. Any individuals within 10 m of the deviation centreline are clearly flagged, so that their location is obvious to personnel clearing the exploration lines.

If it is not possible to deviate around all Threatened flora individuals, a line of least impact is adopted, with the goal of avoiding as many individuals as possible. Individuals deemed likely to

be impacted are counted for the purposes of impact assessment, and to support an application for a Permit to Take Threatened Flora.

3.1.2 Standard Clearing Description

The EMP (Tronox 2023) outlines the approach Tronox employ to minimise clearing and general ground disturbance during exploration. Both the centreline of the exploration line and all Threatened flora individuals are clearly flagged, to ensure that no Threatened Flora individuals are inadvertently impacted outside the surveyed area, and individuals within the surveyed area are obvious to machine operators and can be avoided where possible. GPS tracks of the centreline of the survey area for each exploration line are provided for use by personnel clearing the exploration lines to clarify the survey area, particularly in the event that flagging is not visible (e.g. has been removed or has fallen off).

The following practices outlined in the EMP to enable machine access to exploration lines while minimising clearing and general ground disturbance are adhered to:

- avoiding clearing by machinery driving over vegetation where this can be achieved safely (heath areas and open woodland where trees can be avoided); or
- where clearing is required (i.e. in areas of dense thicket or woodland), clearing approximately 2.7 m width via loader with a raised blade/bucket avoiding disturbance of topsoil.

When vegetation is driven over, the topsoil remains intact, the seed remains in-situ, the plant root ball remain intact and the vegetation will continue to grow when the program has been completed. In most instances the vegetation is not killed.

By adhering to these practices, impacts on Threatened flora individuals identified as likely to be impacted during survey are potentially further minimised, as driving over individuals may cause only minor damage depending on the individual taxon.



Plate 1 Example of exploration track with minimal disturbance

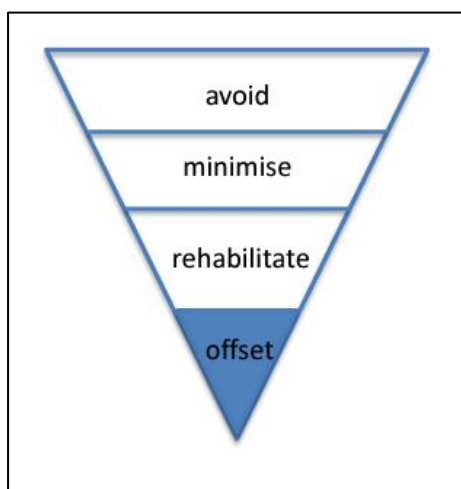
3.1.3 Standard Drilling Completion

Once exploration activities are completed, exploration lines are generally left to re-grow naturally and are not re-used, except in the case of some access tracks where they are intended for use as access to future exploration lines. Continued use by third parties is managed by the establishment of dog legs at major access routes, and obscuring the track entrance with materials such as fallen branches and logs post exploration.

3.2 Mitigation Hierarchy

The impact mitigation hierarchy will be implemented for the proposed clearing.

Figure 4 Mitigation Hierarchy



3.2.1 Avoidance Strategies

The 2024 Osprey drill program is for infill exploratory drilling on a fine scale, with the objective of providing very detailed data on the ore body extent. Accordingly, alternative locations for the drill heads are not feasible. Where possible, existing tracks and cleared areas will be utilised instead of clearing new areas.

Focusing the drill program in late summer and autumn and avoiding the drill program in winter and spring reduces the impacts on annual species and spring flowering.

The following actions will be taken to avoid impacts:

- Avoid creating new tracks where existing tracks can be used.
- Avoid trees and large woody shrubs by driving around them
- Avoid topsoil disturbance by driving over the top of with light vehicles
- Avoid Vegetation rootstock disturbance by driving over
- Avoid creating drill pad, drill holes establish in the track
- Avoid main flowering season (late winter / spring)
- Avoid tracked-vehicle usage for exploration programs (rubber tyres only)
- Avoid drilling in the wet season as per Dieback Management Plan
- No threatened flora disturbance
- Vegetation which comprises an ecological link between significant remnants will be avoided (the land parcel is not highly cleared and significant large intact remnants are present).



Plate 2 Example of exploration drill rig which avoid large scale clearing by driving over and around vegetation instead of removal

3.2.2 Minimisation Strategies

Where impacts cannot be avoided in full, the following actions will be taken to minimise impacts:

- Where there no existing tracks, vegetation will be driven over, not removed. This methodology leaves the root stock and topsoil intact and removes the need to strip, stockpile and respread topsoil.
- Access width minimized to 2.6 – 2.7 m wide to accommodate a vehicle width (less than the DEMIRS low impact width of 4 m).
- Drill program undertaken in dry season in accordance with the project Dieback Management Plan to minimise dieback risks.
- Significant foraging habitat for Carnaby Black Cockatoo will be avoided (by avoiding trees and large woody shrubs).
- Minimise impacts to annual species by not drilling in the main growing season (winter).



Plate 3 Example of exploration track impact minimised by narrow track width

3.2.3 Rehabilitation

The area proposed for the drill tracks will be disturbed temporarily. The following actions will be taken to rehabilitate clearing impacts:

- the disturbance to vegetation proposed is temporary only
- as the rootstock and topsoil remain in-situ, natural regeneration will follow
- no vegetative material will be removed, accordingly seed stock will remain in-situ
- access ways to be blocked to prevent repeated access where practicable
- rehabilitation to be completed in accordance with program of work requirements
- Tronox exploration drilling in past years indicates the vegetation has recovered within an average of 18- 24 months.

Rehabilitation aims to restore the environmental values as reasonably practicable. As the exploration drill program does not disturb topsoil or root balls, water table, and does not remove vegetation from the immediate area, including seed, the rehabilitation success is strong.



Plate 4 Example of exploration track with rehabilitation

3.2.4 Offsets

Offsets are required when residual impacts are determined to be significant after avoidance, minimisation and rehabilitation have been pursued. Based on the efforts to avoid, minimise and rehabilitate, Tronox's assessment indicates there are no significant residual impacts from this proposal. Accordingly, offsets are not proposed for this scope.

4 REHABILITATION RESEARCH AND MONITORING

Monitoring post-exploration activities for rehabilitation success has been conducted by several different environmental consultancies since 2007 (Woodman Environmental 2007a, 2012, 2016a, 2017a; Mattiske 2011a, b; Western Botanical 2013). The work of these studies is reviewed and summarised in *Review of Post-Exploration Monitoring of Threatened Flora Cooljarloo West, Cooljarloo South West and Dongara* (Woodman, 2017b).

Available data from monitoring programs, as well as a one-off assessment of the regeneration of vegetation along their exploration lines, provides a strong indication that exploration activities have had limited ongoing impacts on the Threatened flora taxa included in the review, and their broader habitat (Woodman, 2017b).

Where there has been a direct impact on Threatened flora taxa and their habitat during exploration, all of the taxa directly impacted (except *Paracaleana dixonii*) have been recorded as recolonising cleared exploration lines, and the vegetation that constitutes their habitat has progressed rapidly towards a state similar to adjacent vegetation, particularly in the case of exploration lines that have been burnt (Woodman, 2017b).

Although *Paracaleana dixonii* had not been recorded as recolonising cleared exploration lines at monitoring locations reviewed by Woodman (2017b), it has been recorded on several historical exploration lines, fire breaks and other tracks. There also do not appear to have been any indirect impacts on Threatened flora taxa or in the project area and habitat adjacent to exploration lines; this includes the introduction of weeds.

Data from the monitoring programs was reviewed as was the one-off assessment of the regeneration of vegetation exploration lines by Woodman (2017b). This review indicates that Tronox's clearing practices, as controlled by the EMP, have avoided directly impacting Threatened flora taxa and habitat in several cases where a Permit to Take has been granted to allow for direct impact to occur.

Woodman (2017b) advised it is therefore expected that Threatened flora taxa and associated habitat will respond in a similar manner to future exploration activities, provided that clearing practices as stipulated under the EMP are adhered to. Woodman concluded in 2017b, it is therefore considered that any further monitoring of the response of the Threatened flora taxa and associated habitat included in this review to Tronox's exploration activities will not provide any additional value to that already observed by previous monitoring. A condition to monitor such response for the Threatened flora taxa included in this review therefore does not need to be included in any future Permits to Take.

4.1 Rehabilitation Monitoring Methodology

The exploration rehabilitation monitoring method was first implemented in 2011 (Mattiske 2011a). The method involves the establishment of monitoring quadrats (either 10 x 10 m or 20 x 20 m), primarily to assess the abundance of the Threatened taxon within a defined area. At locations where Threatened taxa were directly impacted, the quadrat was placed such that a section of drill line or access track was included, as well as adjacent vegetation. Counts of individuals were undertaken on the cleared exploration line within the quadrat, and in adjacent vegetation within the quadrat. In the monitoring events by Western Botanical (2013) and Woodman Environmental (2016a, 2017a), counts of individuals were also undertaken outside the quadrat in the immediate vicinity of the quadrat. Other relevant variables, including drill line compaction, presence of introduced species (weeds) and foliage cover of impacted habitat as a percentage of surrounding intact habitat, were also assessed by Western Botanical (2013) and Woodman Environmental (2016a, 2017a).

At locations not directly impacted (i.e. impacts to habitat within 50 m of individuals only), the method varied on a case by case basis; quadrats were established within the identified population in some cases, particularly when a large number of individuals were in close proximity to exploration lines, with individuals counted within the quadrat. In other cases, particularly when only a small number of individuals were previously recorded, a general assessment was undertaken only, including a re-count of previously recorded individuals.

4.2 Rehabilitation Research 2010

In spring 2010, Mattiske Consulting Pty Ltd was commissioned to undertake an assessment on areas of Declared Rare Flora species disturbed by clearing for exploration drill lines. The Declared Rare Flora species, *Andersonia gracilis* and *Macarthuria keigheryi*, were approved to be cleared via Permits to Take under the then *Wildlife Conservation Act 1950*. The species were disturbed during drilling between 2007 and 2010. The study involved assessing 7 locations of disturbance.

The results indicate that *Andersonia gracilis* (DRF) was successfully re-establishing on cleared lines and access tracks.

Each of the eight *Macarthuria keigheryi* (DRF) specimens located during the pre-drill survey were resprouting from woody material at the base of the plant. The laying down of horizontal stems (into surface soil), which then reshoot is a known survival tool for *Macarthuria keigheryi* (Close et al., 2006), therefore these observations may be an indication of this mechanism in action. If this is the case, then this could be seen as a positive for regeneration (Mattiske, 2011).

4.3 Rehabilitation Research 2017

In 2017 Woodman Environmental Consulting undertook another review of the post-drilling program rehabilitation (Woodman, 2017b). The purpose of the 2017 review was to collate monitoring findings for each individual taxon and its habitat, and determine the value of continuing the Threatened flora post-exploration monitoring program.

The post-exploration monitoring data reviewed by Woodman (2017b) indicates relative foliage cover increases with time, with a number of locations having over half the foliage cover of adjacent vegetation within 2 years (Woodman Environmental 2007a, 2012, 2016a, 2017a; Mattiske 2011a, b; Western Botanical 2013).

Wheel ruts remain evident on most old exploration lines, however at a number of locations, including those relatively recently, shrubs are evident colonising the wheel ruts.

Plate 5 shows an old exploration line 2 years after use (in 2013), with the vegetation on the exploration line almost indistinguishable from adjacent vegetation (Woodman, 2017b). This is an example of where the vegetation has been driven over by light vehicle.



Plate 5 Exploration line by driving over showing regeneration of vegetation 2 years post-exploration

Plate 6 shows an old exploration line 1 years after use (in 2016). Because of the density of the upper stratum, it was not possible for Tronox to drive over the vegetation at this location, and therefore the vegetation has been cleared with a raised blade as per the EMP (Tronox 2023). Plate 6 indicates the width of the track has been deliberately minimised to the width of one vehicle.

Wheel ruts are evident, and relative native foliage cover was less than a quarter of that of adjacent vegetation. However it was noted that native shrubs had begun to colonise the drill lines, including within the wheel ruts (Woodman Environmental 2016a, 2017a). Some weeds were recorded but were at low foliage coverage. It is expected that, if left undisturbed, the vegetation along the exploration line will regenerate to a state resembling adjacent vegetation in a relatively short period of time. In the context of some conservation significant species, the exploration lines are already suitable habitat (Woodman, 2017b). Following fire, it is considered likely that the drill line and the vegetation on it will be virtually indistinguishable from adjacent vegetation (Woodman, 2017b).



Plate 6 Exploration line of raised blade clearing showing regeneration of vegetation 1 year post-exploration, noting germination on the track evident within 1 winter.




Plate 7 Exploration line of vegetation driven over showing regeneration of vegetation 2 year post clearing.

5 VEGETATION TYPES

The vegetation types identified by the 2022 and 2023 Umwelt studies that intersect the *Osprey Deposit 2024 Exploration Drilling Program AMENDED* are outlined below.

Table 3 Vegetation Types in the AMENDMENT Application Area

Purpose Permit Total Area	Proposed Disturbance	Vegetation Type
0.23	0.07	<p>Wet Vegetation Community C (W-C)</p> <p>Occasional low open woodland to isolated trees of mixed species including <i>Nuytsia floribunda</i>, <i>Banksia menziesii</i>, <i>Banksia attenuata</i>, <i>Banksia prionotes</i> and <i>Melaleuca preissiana</i>, over mid closed to open heathland of mixed species dominated by <i>Banksia telmatiaea</i>, <i>Regelia ciliata</i>, <i>Hakea obliqua</i> subsp. <i>parviflora</i> and occasionally <i>Beaufortia squarrosa</i> and <i>Calytrix aurea</i>, over low heathland to sparse heathland of mixed species including <i>Melaleuca seriata</i>, <i>Verticordia densiflora</i> var. <i>densiflora</i>, <i>Isopogon panduratus</i> subsp. <i>palustris</i> (P3), <i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i> and <i>Jacksonia hakeoides</i>, on grey, brown or yellow sandy loam or sand on seasonally damp to wet low lying plains, flats, open depressions and swamps.</p>
0.23 ha	0.07 ha	TOTAL

Vegetation Community W-C	
Description	Occasional low open woodland to isolated trees of mixed species including <i>Nuytsia floribunda</i> , <i>Banksia menziesii</i> , <i>Banksia attenuata</i> , <i>Banksia prionotes</i> and <i>Melaleuca preissiana</i> , over mid closed to open heathland of mixed species dominated by <i>Banksia telmatiaea</i> , <i>Regelia ciliata</i> , <i>Hakea obliqua</i> subsp. <i>parviflora</i> and occasionally <i>Beaufortia squarrosa</i> and <i>Calytrix aurea</i> , over low heathland to sparse heathland of mixed species including <i>Melaleuca seriata</i> , <i>Verticordia densiflora</i> var. <i>densiflora</i> , <i>Isopogon panduratus</i> subsp. <i>palustris</i> (P3), <i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i> and <i>Jacksonia hakeoides</i> , on grey, brown or yellow sandy loam or sand on seasonally damp to wet low lying plains, flats, open depressions and swamps.
Location	Mapped widely throughout the Survey Area Proportion of Survey Area: 594.5 ha (45.0 %).
Indicator Taxa	<i>Banksia telmatiaea</i> , <i>Beaufortia squarrosa</i> , <i>Hakea obliqua</i> subsp. <i>parviflora</i> , <i>Isopogon panduratus</i> subsp. <i>palustris</i> (P3).
Significant Taxa	<i>Anigozanthos viridis</i> subsp. <i>terraspectans</i> (T), <i>Babingtonia urbana</i> (P3), <i>Chordifex reseminans</i> (P2)^, <i>Conospermum scaposum</i> (P3)^, <i>Desmocladius nodatus</i> (P3)^, <i>Hypocalymma quadrangulare</i> (P3), <i>Isopogon panduratus</i> subsp. <i>palustris</i> (P3)^, <i>Lepyrodia curvescens</i> (P2)^, <i>Persoonia rudis</i> (P3)^, <i>Poranthera asybosca</i> (P1), <i>Schoenus griffinianus</i> (P4)^, <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> (P4)^.
	 <p>Photo 5.21 VT W-C (quadrat LFGS05)</p>

6 ASSESSMENT AGAINST CLEARING PRINCIPLES

Clearing principle	Clearing Assessment	Outcome
<p>(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.</p>	<p>The proposed purpose permit area subject to this NVCP application totals 2.3 ha of Native Vegetation comprising four Vegetation Types (VTs) of which all are considered to be in Very Good or better condition. The VTs identified in the clearing area and extents of their clearing are:</p> <p>Wetland Vegetation Community W-C: Occasional low open woodland to isolated trees of mixed species including <i>Nuytsia floribunda</i>, <i>Banksia menziesii</i>, <i>Banksia attenuata</i>, <i>Banksia prionotes</i> and <i>Melaleuca preissiana</i>, over mid closed to open heathland of mixed species dominated by <i>Banksia telmatiaea</i>, <i>Regelia ciliata</i>, <i>Hakea obliqua</i> subsp. <i>parviflora</i> and occasionally <i>Beaufortia squarrosa</i> and <i>Calytrix aurea</i>, over low heathland to sparse heathland of mixed species including <i>Melaleuca seriata</i>, <i>Verticordia densiflora</i> var. <i>densiflora</i>, <i>Isopogon panduratus</i> subsp. <i>palustris</i> (P3), <i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i> and <i>Jacksonia hakeoides</i>, on grey, brown or yellow sandy loam or sand on seasonally damp to wet low lying plains, flats, open depressions and swamps. 95% of the area proposed to be temporarily disturbed.</p> <p>The Amendment Area comprises 1 vegetation type: Wetland Vegetation Community W-C. The 2022 survey alone mapped 594.5 ha of this vegetation community. There is likely to be additional areas outside of the survey area. The proposed temporary disturbance area is a very small percentage of the vegetation community present and the temporary disturbance is unlikely to have a significant impact of the population.</p>	<p>The proposed clearing is considered not to be at variance to this principle.</p>
<p>(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia</p>	<p>There is no evidence of a Black Cockatoo night roost in the project area. There is no evidence of Black Cockatoo breeding habitat in the project area due to the lack of hollowing trees. The project area is on the Swan Coastal Plain which is primarily used by Black Cockatoos for foraging.</p> <p>The majority of the vegetation surveyed during the Cooljarloo West Study Area is considered to be suitable foraging habitat for the Carnaby's Cockatoo (Umwelt, 2022) due to the presence of native proteaceous plant species (as <i>Banksia</i> spp., <i>Hakea</i> spp. and <i>Grevillea</i> spp.)</p> <p>There are significant areas of suitable Black Cockatoo foraging habitat surrounding the project area. This vegetation proposed for clearing doesn't represent a refuge or significant clump in an area otherwise devoid of habitat.</p> <p>Given the temporary nature and extent of clearing of these vegetation types in comparison to their remaining extent, it is not expected that clearing activities will result in the loss of significant habitat for the Carnaby's Cockatoo. The method of clearing which involves avoiding large trees will also ensure that impacts to these habitat types are insignificant. Therefore, whilst a very small area of Black Cockatoo foraging habitat will be temporarily disturbed, the habitat and impact to habitat are considered insignificant.</p>	<p>The proposed clearing is considered not to be at variance to this principle.</p>

Clearing principle	Clearing Assessment	Outcome
<p>(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora</p>	<p>There have been many field surveys within the greater Osprey Deposit are since 2014. Most recently, Umwelt has undertaken both a vegetation survey and a targeted flora survey for the larger Osprey project area in 2022 and 2023.</p> <p>No Threatened taxa were recorded during field surveys of proposed clearing sites and the area proposed under this permit does not expected to impact any Threatened flora.</p> <p>There are no Priority Flora recorded in the Amendment Area.</p>	<p>The proposed clearing is considered not likely to be at variance to this principle.</p>
<p>(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</p>	<p>No Western Australian listed TECs are known to occur in the area.</p> <p>One DBCA-classified PECs is present in the general area, but not present in the Amendment Area.</p>	<p>The proposed clearing is considered as not likely to be variance to this principle.</p>
<p>(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</p>	<p>The 2024 Drilling Program vegetation clearing subject to this NVCP application intersects one Vegetation System Association (VSA) as defined by (Shepherd et al., 2002), being Bassendean 1030. The Bassendean 1030 vegetation system association has 69.1% of their pre-European extent remaining respectively (DBCA, 2019a), with the proposed clearing activities only temporarily reducing their extent by a small amount (0.63 ha).</p> <p>The VTs mapped during field surveys that are locally restricted within the application Area (VT6) is considered to be well represented or likely represented within conservation reserves or Unallocated Crown Land (UCL) outside the application area. As a result, the level of local impact to VTs or VSAs is considered to be Low, with only a very small area to be temporarily cleared.</p>	<p>The proposed clearing is considered not to be at variance to this principle.</p>
<p>(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland</p>	<p>There are no watercourses in the proposed clearing area.</p> <p>The nearest mapped permanent watercourses are: i) Nambung River (Major River) – 20 km to the northeast (Landgate, 2022) and ii) Moore River (Major River) – 40 km to the south (Landgate, 2022)</p> <p>The proposed clearing sites are largely located within the boundary of a wetland area listed in the Directory of Important Wetlands (DBCA, 2018c). This area is known as “Lancelin Defence Training Area”. It is registered within the Directory of Important Wetlands under Criteria 1 and 2 and is classified as an A5, B14 and B10 wetland type (See DCCEEW, 2021, for more) with a current extent of 9,930.41 ha of which < 0.005% is proposed for temporary disturbance for this application (0.63 ha).</p>	<p>The proposed clearing is considered as may be at variance to this principle.</p>

Clearing principle	Clearing Assessment	Outcome
	<p>The proposed clearing is considered minimal in comparison to the remaining extent of these wetlands and is unlikely to cause any impacts on surface or ground water hydrology, with no surface water present at the time of survey and exploration activities to be completed during the summer months (discussed further under Principle (l)).</p> <p>The exploration drill program is proposed to be undertaken in the dry season, which will avoid interactions with surface water. Drill holes are backfilled immediately prior to departure from site.</p>	
(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	<p>Soil quality mapped by DPIRD within the greater Cooljarloo West area has identified the primary soil risks of concern as wind erosion, waterlogging, and subsurface acidity. The small extent of proposed clearing in comparison to the vegetation remaining undisturbed within the area as well as the nature of the clearing method (where vegetation is generally driven over rather than cleared, and the majority of large trees are avoided) results in a short-term impact only, suggesting that the clearing is unlikely to exacerbate any of the soil risks identified. All holes will be backfilled prior to departure from site.</p>	<p>The proposed clearing is considered as not to be at variance to this principle.</p>
(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	<p>There are no conservation areas which may be impacted by the proposed drilling program. An ESA is recognised in the application area due to the Lancelin Defence Area wetland, see Principle (f).</p> <p>With the temporary nature and minimal extent of clearing activities, indirect impacts to adjacent or nearby conservation areas are considered unlikely.</p> <p>Conservation areas in proximity to application area include: i) Wongonderrah Nature Reserve – approximately 4.4 km North of the application area; ii) Unnamed Nature Reserve (Reserve No. 40916) – approximately. 4 km south of the application area and iii) Unnamed Conservation Park (Reserve No. 41986) – approximately 5 km east of the application area.</p>	<p>The proposed clearing is considered as may be at variance to this principle.</p>
(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	<p>The proposed clearing sites subject to this application are encompassed within the Gingin Proclaimed Groundwater Areas under the <i>Rights in Water and Irrigation (RIWI) Act 1914</i>:</p> <p>The nearest Surface Water Areas proclaimed under the RIWI Act 1914 are: i) Hill River and Tributaries Catchment Surface Water Area 15 km to the north and ii) Moore River and certain Tributaries Surface Water Area 27 km to the south</p> <p>As discussed under Principle (f), the wetland vegetation intersected by proposed clearing sites primarily contain low shrubland vegetation and are only likely to be seasonally moist, with surface water generally unlikely to be present.</p> <p>Field results indicate the proposed exploration drilling program is unlikely to cause any significant impacts on surface or ground water hydrology provided that drilling is conducted during dry soil conditions where there is no risk of surface water being present in the intersected wetland areas. Ground disturbance will be limited to vehicle tracks that are unlikely to impede surface water flows, and vegetation will not be completely removed such that surface water could cause erosion or</p>	<p>The proposed clearing is considered not to be at variance to this principle.</p>

Clearing principle	Clearing Assessment	Outcome
	to cause any significant change to the hydrological regime (i.e. runoff or recharge). It is considered that the possible introduction of pollutants to surface water or ground water by machinery can also be appropriately managed by Tronox under the EMP (Umwelt, 2022).	
(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding	<p>The majority of the area proposed for clearing is mapped as “<3% of the map unit has a moderate to high flood risk” (DPIRD, 2019b) and all is mapped as either “70% of map unit has a moderate to very high waterlogging risk” or lower (DPIRD, 2019g). All sites also occur on the WA Soil Group “Pale Deep Sand” (DPIRD, 2019i) which has rapid to very rapid permeability and low soil water storage potential (Schoknecht & Pathan, 2013, p. 91).</p> <p>Floodplain mapping is not available for the area and BOM rainfall data from the nearest monitoring station (ID: 009037) shows an annual mean rainfall of 537 mm over the past 52 years (BOM, 2022a).</p> <p>Given the small extent of clearing area proposed, temporary nature of clearing activities and soil classification within the area, and planning exploration activities during summer when low rainfall is expected, it is considered that the proposed clearing activities subject to this NVCP application will not cause or exacerbate the incidence of flooding.</p>	The proposed clearing is considered not to be at variance to this principle.

7 CONCLUSION

Infill drilling required for the Osprey Project Area requires disturbance of vegetation. The vegetation is not proposed to be killed or removed, but impacted through being driven over. The disturbance is to be rehabilitated and is therefore considered temporary.

The original area of disturbance is 0.63 ha within a larger area of 2.3 ha. A purpose permit for the original request was granted in June 2024. The AMENDMENT is proposed to fill two gaps and allow track deviation to avoid trees. The AMENDMENT is for an additional purpose permit area of 0.23 ha and 0.07 ha of clearing (of which approximately 0.05 has already been approved).

The project proposes no net loss of Black Cockatoo foraging habitat.

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9 ATTACHMENTS