



Appeals Convenor
Environmental Protection Act 1986

**REPORT TO THE
MINISTER FOR ENVIRONMENT**

**APPEALS IN OBJECTION TO THE CONTENT OF, AND RECOMMENDATIONS
IN, AN ENVIRONMENTAL PROTECTION AUTHORITY REPORT**

**EPA REPORT 1580: EXTENSION TO THE WILUNA URANIUM
PROJECT
SHIRE OF WILUNA**

PROPONENT: TORO ENERGY LIMITED

Appeal Numbers 074 to 087 of 2016

December 2016

Appeals Summary

This report addresses appeals lodged in objection to the content of, and recommendations in, the report of the Environmental Protection Authority (EPA) in relation to the proposal by Toro Energy Limited (the proponent) to revise the Wiluna Uranium Project (Approved Project) by developing the Millipede and Lake Maitland deposits and associated infrastructure develop (the Revised proposal).

The appellants raised a range of issues in relation to the proposal, which have been broadly summarised as follows: revised project and cumulative impacts; flora and vegetation; fauna and subterranean fauna; hydrological processes, water use and quality; impacts to human health; impacts to Aboriginal heritage; tailings, rehabilitation and mine closure; regulatory framework and other matters.

The Appeals Convenor's investigation included consideration of the appeal grounds, advice from the EPA, the proponent's response to appeals and discussions with appellants and relevant government agencies.

With respect to appellants concerns about appellants concerns about the assessment of the revised project and cumulative impacts, the EPA advised that it considered the potential for the impact from existing activities to overlap with the impacts from the proposed project for each key environmental factor, including for the Matilda and Bronzewing Gold Mines, as well as mines located further away.

In relation to concerns about the adequacy of impacts on *Tecticornia* species, it is considered that the EPA appropriately considered impacts to *Tecticornia* species, based on available information. However, noting the location of *Tecticornia* sp. aff. *Burnerbinmah* 'inflated fruit', a newly identified taxon recorded from a single location, it is recommended that this ground of appeal be upheld to the extent that condition 9 be amended to include a suitable buffer to ensure that the *Tecticornia* sp. aff. *Burnerbinmah* 'inflated fruit' buffer zone remains contiguous to the land mass outside the mine pit.

In relation to concerns about the flood regimes, availability of sufficient groundwater and water contamination, the Appeals Convenor noted the requirement for perimeter flood protection bunding, the DoW's advice and that the required volume of water can be sustainably supplied from the West Creek and Lake Maitland borefield. It is considered that the EPA's conclusion that its object for these factors can be met, subject to certain conditions, is supported.

However, to provide to provide assurance that predicted environmental outcomes are achieved for groundwater drawdown, it is recommended that this ground of appeal be upheld to the extent that a new environmental outcome is added in condition 11, to ensure that there is no adverse impact to groundwater dependent vegetation and subterranean fauna habitat outside the mapped 0.5 metre drawdown contour. It is further recommended that conditions 11 and 12 be amended that condition 11 relates to Groundwater drawdown and condition 12 to Surface water.

In relation to appellants concerns that the EPA's assessment did not adequately address health risks to workers and the public, the EPA considered the different exposure pathways for radiation and potential health impacts against established regulatory dose limits and that groundwater has no potential to be used as potable water. The Appeals Convenor supported the EPA's view that any risks associated with radiation can be adequately managed by other agencies without the need for conditions to be applied under Part IV of the EP Act.

In relation to appellants' concerns about the tailings storage facility, rehabilitation and closure it is noted that the EPA had regard to available information, that the public had opportunity to comment on the draft Mine Closure Plan and that the DMP confirmed it can regulate mine closure for this proposal via the Mine Closure Plan required under the *Mining Act*. Having regard to the information and advice presented, the Appeals Convenor considered that the EPA appropriately considered the potential impacts associated with rehabilitation, mine closure and tailings storage facilities.

However, noting the proponent' commitment to undertaking the necessary research to inform the design and operation of the tailings storage facility, it is recommended that this ground of appeal be allowed to the extent that a condition with the objective of 'minimising impacts to ground water as far as practicable from the design and operation of the tailings storage facility', be added.

Having regard to the information and advice presented in respect to the appeals from appellants, relevant Government agencies and the proponent, the Appeals Convenor considered that the EPA had sufficient information to assess the proposal, that this assessment was consistent with section 44 of the *Environmental Protection Act 1986* and that its conclusion that the proposal may be implemented subject to the recommended conditions, is supported.

The Appeals Convenor noted that there is an established regulatory framework in place to adequately manage and mitigate potential risks from the proposal which provided confidence that potential impacts related to human health, flora and vegetation, groundwater drawdown and hydrological processes, rehabilitation and closure and transport risks, can be adequately managed.

However, having had regard for all of the information presented, the Appeals Convenor recommended that the appeals be allowed to the extent that the conditions should be amended as set out below and for the reasons detailed in this report.

Recommendations

For the reasons set out in this report, it is recommended that the appeals be allowed to the extent that conditions are amended as follows:

Flora and vegetation

- Condition 9-2 be amended to include a suitable buffer to ensure that the *Tecticornia* sp. aff. *Burnerbinmah* 'inflated fruit' buffer zone remains contiguous to the land mass outside the mine pit.

Hydrological processes, water use and quality

Surface water

- Condition 11 is amended to remove references to surface water from 11-1 (1); 11-1 (2) and 11-3 (10) and that these requirements are included, where relevant, in condition 12; and
- Condition 12 is amended to include an additional objective that 'avoidance of impacts to the hydrological regimes and quality of surface water as far as practicable'.

Groundwater

- amend the title of condition 11 by amending the title to 'Groundwater drawdown' ensuring broader consideration in the relevant management plan than abstraction alone;
- Amend condition 7 by removing condition 7-1 (2) and amend condition 11 by adding

and amending condition 7-1 (2) as an outcome to specify that the proposal should be managed in 'a manner that ensures there is no adverse impact to inferred groundwater dependent vegetation and subterranean fauna habitat outside 0.5 m Relative Level (mRL) groundwater drawdown contours as shown in Figure 2.

Tailings, rehabilitation and closure

- Add a management-based condition with the objective to minimise impacts to groundwater as far as practicable from the design and operation of the tailings storage facility. This condition should include a require to development a Tailings Storage Facility Management Plan in consultation with the DMP and include the details of a research plan to inform the design and operation of the tailings storage facility.

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INTRODUCTION

This report addresses fourteen appeals lodged in objection to the content of, and recommendations in, the Environmental Protection Authority's (EPA) Report 1580 in relation to the proposal by Toro Energy Limited (the proponent) to extend its approved Wiluna Uranium Project, which was the subject of assessment by the EPA in May 2012, to include the Millipede and Lake Maitland deposits (the Revised Proposal).

The proponent referred the Revised Proposal to the EPA in February 2014. On 7 April 2014 the EPA set the level of assessment at Public Environmental Review (PER) with a 12-week public review period that commenced on 16 November 2015.

In September 2016, the EPA released its report and recommendations to the Minister for Environment on its assessment of the Revised Proposal (EPA Report 1580), where it concluded that the key environmental factors identified for the Revised Proposal can be managed to meet the EPA's objectives and recommended that the Revised Proposal may be implemented subject to the conditions and procedures set out in EPA Report 1580.

The Revised Proposal was determined to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 20 February 2015 due to the Revised Proposal's potential impacts to Matters of National Environmental Significance (MNES): listed threatened species and communities and nuclear actions.

Fourteen appeals were lodged against the report and recommendations of the EPA for the Revised Proposal (Appendix 1).

This document is the Appeals Convenor's formal report to the Minister for Environment under section 109(3) of the *Environmental Protection Act 1986* (EP Act).

THE PROPOSAL

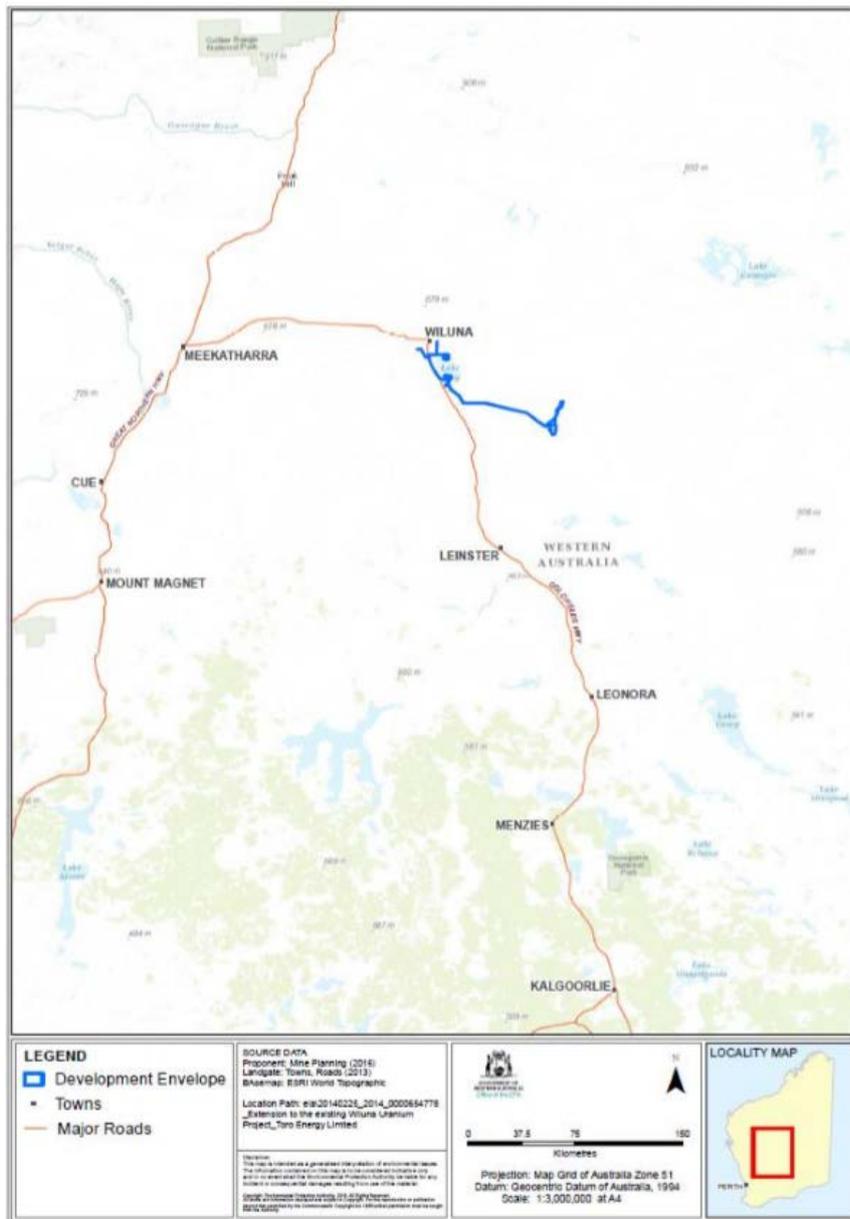
The approved Wiluna Uranium Project is located approximately 30 km south and 15 km south-east of Wiluna (Figure 1). It was assessed by the EPA in Report 1437, dated May 2012. The Minister approved its implementation subject to the conditions set out in Ministerial Statement 913 (Statement 913).

Since the publication of Statement 913, the proponent has acquired two neighbouring deposits, Millipede and Lake Maitland, located 30 km south and 105 km southeast of Wiluna respectively. The Proponent proposes to revise the approved project by developing the Millipede and Lake Maitland deposits and developing associated infrastructure (Figure 2).

The Revised Proposal would result in the additional direct disturbance of approximately 1,582 hectares (ha) within an additional Development Envelope of approximately 3,891 ha and would include open mine pits at Millipede and Lake Maitland, in-pit tailings storage facility (TSF) at Millipede, accommodation village, workshop, run-of-mine (ROM) ore pad and associated infrastructure. The Revised Proposal would also include the construction of a haul road between Lake Maitland and the processing plant.

The EPA advises that both the processing plant and the transport of the product via the Goldfields Highway to Kalgoorlie and the Eyre Highway to South Australia for shipment from Port Adelaide or railed from there to the Port of Darwin for shipment were the subject of evaluation and approval in Statement 913.

Figure 1 – Proposal Location



Open-pit mining would be undertaken to a depth of approximately 15 m using a surface miner and tailings and waste from mining at both Millipede and Lake Maitland would be stored in the mined-out Millipede and Centipede pit voids. No tailings or mineralised wastes would be placed in the Lake Maitland pit voids.

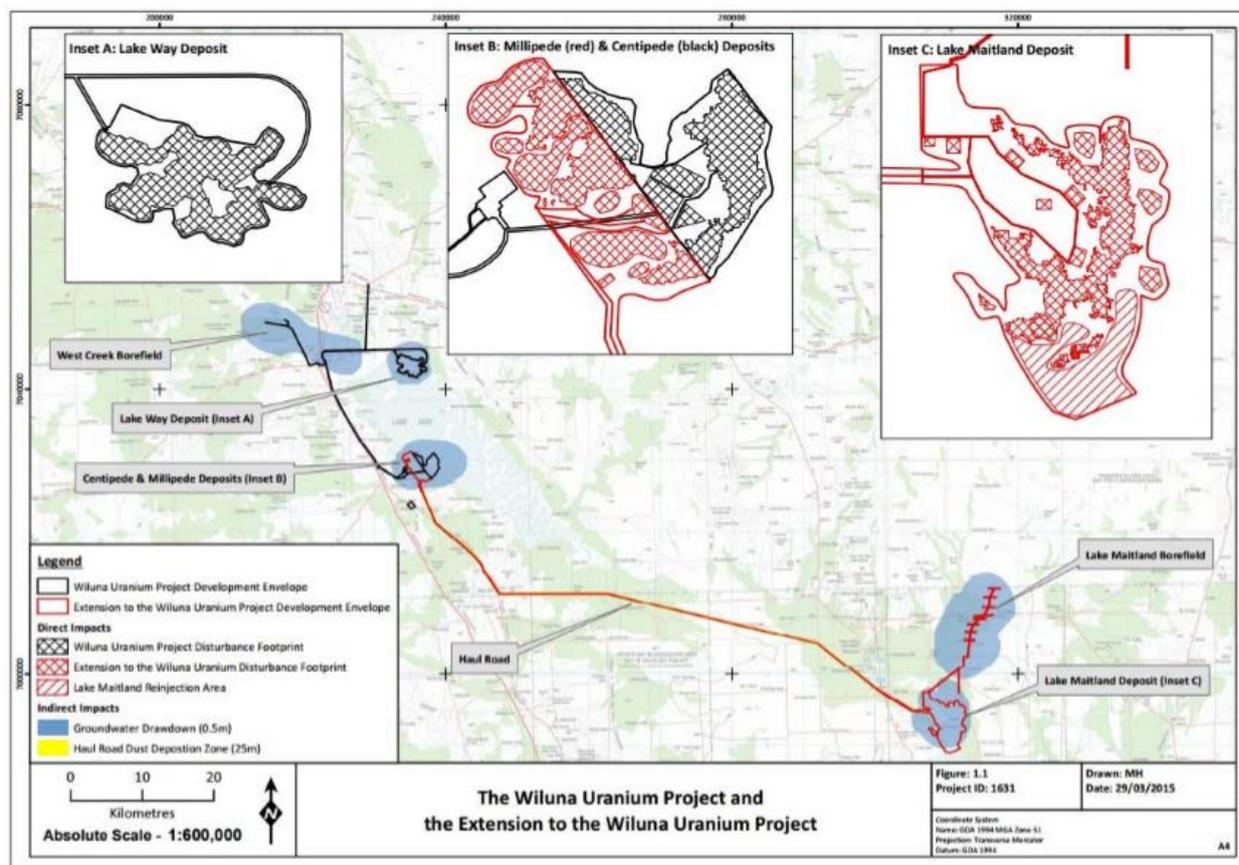
Progressive rehabilitation would occur during mining with land re-contoured to blend with local terrain and revegetated using local provenance species. Radiation levels in areas where mining has been undertaken would be returned to levels at or below pre-mining levels.

The Revised Proposal would have an operational mine life of approximately 12 years and comprise elements within four distinct Development Envelopes:

- Millipede Development Envelope: includes an open-cut mine pit, waste and pre-strip stockpiles, in-pit TSF, ROM pad and associated infrastructure;

- Lake Maitland Development Envelope: includes an open-cut mine pit, waste and pre-strip stockpiles, accommodation village, workshop and associated infrastructure;
- Southern haul road Development Envelope: includes haul road and borrow pits and water filling stations (Figure 5); and
- Lake Maitland borefield Development Envelope: includes access tracks and borefield as shown in.

Figure 2 – Revised Proposal (approved Project and Extension Proposal) Area



In undertaking this assessment, the EPA advised that it has assessed the impacts of the Revised Proposal in the context of the Approved Project the subject of Statement 913, considering the cumulative impacts of the entire Revised Proposal where appropriate.

KEY ENVIRONMENTAL FACTORS

In determining the key environmental factors for the proposal, the EPA advised that it had regard for the object and principles as set out in section 4A of the EP Act to the extent relevant to the particular matter being considered during its assessment. The EPA also advised that the following guidelines set out the basis for the EPA's determination on what it considers are key environmental factors, and to form its recommendation on whether or not a proposal should be implemented, and if so, the recommended conditions:

- EPA (2015a) Environmental Assessment Guideline No. 8 – Environmental principles, factors and objectives;
- EPA (2015b) Environmental Assessment Guideline No. 9 – Application of a significance framework in the Environmental Impact Assessment process

The EPA identified that the following key environmental factors as being relevant to the proposal:

- Flora and vegetation;
- Subterranean fauna;
- Hydrological processes and Inland waters quality;
- Human health;
- Heritage;
- Rehabilitation and decommissioning; and
- Offsets.

The EPA advised that it undertook its assessment consistent with the EP Act and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012* (Administrative Procedures 2012). Appendix 3 of Report 1580 describes how the EPA identified the key environmental factors and consideration of the principles of the EP Act, including the precautionary principle, the principle of intergenerational equity and the principles of the conservation of biological diversity and ecological integrity.

The EPA advised that it has applied the principles consistently across all the environmental factors in undertaking its assessment and considers that implementation of the proposal does not pose a threat of serious or irreversible damage to the environment and that the health, diversity and productivity of the environment can be maintained if the recommended conditions are imposed.

Further, the EPA advised that it considers that the proposal would result in local impacts to flora and vegetation and terrestrial fauna, however provided that conditions are imposed the EPA considers that the proposal would not compromise the biological diversity or ecological integrity within the region.

OVERVIEW OF APPEAL PROCESS

In accordance with section 106 of the EP Act, a report was obtained from the EPA in relation to the issues raised in the appeals. The proponent was also provided an opportunity to address the matters raised in the appeals.

During the appeals investigation, the Office of the Appeals Convenor provided appellants the opportunity to discuss their appeals, which included meetings in Perth and via the telephone. Representatives of the Office of Appeals Convenor also consulted separately with representatives of the proponent.

The environmental appeals process is a merits based process. For appeals in relation to an EPA report and recommendations, the Appeals Convenor normally considers the environmental merits of the assessment by the EPA, based on objectives as set by the EPA as well as other environmental factors. The appeals process considers environmental significance, relevance of factors, additional information not considered by the EPA, technical errors and attainment of policy objectives. Where the development has been the subject of previous EPA assessments, those assessments and any subsequent Ministerial appeal decisions also need to be taken into account.

OUTCOMES SOUGHT BY APPELLANTS

Broadly the appellants sought for the proposal not to be approved as it cannot meet important principles of the EP Act, the EPA's assessment and recommendations to be

rejected, or if the proposal is not rejected, for it to be submitted for re-assessment, or in the event of the proposal being approved, additional and revised conditions to be applied.

GROUND OF APPEAL

The appellants raised a number of common concerns, which have been broadly summarised under the following grounds:

- Revised project and cumulative impacts
- Flora and vegetation
- Fauna and Subterranean Fauna
- Hydrological processes, water use and quality
- Impacts to human health
- Impacts on Aboriginal heritage
- Tailings, rehabilitation and mine closure
- Regulatory framework

Appellants raised a number of other matters that are considered to be beyond the scope of the appeal, however appellants contend these matters are relevant to the Minister's considerations.

GROUND 1: REVISED PROJECT AND CUMULATIVE IMPACTS

Appellants submitted that the extension of the Wiluna mine should have been resubmitted as a single project with the original proposal, and should also include further mines the proponent plan at Dawson-Hinkler, Nowthanna and Firestrike. Appellants contended that the EPA's assessment of the proposal only discussed the regional context briefly, not including consideration of the impacts of existing mines at Jundee Gold, Rosslyn Hill Mining, Mount Keith Nickel Mine, Bronzewing Gold Mine, Wiluna West Iron Ore Project or the Matilda Gold Project, Magellan and Gidgee.

Appellants highlighted cumulative impacts of blasting dust, water usage and groundwater drawdown, clearing, weeds, feral animals and transport.

Consideration

In response to appeals, the EPA advised that the impacts of past, current and proposed activities on the environment were considered in the assessment of the revised Wiluna Uranium Project, consistent with the concept of cumulative impact assessment.

In relation to future activities, the EPA advised that the proponent has not sought environmental approval for the Dawson Hinkler, Nowthanna or Firestrike deposits and referral to the EPA would be required, should the proponent wish to develop further deposits in the future. The EPA is obliged to assess the proposal before it, which includes only the Millipede, Centipede, Lake Way and Lake Maitland deposits. The EPA considered the potential for the impact from existing activities to overlap with the impacts from the proposed project for each key environmental factor, including for regional cumulative impacts.

With respect to existing mine sites listed by appellants, the EPA noted that the Matilda Gold Project is the closest to Millipede (approximately 15 km to the north-west), followed by Wiluna West (approximately 20 km to the west), and the other mines are all around 50 km or more away. The closest to Lake Maitland is Bronzewing Gold Mine (approximately 25 km to the south-west), and the other mines are all around 50 km or more away.

The EPA, in response to appeals, confirmed its consideration in Report 1580 of the cumulative impact of the Revised Proposal to 19 land systems it intersects, but also provided further advice on cumulative impacts it considered, including for clearing of vegetation, introduction of weeds and feral animals, groundwater and water usage, blasting dust and transport.

In relation to the clearing of vegetation, the EPA advised that it is important to note that the Wiluna Uranium Project is located at the edge of salt lakes, whereas most of the other mines referred to, sit on different land systems, at different elevations and thus with different vegetation associations.

The EPA advised that the potential for cumulative impact to vegetation on the regional scale of the mines listed, is best addressed through considering the impact to the various mapped vegetation associations and land systems in the Murchison. In this case, the revised Wiluna Uranium Project impacts less than 0.9 per cent of each of the mapped vegetation associations in the Murchison, and less than 0.5 per cent of each of the mapped land systems in the Murchison. The EPA also regarded the impacts to flora and vegetation units, shown as percentages of the local study area in Report 1580, as an appropriate scale to consider these impacts. It is understood that in the event that the local study area be expanded, it is likely that more of each flora and vegetation type are found, decreasing the percentage impact further.

In relation to the control of weeds, the EPA advised that there is little practical benefit in considering weed species that have been introduced regionally and that the introduction of weeds needs to be managed through onsite controls. Attraction of feral animals also require on site management, as programs to deal with feral animals on a regional basis are outside of the proponent's control.

The proponent submitted that the soft ground at Millipede and Lake Maitland allows mining via surface mining and conventional excavators with no drilling or blasting required. The EPA noted that there would be no potential for blasting dust to overlap, given the large distances between mines.

In relation to transport, the proponent submitted that the revised Wiluna Uranium Project would require monthly delivery of uranium oxide concentrate (UOC) in a convoy of two to three trucks. Since the production rate of UOC remains the same as the original Wiluna Uranium Project, the number of truck movements remains the same, but would be required for additional years. The EPA noted that a monthly movement of three vehicles would not make any material difference to the number of vehicles operating in the region.

The cumulative impact in relation to groundwater and water usage is addressed under appeal ground 4.

Conclusion

Having regard to the above, it is considered that the EPA had regard to cumulative impacts of the activities of the revised Wiluna Uranium Project in a local, as well as regional context and in relation to the impacts of past and existing activities in the region. It is recommended that this ground of appeal be dismissed.

GROUND 2: FLORA AND VEGETATION

By this ground of appeal, appellants contended that the EPA failed to undertake important baseline studies on flora.

Appellants submitted that the proponent did not deal with impacts to vegetation from altered surface water flow, ponding and changes in salinity.

Concern was also raised that the EPA failed to properly consider *Tecticornia* species, a newly identified succulent about which little is known, including whether it is groundwater dependent. In addition, appellants submitted that although there may be a management plan for *Tecticornia*, there is little information on its capability to adapt to lowering groundwater levels.

Appellants raised concern that a lack of detail in the management plan has been identified, including monitoring frequencies, sampling methodologies and sufficient management responses, but despite a high level of uncertainty about significant environmental impacts, the EPA recommended approval.

Consideration

The EPA identified Flora and Vegetation as a key environmental factor for this proposal. The objective for this factor is to maintain representation, diversity, viability and ecological function at the species, population and community level.

In relation to baseline studies, the proponent submitted flora and vegetation baseline studies conducted between 2007 and 2015. The Environmental Scoping Document (ESD; Appendix 1 to the PER) documented the baseline studies that had already been completed for the project area and their consistency with EPA policy and guidance. The ESD also outlined the additional work required by the EPA to be undertaken for the purpose of assessment of the Extension proposal.

The EPA concluded in Report 1580 that the proponent had addressed the policy and guidance relevant for this factor. In its response to the appeals the EPA confirmed that the work undertaken was consistent with EPA policy and guidance. The EPA also advised that in undertaking its assessment it also requested the proponent to commission a peer review¹ (Acris peer review) of the flora and vegetation studies for the project in response to the public submissions on the PER.

In reference to new *Tecticornia* species EPA Report 1580 identified direct impacts from clearing of two new flora taxa, *Tecticornia* sp. aff. *Burnerbinmah* (inflated fruit) and *Tecticornia* aff. *halocnemoides* s. l. 'large ovate seed aggregate'.

Report 1580 stated that *Tecticornia* sp. aff. *Burnerbinmah* (inflated fruit) was recorded at a single location in Abercrombie Creek which drains into Lake Way adjacent to the Centipede and Millipede deposits. The PER stated it was recorded as a single individual and that there was a low likelihood of additional habitat for this taxon as the minor tributary it occurs on is not extensive in the area. The Peer Review stated the taxon is known from a single record, that habitat specificity of this taxon is uncertain, but targeted surveys of similar tributaries around Lake Way may detect additional populations.

~~The proposal will directly impact the one location of this species.~~

The EPA noted the proponent's commitment in the Response to Submissions to avoid and implement a 50 m buffer area around the location of the collection of *Tecticornia* sp. aff. *Burnerbinmah* (inflated fruit). The EPA subsequently recommended Draft Condition 9 to apply a 50 m buffer area within which the taxon is not to be disturbed. Ground disturbance

¹ Actis Environmental Services 2016, Independent review, Wiluna extension proposal: Assessment of potential impacts on samphire vegetation communities; may be downloaded from the EPA website

may only occur within the buffer area when the CEO is satisfied that a viable population of *Tecticornia* sp. aff. *Burnerbinmah* 'inflated fruit' has been found outside the Development Envelope.

In relation to *Tecticornia* aff. *halocnemoides* s.l. 'large ovate seed aggregate', following consideration of the public submissions, the impact on this species is that of 12 confirmed individuals, three (25%) will be directly impacted by the project, with an additional four individuals (33%) within the predicted 0.5 m groundwater drawdown contours. This species is not considered to be groundwater dependent and is therefore not expected to be impacted by groundwater drawdown. In Report 1580 the EPA noted that the taxon was recorded from several locations and is not considered restricted to any specific landform or salt lake zonation, with additional suitable habitat likely to exist outside the impact areas. As for *Tecticornia* sp. aff. *Burnerbinmah* the EPA recommended Draft Condition 8 to apply a buffer area to the locations of *Tecticornia* aff. *halocnemoides* s.l. 'large ovate seed aggregate' until viable populations are found outside the Development Envelope.

In relation to *Tecticornia* species' general ability to adapt to changing conditions and impacts of altered surface water flow and changes in salinity, in responding to public submissions the proponent submitted a report on *Tecticornia* groundwater dependency². This report discussed the attributes of groundwater dependent vegetation and noted that it is relatively uncommon in the arid regions of Western Australia and is generally associated with permanent or persistent waterbodies. Groundwater dependent species may have deep root systems, or root adaptations for persisting in waterlogged conditions. The report also makes reference to research on *Tecticornia* at Fortescue Marsh. Most Australian inland lakes remain dry throughout the year and are only filled after exceptional rainfall events and the margins of these lakes are often inhabited by plant communities dominated by *Tecticornia* species. Based on research undertaken at Fortescue Marsh and similarity between soil profiles and dominant *Tecticornia* species in the communities fringing Lake Way and Lake Maitland playa lakes, the report stated that given the relatively shallow root depth of the dominant component of *Tecticornia* communities fringing Lake Way, *Tecticornia* species are unlikely to be dependent on groundwater for their survival.

The report further stated that if *Tecticornia* was to be classified as a groundwater dependent genera, given the seasonal fluctuations in groundwater levels at shallow monitoring bores which correlate with the range of the proposed 0.5m groundwater drawdown associated with the Project, it would be reasonable to conclude that the *Tecticornia* species that occur within the groundwater drawdown indirect impact contour are likely to be well adapted to seasonal fluctuations in groundwater levels and are therefore less likely to be susceptible to a groundwater drawdown.

It is noted that the recommended condition 17 requires that the proponent fund and undertake an offset with the objective to counterbalance the cumulative impact on 1333.2 ha of *Tecticornia*-dominated vegetation as a result of implementation of the proposal.

The EPA advised, in response to appeals, that it considered that the impacts can be managed to meet the EPA's objectives for Flora and Vegetation subject to a number of recommended conditions including a Flora and Vegetation Management Plan, exclusion zones around restricted *Tecticornia* taxa, and an offset to counterbalance the residual impact.

² Ecologia 2016. Extension to the Wiluna Uranium Project. Response to EPA Submissions *Tecticornia* Groundwater Dependency

Conclusion

Having regard to the information above, it is considered that the EPA appropriately considered impacts to *Tecticornia* species, based on available information, and recommended conditions requiring a Flora and Vegetation Management Plan, exclusion zones for new *Tecticornia* species and an off-set to conserve and improve the scientific knowledge of *Tecticornia* taxa.

Noting the location of *Tecticornia* sp. aff. *Burnerbinmah* 'inflated fruit' close to the edge of the Millipede mining pit, it is considered that there is a possibility that the defined exclusion zone may create an 'island effect' around the plant within the mine pit. The EPA stated its intent to provide suitable focus on the management of indirect impacts to this taxon until such time that surveys find them outside the impact area.

It is therefore recommended that this ground of appeal be upheld to the extent that condition 9 be amended to ensure consistency with this intent by amending condition 9-2 to include a suitable buffer to ensure that the *Tecticornia* sp. aff. *Burnerbinmah* 'inflated fruit' buffer zone remains contiguous to the land mass outside the mine pit.

GROUND 3: FAUNA AND SUBTERRANEAN FAUNA

Key concerns raised in relation to this ground of appeal have been broadly summarised as:

- Impacts on fauna; and
- Impacts on subterranean fauna.

Impacts on fauna

By this ground of appeal, appellants contended that the proponent failed to undertake important baseline studies on fauna.

An appellant raised concern that the proposal would impact on the desert ecosystem and fauna, such as the Peregrine Falcon, Brush-tailed Mulgara, Bustard and potentially the Night Parrot.

Consideration

The EPA considered Terrestrial fauna as a preliminary key environmental factor, but in consideration of the availability and widespread nature of suitable habitat for terrestrial fauna found outside the impact area and that conservation significant terrestrial fauna species recorded in the impact area are unlikely to rely exclusively on habitat within the development envelope or be restricted to this area, determined that Terrestrial Fauna was not a key environmental factor for this proposal.

The EPA also noted that the Northern Marsupial Mole was not listed under the EPBC Act and determined that it is unlikely that the proposal would have a significant impact on terrestrial fauna and can meet the objectives for this factor.

The proponent identified conservation significant fauna that were recorded or had the potential to occur within the development envelope, as well as fauna habitat on the basis of several studies and surveys conducted between 2002 and 2015. Conservation significant fauna recorded within the development envelope included the Brush-tailed Mulgara (*Dasyercus blythi*), Peregrine Falcon (*Falco peregrinus*), Australian Bustard (*Ardeotis australis*), Rainbow Bee-eater (*Merops ornatus*) and the Sharp-tailed Sandpiper (*Calidris acuminata*).

The proponent submitted that the Night Parrot was reportedly sighted some 90 km north of the study area, was considered to have a medium likelihood of occurrence in the development envelope, but was not recorded in the development envelope.

The EPA noted in Report 1580 that the DEE stated in its decision on the referral to be a controlled action under the EPBC Act, that the proposed extension involves the disturbance of habitat which is likely to contain an important population of the listed vulnerable (VU) Crest-tailed Mulgara (*Dasyercus cristicauda*) or a population of the unlisted Brush-tailed Mulgara (*Dasyercus blythi*).

The EPA noted that the Crest-tailed Mulgara was not recorded in fauna surveys conducted within the development envelope and surrounding areas, concluding that the proposal is unlikely to have a significant impact on the Crest-tailed Mulgara. The EPA further noted that several records of the unlisted Brush-tailed Mulgara were recorded over a wide area within sandplain dominated habitats and that these habitats are well represented locally and regionally within the area. The EPA considered that this species is unlikely to rely exclusively on sandplain habitat within the Development Envelope and that the impact on this species is likely to be low.

The EPA, in response to appeals, advised that it considered the impacts to conservation significant fauna are unlikely to be significant, due to the availability of widespread habitat outside of the impact area, and conservation significant fauna not being restricted to or likely to rely on habitat within the impact area. The EPA also considered the proponent's commitments around fauna management and monitoring and determined that Terrestrial Fauna was not a key environmental factor for this proposal.

Impacts on subterranean fauna

An appellant raised concern that the major impacts to subterranean fauna were not adequately assessed. Concerns were submitted in relation to impacts on subterranean fauna habitat, radioactive seepage into caves and harmful changes to salinity that will endanger the continued existence of stygofauna and troglifauna in the area.

An appellant raised concern that inconsistencies in studies on subterranean fauna, together with a lack of information on levels and diversity of impacted species outside the area of impact, were raised by the public and government agencies during the assessment. The appellant submitted that these deficiencies were not addressed and the EPA deferred the management of impacts to future management plans.

Consideration

The EPA identified Subterranean Fauna as a key environmental factor. The objective for this factor is 'to maintain the representation, diversity, viability and ecological function at the species, population and assemblage level'.

In relation to baseline studies, the proponent submitted stygofauna and troglifauna baseline studies conducted between 2007 and 2015. The Environmental Scoping Document (ESD; Appendix 1 to the PER) documented the baseline studies that had already been completed for the project area and their consistency with EPA policy and guidance. The ESD also outlined the additional work required by the EPA to be undertaken for the purpose of assessment of the Revised proposal.

The proponent submitted³ that the Millipede deposit overlaps the eastern margin of the Hinkler Well calcrete system and the Lake Maitland deposit overlaps the eastern margin of the Barwidgee calcrete system. The PER noted that the proposed extension involved the removal and dewatering of the Hinkler Well and Barwidgee calcrete systems, both which are providing habitat for listed stygofauna Priority Ecological Communities and troglofauna.

Following comments submitted during public and government agency review of the PER and noting inconsistent information which did not provide for assessment of impacts on subterranean fauna, the OEPA requested the proponent to provide additional information on a range of issues, including:

- The impacts of changes to natural physico-chemical gradients in aquifers on subterranean fauna;
- Adequacy of the survey effort to address the diversity of subterranean fauna;
- Genetic and morphologic comparison of selected species to confirm the divergence of specimens from different locations;
- Commitments to mitigate and manage the potential loss of troglofauna habitat, where appropriate;
- More information to illustrate the predicted extent of subterranean fauna habitat in relation to the distribution of species and impacts; and
- Mitigation measures and residual impacts.

The EPA noted in Report 1580 that a peer review was also commissioned to provide an additional professional opinion on the subterranean fauna assessment.

Based on additional information⁴ submitted on subterranean fauna habitat, the EPA considered that the proposed extension will directly impact subterranean fauna by extending removal of stygofauna habitat from the Hinkler Well calcrete PEC by 2.2 per cent to a total of 17.5 per cent and removing 25.6 per cent of habitat from the Barwidgee calcrete PEC. The proponent confirmed that the drawdown limit of 0.5 m below the natural standing water level (m bSWL) represented the impacts to habitat values, noting that this level falls within naturally occurring fluctuations.

The EPA noted in Report 1580 that the habitat loss estimates are conservative and had regarded in assessing impacts to subterranean fauna, that approximately 82 per cent of the Hinkler Well calcrete PEC and 74 per cent of the Barwidgee calcrete PEC will be retained outside the mine pit and groundwater drawdown contour.

In relation to the diversity of impacted species outside the area of impact, the proponent noted that despite the much lower survey effort conducted in non-impact areas, the diversity of subterranean fauna recorded was often greater, citing that 25 stygofauna species were recorded from the Lake Maitland non-impact area are compared to 20 species from impact areas.

The EPA reviewed the information and data submitted in relation to nine species of troglofauna recorded in the project area and identified one species of troglomorphic centipede (*Scolopendridae* sp. OES1) known from a single specimen within the Lake Maitland mining area. The EPA considered that the conclusion that proposed mining at Lake Maitland is not considered likely to pose a long-term conservation risk, due to the wider distribution of other members of the troglofauna assemblage throughout the calcrete habitats, is likely to be correct.

³ PER, including 10 Appendices related to subterranean fauna, November 2015

⁴ MWH Response to OEPA PER comments, re SF, April 2016

The EPA reviewed all available information and data, identifying 34 stygofauna recorded in the Millipede development envelope and 28 stygofauna from the Lake Maitland development envelope. The EPA noted in Report 1580 that most of these taxa are widespread in the system, suggesting that it is better connected than other Yilgarn calcrete systems.

In consideration of levels and diversity of impacted stygofauna, the EPA gave detailed consideration in Report 1580 to five species of subterranean fauna, known to occur only in the cumulative impact area of the Wiluna uranium proposal and the proposed extension. In its consideration of potential wider habitat ranges for these stygofauna species the EPA identified in Report 1580 that *Schizopera* sp. TK 1 was collected from three bore holes located approximately four kilometres apart within the development envelope.

The proponent submitted that seven co-occurring stygofauna species were also found outside the impact area further to the west up the Barwidgee calcrete body, suggesting that the species range may extend beyond the area of groundwater drawdown. The peer review⁵ however considered that caution should be used when considering the distribution of *Schizopera* sp. TK 1 when compared to *Chiltonidae* sp. SAM 4.

The EPA considered that a cautionary approach was required to ensure the persistence beyond the impact area for *Schizopera* sp. TK1, recommending an exclusion area to restrict ground disturbance and limit groundwater drawdown to less than 0.5m until further surveys identify the species outside the impact area.

With respect to physico-chemical gradients, including salinity, the proponent confirmed in additional information⁶ submitted that the upper groundwater surrounding the proposed mining panels consists of mostly hypersaline waters and horizontal inflow from the upper several metres of the neighbouring water body is expected. The proponent noted that disruptions to the natural physico-chemical gradients would be considered to only occur close to where mine pit dewatering and excavation would be occurring and these indirect impacts close to mine pit boundaries have been included.

In relation to stygofauna species' general ability to adapt to changing conditions, the PER noted the apparent tolerance of subterranean fauna in the WA goldfields region to a wide range of salinities referring to Lake Way. The proponent submitted the results of baseline studies from Hinkler Well calcrete sampling in 2009/2010, presenting no relationship between groundwater salinity and stygofauna abundance and diversity.

In relation to seepage of radioactive material into subterranean fauna habitat, the proponent committed to lining the tailings storage facilities to mitigate seepage. Tailings storage facilities and associated potential impacts are considered in more detail under appeal ground 7 of this report.

The EPA concluded in Report 1580 that the proponent had generally conducted the sampling and survey methods for the proposed extension in accordance with the policy and guidance requirements relevant for this factor.

The EPA advised, in response to appeals that the impacts of drawdown were the subject of a comprehensive assessment. The EPA found that the impacts can be managed to meet its objective for subterranean fauna subject to a number of recommended conditions including:

- Condition 10 requiring a Subterranean Fauna Management Plan to minimise direct and indirect impacts to conservation-significant subterranean fauna and their habitat;

⁵ Bennelongia 2016

⁶ MWH Response to OEPA PER comments, re SF, April 2016

- Condition 11, requiring a Groundwater Drawdown Management and Monitoring Plan to avoid impacts to the hydrological regimes and quality of groundwater and the design and implementation of a barrier system to minimise impacts of dewatering and abstraction on subterranean fauna; and
- Condition 13, specifying an exclusion zone around a restricted species.

In addition, the EPA recommended offset condition 18, requiring a Subterranean Fauna Research Plan to counterbalance the significant residual impacts to subterranean fauna habitat in the Hinker Well and Barwidgee calcrete PEC's.

Conclusion

Having regard to the information presented in respect to this ground of appeal, it is noted that the EPA had regard for appropriate baseline information and requested additional information, where required, as part of its assessment process. It is considered that the EPA's conclusion that its objective for this factor could be met is supported and the recommended conditions requiring a Subterranean Fauna Management Plan and an offset to counterbalance the significant residual impact on Hinkler Well Calcrete PEC and Barwidgee PEC are appropriate. It is recommended that this ground of appeal be dismissed.

GROUND 4: HYDROLOGICAL PROCESSES, WATER USE AND QUALITY

By this ground of appeal, appellants raised a number of issues, which are summarised as follows:

- Surface water, flooding and contamination;
- Groundwater abstraction and contamination; and
- Cumulative impacts.

Surface water, flooding and contamination

Appellants submitted that the hydrology and flood regimes in relation to the proposal's location in a flood plain and on the edge of a lake, are not adequately understood. Appellants raised concern in regard to the proponent's capacity to manage risks of flooding during major rainfall events, changes in surface water flow, inundation of mine pits and containment of radioactive tailings.

An appellant noted comments by the DEE in the Revised Response to Submissions document which stated that 'no work seems to have been done on potential solute release from stockpiles to the environment during mining.' It was further contended that a number of deficiencies in the hydrological studies, identified through public and government agency review, resulted in important information not being considered.

An appellant contended that global warming would probably increase extreme weather conditions in this region, increasing the frequency of flooding and stressing the tailings containment measures. Appellants also raised concern in relation to the effectiveness of bunding of tailings and contingencies in the event of bund failures during flooding.

An appellant submitted that the future development of operational procedures, monitoring surface water quality and trigger values, undermines the credibility of the assessment.

Consideration

The EPA identified Hydrological Processes and Inland Waters Environmental Quality as key environmental factors for this proposal. The EPA's respective objectives for these factors are:

- To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected; and
- To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.

Report 1580 identified the location of the Millipede and Lake Maitland deposits on the Carey paleodrainage system (ancient river channel), with the Millipede deposit located within the floodplain of Lake Way and the Lake Way deposit located on the lake surface itself.

The proponent submitted that surface water flow is ephemeral and highly dependent on rainfall, with high rainfall events causing flash flooding. The proponent further submitted that the wettest period in the Wiluna rainfall record occurred in 1941/42 when 732 mm of rain fell in six months, representing between a 1-in-200 year and a 1-in-500 year wet season, however this did not result in water flowing from Lake Way.

In relation to major rainfall events and flooding, the EPA considered that Lake Maitland would be flooded in a 1-in-100 year flood event, while the Millipede deposit could be inundated by a maximum flood event.

The EPA noted that the mine pits at Millipede would incorporate perimeter flood protection bunds that were a Federal requirement for Centipede in-pit tailings storage facilities under the Approved Project. These bunds and drainage measures must ensure against incursion of flood waters in a probable maximum-flood event, noting that these bunds would also prevent uncapped tailings from being discharged to the environment.

The EPA advised that similar flood protection bunds would be constructed at Lake Maitland, although as no tailings would be deposited at that site, these bunds were primarily for safety and infrastructure protection.⁷

With respect to solute release from ore stockpiles, the proponent submitted⁸ that ore stockpiles would also be bunded to prevent erosion and leaching of contaminants into the surrounding environment.

The DEE, after its review of the PER required a water balance, integrating surface water and groundwater modelling to take account of the risk of water storages overflowing. The proponent submitted a whole-of-project water balance, indicating overflow of the evaporation pond at the Lake Maitland deposit in two of the proposed six years of mining without mitigation. The proponent detailed modifications to its mine plan as mitigation measures and also submitted that field scale trials confirmed flood protection perimeter barriers reduced water influx by 30%, indicating no overflow of the evaporation pond.

In a submission on the PER, the DEE stated:

The proposed Lake Way, Centipede and Millipede pits encroach into the flood plains of Abercrombie, Negrara and Kukububba Creeks in the Lake Way catchment and cross the main creek channel. The risk of contaminant mobilisation caused by progressive changes to diversion bunds as the mine progresses has not been considered. This risk should be assessed.⁹

The proponent responded to this issue by confirming that it is planning to construct perimeter bunds sufficient to exclude up to the probable maximum flood event as required by the

⁷ EPA, Report 1580, *Extension to the Wiluna Uranium Project*, September 2016, page 45.

⁸ PER, section 11.4.7

⁹ Toro Energy, *Revised Response to Submissions*, July 2016, pages 251-252.

Commonwealth when it assessed mining at Centipede and Lake Way.¹⁰ Post-closure, the proponent noted that the lowest risk option to avoid erosion of tailings storage facilities is to construct a permanent creek diversion to the south of the Centipede mine pit, such that streamflow permanently passes the former mining area. In this way, the proponent stated that risks of long-term erosion entraining tailings and overlying cover materials from the backfilled mine void is eliminated.¹¹

In relation to climate change and extreme weather conditions, the proponent submitted in the PER that an assessment by the Bureau of Meteorology indicates that the dry climate at Wiluna continues as climate change progresses, with no changes in the intensity and frequency of cyclonic activity predicted in the Wiluna region for the next 50 years.

The EPA considered in Report 1580 that impacts to Hydrological Processes and Inland Waters Environmental Quality are acceptable provided the application of condition 12 which sets an objective to 'prevent surface water contamination from, among other things, water contact with workings from diversion of creek lines.

With respect to the future development of operational procedures, trigger values and contingency measures, it is noted that the EPA's *Environmental Assessment Guideline (EAG) 17 – Preparation of Management Plans under Part IV of the EP Act* provides for the development of operational actions, environmental criteria to measure environmental performance and contingency actions. The requirements in the proposed conditions in the Surface Water Management Plan are considered consistent with the intent of EAG 17.

Water use, groundwater drawdown and contamination

Appellants submitted that suitable volumes of water (6.9 million litres) are not available from this arid region to meet the process requirements of the mine expansion, citing evidence that water is only available for the first seven years of the life of the mine.

An appellant raised concern that limitations in the groundwater investigations for the West Creek borefield identified through peer review, resulted in important information not being considered in the assessment.

An appellant submitted that the conditions relating to groundwater abstraction in Report 1580 are vague in defining environmental outcomes. It was further contended that in the defining of trigger levels, criteria and contingency actions in the future, implied that the project can proceed and pose an unacceptable risk to the water resource and groundwater dependent ecosystems, which is at odds with the precautionary principle.

Consideration

The PER detailed dewatering of the Carey paleodrainage channel (ancient river channel) to access uranium deposits and the abstraction of groundwater from the West Creek and Lake Maitland borefields for process water and domestic supply.

It is noted that the EPA, in the assessment of the Wiluna Uranium Project in 2012, identified that water supply was available for only the first seven years of mine life for the Lake Way and Centipede deposits. The proponent conducted additional investigations since that assessment and submitted that the annual water demand of approximately 2.5 GL/a for the proposal can be met from groundwater abstraction from the West Creek and Lake Maitland borefields, together with use of saline mine dewatering to the maximum extent obtainable.

¹⁰ Toro Energy, *Revised Response to Submissions*, July 2016, page 252.

¹¹ Toro Energy, *Revised Response to Submissions*, July 2016, page 252.

The EPA advised, in response to appeals, that the proponent's hydrological assessment was reviewed by the DoW, which advised it was satisfied that the required volume of fresh to brackish water can be sustainably supplied from the proposed borefields.

The DoW also advised that it was generally satisfied with the investigations undertaken for dewatering activities and abstraction borefields, and that the investigations appear to have complied with relevant DoW policy.¹² These investigations included aquifer pump testing at the proposed borefield site and the construction of a conceptual and numerical model.

The EPA determined that groundwater drawdown associated with the Millipede open pit would not affect beneficial use, and the water in any event is hypersaline and not suitable for humans or stock.¹³

The DoW in its review of the Revised Response to Submissions, advised that the proponent will be required to apply for a licence to take water for dewatering and process water requirements and additional investigations, modelling and an operating strategy may be required as part of this application process.

In relation to dewatering and impacts to water dependent species, the EPA advised that a detailed assessment of Subterranean Fauna and *Tecticornia* was undertaken, including the consideration of a range of evidence, and the measures available to avoid, minimise, and offset impacts. Following detailed assessment, the EPA did consider there was potential for one species of Stygofauna and one species of *Tecticornia* to be restricted to impact areas, however it found in this case that it was possible to protect these species through exclusion zones.

In relation to dewatering, the EPA considered the proposal could be implemented to meet its objectives for this factor, subject to condition 11, requiring the proponent to prepare a Groundwater Drawdown Management and Monitoring Plan. This Plan includes achievement of 'avoiding impacts to groundwater quality and regimes as far as practicable'.

The EPA advised, in response to appeals, that it considered that implementation of the proposal does not pose a threat of serious or irreversible damage to the environment and that the health, diversity and productivity of the environment can be maintained if the recommended conditions are imposed.

In addition to the recommended conditions, the EPA also noted that the DER has the ability to regulate discharges from the operation under Part V of the EP Act.

Cumulative impact

An appellant contended that the proposal will impact an aquifer spanning a large distance and already impacted by other mining projects. The appellant raised concern that the EPA's assessment of the mine pits at Lake Way, Centipede, Millipede and Lake Maitland did not consider cumulative impacts associated with other mining proposals in the area, specifically in relation to water drawdown and contamination. In that regard, an appellant identified mines at Jundee Gold, Rosslyn Hill Mining, Mount Keith Nickel Mine, Bronzewing Gold Mine, Wiluna West Iron Ore Project or the Matilda Gold Project, Magellan and Gidgee requiring water resources, and that the EPA did not take these impacts into account.

An appellant submitted that in the absence of a Water Allocation Plan for the East Murchison or Northern Goldfields, there is no evidence that the EPA considered the regional and

¹² EPA, Response to Appeals, October 2016, page 8.

¹³ EPA, Report 1580, *Extension to the Wiluna Uranium Project*, September 2016, page 44.

cumulative impacts from water consumption and allocations for the environment, mining and other users.

Appellants contended that the precautionary principle and principle of intergenerational equity have not been complied with as the recommendation is based on insufficient information.

Consideration

In response to this ground of appeal, the EPA advised that the mines referred to by the appellants are not situated over one continuous aquifer, but rather are within numerous palaeochannels (ancient river channels) and associated calcrete and alluvial aquifers in the region:

For example, Millipede and Centipede are on a tributary palaeochannel near to where this tributary joins the trunk palaeochannel under Lake Way. Wiluna West and Rosslyn Hill (previously Magellan) are on a different tributary which flows to the same trunk. The Mount Keith Nickel Mine is on a tributary palaeochannel which joins the trunk palaeochannel under Lake Maitland (from the west), whereas the Lake Maitland borefield is on a separate tributary which joins the Lake Maitland trunk from the east. Jundee Gold and Gidgee are in separate catchments to both Lake Way and Lake Maitland.

Lake Way and Lake Maitland are both low points in the landscape and act as groundwater discharges (through evaporation), and as such there is no material discharge further downstream. The mine dewatering induced 0.5 metre (m) drawdown contours are limited in extent to several kilometres from the Millipede/Centipede and Lake Maitland mine pits.

In relation to cumulative impacts from groundwater abstraction, the EPA advised in response to appeals, that cumulative impacts from groundwater abstraction need to be considered in the context of the aquifer being utilised, and not simply on a regional basis. The mines referred to occur on separate tributaries to Centipede, Millipede and the Lake Maitland borefield, and groundwater moves so slowly that no material overlap would occur.

In relation to other users, the EPA noted in report 1580 that the Wiluna town water supply is 25 km from, and up-gradient of, the proposed mining and processing areas and is not hydraulically connected to the operational area, and would thus be unaffected by implementation of the Proposed Extension. The EPA also advised that the groundwater below Lake Way is hypersaline, and there is no potential for it to be used as potable water or for stock watering.

In relation to groundwater contamination, the EPA advised that the groundwater seepage velocity along the palaeochannel in the vicinity of Lake Way is estimated to be around 0.01 m/day¹⁴ meaning that it would take groundwater over 4,000 years to move the 15 km from the Matilda Gold Project to the Millipede/Centipede area. This is much slower than groundwater recovery after the cessation of mining and no material overlap would occur.

The EPA advised, in response to appeals, that the principles of the EP Act had consistently been applied across all the environmental factors in undertaking its assessment. The EPA considered that implementation of the proposal does not pose a threat of serious or irreversible damage to Hydrological Processes and Inland Water Environmental Quality and the diversity and productivity of the environment can be maintained if the recommended conditions are imposed.

¹⁴ Groundwater Resources of the Northern Goldfields, Western Australia, Water and Rivers Commission, 1999

Conclusion

Having regard for the information provided in respect of this ground of appeal and in particular the requirement for perimeter flood protection bunding to control surface water flows, DoW's advice that the hydrological assessment for the proposal was satisfactory and generally compliant with its operational policy and that the volume of water required from the proposal can be sustainably supplied from the West Creek and Lake Maitland borefield and the EPA's advice in respect to its consideration of cumulative impacts associated with other mines and water users in the area, it is considered that EPA's conclusion that its object for these factors can be met, subject to certain conditions, is supported.

However, to provide greater clarity on the EPA's proposed conditions to manage potential impacts to surface water and ground water, it is recommended that this ground of appeal be upheld to the extent that some of the recommended conditions be amended to ensure that the identified potential impacts and risks related to groundwater drawdown and surface water are managed consistently with those evaluated through the EPA's assessment.

In this regard, it is recommended that components relating to surface water that are contained in condition 11, be moved to condition 12. Condition 11 would then relate to Groundwater draw down and Condition 12, surface water. It is recommended that these conditions be amended in the following manner:

- Condition 11 is amended to remove references to surface water from 11-1 (1); 11-1 (2) and 11-3 (10); and
- Condition 12 is amended to include an additional objective that 'avoidance of impacts to the hydrological regimes and quality of surface water as far as practicable'.

It is also recommended that to strengthen the relationship between groundwater drawdown and the potential impacts to subterranean fauna habitat and *Tecticornia* species that recommended conditions 7 and 11 be amended to more clearly require an outcome based condition for groundwater drawdown. It is considered that this approach is also consistent with EPA's *Environmental Assessment Guideline (EAG) 17 – Preparation of Management Plans under Part IV* of the EP Act, noting that outcome based conditions generally define a known parameter or outcome and a plan must be prepared to demonstrate how that outcome will be achieved, which will include trigger criteria, monitoring and contingency actions if an outcome is being appropriated. In this regard it is recommended that the conditions be amended as follows:

- Amend the title of condition 11 by amending the title to 'Groundwater drawdown';
- Amend condition 7 by removing condition 7-1 (2) and amend condition 11 by adding and amending condition 7-1 (2) as an outcome to specify that the proposal should be managed in 'a manner that ensures there is no adverse impact to inferred groundwater dependent vegetation and subterranean fauna habitat outside 0.5 m Relative Level (mRL) groundwater drawdown contours as shown in Figure 2.'

GROUND 5: IMPACTS TO HUMAN HEALTH

Many of the appellants raised a range of issues relating to the key environmental factor Human Health, which have been broadly summarised under the following headings:

- Health risk to the community and workers, including from bush tucker; and
- Drinking water – ground and surface water

Health risk to the community and workers

Appellants were of the view that the proponent's PER and the EPA's assessment did not adequately address health risks from radiation exposure to the community and workers in the vicinity of the mine and from transport of uranium oxide concentrate. An appellant raised concern that the EPA did not adequately consider radioactive dust from ore stockpiles, radon sources and the health risk from gathering and eating contaminated food (bush tucker).

An appellant raised concern that the proponent has not provided the assessment methodology employed to determine public radiation doses, requested by the DEE in its review of the PER.

Appellants contended that no level of radiation exposure is safe and radioactive waste after mine closure will pose a long term health hazard to the public, travellers and local indigenous people.

An appellant acknowledged that the radiation in the environment is likely to be low, but raised concern that the use of the ERICA model should not replace real data or samples to measure baseline radiation, as well as changes during proposal implementation in the environment.

An appellant submitted that no conditions for the management of radioactive dust from ore stockpiles have been included in its recommendations. In addition there is concern that the EPA's recommended condition 15 provides for the possibility of blasting, associated with additional dust.

Consideration

The EPA's objective for Human Health, identified as a key environmental factor for this proposal, is 'To ensure that human health is not adversely affected'. The EPA noted in Report 1580 that a significant number of non-EPA policies and guidance material, applying to this factor, was considered to inform the radiological exposure assessments for the proposal.

In regard to baseline radiation monitoring, the proponent submitted a range of baseline data, including measured radionuclide concentrations in dust and air, radon concentrations, radionuclide levels in groundwater, surface water (after rainfall), soil, sediments and vegetation. The proponent also submitted potential public and employee exposure to radioactivity, based on modelling results of the dispersion of radioactive material from potential sources during construction, operation and after closure, including mine pits, mine pits, the processing plant and tailings storage facilities.

In relation to the consideration of radioactive dust from ore stockpiles, the proponent submitted that dust from the ore stockpile was not included in dispersion modelling for the operational period, as the moisture content of the ore is high¹⁵. It is noted that the EPA recommended condition 15 with the environmental objective to minimise direct and indirect impacts associated with dust.

The EPA found in its Report that the proponent demonstrated through the 'as low as reasonably achievable' (ALARA) approach that 'best practice' design optimisation, operational procedures and monitoring to control exposure to hazardous pollutants to the Maximum Extent Achievable, would be implemented, consistent with EPA Guidance

¹⁵ PER, Appendix 10.66

Statement No. 55 - '*Implementing best practice in proposals submitted to the environment impact assessment process*'.

The EPA advised, in response to appeals, that the estimated potential exposure considered all relevant exposure pathways, including from inhalation, dust and consumption of food and water. With respect to methodology to determine public exposure, the EPA, in response to issues raised during the public review of the Revised Summary of Submissions, requested clear interpretation of radiological data presented in the PER. The proponent provided a review of radiological data¹⁶, including that exposure through inhalation of radionuclides in dust and radon decay products were determined from air quality modelling results, ingestion of radionuclides through modelled dust deposition and the Environmental Risk from Ionising Contaminants: Assessment and Management (ERICA) tool, and gamma radiation exposure determined from first principles.

The EPA advised, in response to appeals, that the estimated exposure from the Revised Wiluna Uranium Project to people living at Lake Way Station, Barwidgee Station and communities in and around Wiluna ranges from 0.005 to 0.047 mSv/yr and stated that these doses are significantly less than the regulatory public dose limit of 1mSv/yr.

In response to concerns regarding exposure during transport on public roads, the EPA noted that the dose to the public would be significantly less than the regulatory dose limit and is the same as previously evaluated for the Wiluna Uranium Mine. The proponent submitted that a Transport Management Plan, addressing road transport safety, loss of containment and injury to personnel, will be submitted to the Federal and Western Australian governments and be subject to their regulation.

In relation to the exposure of workers to radiation, the EPA advised, in response to appeals, that employees are conservatively estimated to receive doses that range from 0.5 to 5.1 mSv/yr, depending on the work undertaken. The EPA noted that employee exposure to radiation from the revised Wiluna Uranium Project is estimated to be similar to other open-pit uranium mines in Australia and that the doses are below the regulatory occupational dose limit of 20 mSv/yr. The EPA advised that the estimated radiation dose of 0.5 mSv/yr to transport workers is also well-below this limit.

It is noted that Schedule 1 of the *Radiation Safety (General) Regulations 1983*, specifies that the regulatory public dose limit above background is 1 mSv/yr and the regulatory occupational dose limit above background is 20 mSv/yr. It is understood that these limits align with those recommended by the International Atomic Energy Agency and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is the primary authority for radiation protection and nuclear safety in Australia.

In relation to exposure from contaminated food, the EPA noted that, following discussions with Traditional Owners, the proponent undertook an assessment for a scenario of persons spending 28 days per year camping at the project boundary and sourcing all of their bush tucker (meat and vegetables) from the area. The predicted total dose for this group from this scenario was less than 0.001 mSv/yr, which is significantly less than the regulatory public dose limit of 1 mSv/yr above background.

The EPA noted that in response to appeals, that ERICA is considered an appropriate tool for undertaking assessment of radiological impacts to the environment by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the national authority on radiation matters. The EPA considered on this basis, that ERICA was appropriate in

¹⁶ JRH Enterprises Pty Ltd, Environmental Radiation Baseline Review for the Toro Energy Public Environmental Review, April 2016; May be downloaded from EPA webpage.

assessing radiological impacts to fauna and flora which may be used as food, and the data used was considered to be valid.

In relation to radiation levels in the environment, the EPA advised that the proponent would be required to prepare a Radiation Management Plan. Radiation Management Plans are required to cover a range of environmental issues, including environmental monitoring to ensure that radiation levels in the air, water, flora, fauna and employees do not exceed allowable levels. The EPA advised that radiation is co-regulated by both the DMP and the Radiological Council, and the proponent is required to provide monitoring results and data to both agencies for review.

With regard to long term post-closure radiation exposure, Report 1580 identified the proposed tailings storage facilities cover system design, providing radiation control, shaping and water shedding layers, with the estimated radon emissions from the closed tailings storage facility not exceeding natural background levels.

The EPA noted in Report 1580 that the two key agencies responsible for regulation of radiation, the Radiological Council and the DMP, advised that they are satisfied with the details provided in the PER and the proponent's response to submissions.

In Report 1580 the EPA considered that the proposal can be managed to meet the EPA's objective for Human Health provided a Radiation Management Plan is prepared. The EPA noted that a Radiation Management Plan is a statutory obligation and not a discretionary option under the *Mines Safety and Inspection Regulations 1995*. The DMP and the Radiological Council both confirmed that they require a Radiation Management Plan be submitted for approval.

The EPA also considered that risks relating to transportation of uranium oxide concentrate would be effectively managed under a Transport Management Plan, which is a statutory requirement of the *Radiation Strategy (Transport of Radioactive Substances) Regulations 2002*.¹⁷ The EPA further noted that both DER and the DEE have legislation that can permit and regulate potential radiological impacts to Human Health. The EPA was satisfied therefore that no additional condition is required under Part IV of the EP Act to address the matter.

The EPA advised, in response to appeals, that the proposal could meet the EPA's objectives for Human Health. In forming this view the EPA had particular regard to the following in its assessment:

- The proponent's implementation of 'best practice' design optimisation, operational procedures and monitoring to control exposure to hazardous pollutants to the Maximum Extent Achievable through the ALARA approach;
- The proponent's assessment of public exposure from operations at Lake Way, Centipede, Millipede and Lake Maitland which estimates a dose of less than 1 per cent of the regulatory public dose limit;
- The proponent's assessment of mine-site employee exposure at Millipede and Lake Maitland which estimates a dose of approximately 25 per cent of the regulatory occupation dose limit; and
- The DMP's advice that the radiological assessments undertaken to model radiation exposure to the public and employees are acceptable,

¹⁷ EPA, Response to Appeals, XX October 2016, page 13.

In relation to a condition for the management of stockpiles, the EPA recommends conditions, consistent with EAG 17 that include either an outcome or an objective and not elements of a proposal. The recommended condition 15 for Dust Management requires the proponent to prepare and implement a Dust Management Plan, including management actions and changes to proposal activities, should the objective for minimisation of direct and indirect impacts associated with dust, not be achieved. This objective and required management actions apply to dust generation from all sources, including stockpiles. The condition does not include blasting, but the preparation of a contingency plan, should mining involve blasting. This is consistent with Ministerial Statement 913 for the Wiluna Uranium Mine.

Water quality and human health

Concerns raised by appellants in respect to this issue included the potential for radioactive tailings being stored at the edge of a lake leaking and contaminating water, which would make the water unsafe to drink.

An appellant specifically referenced the Western Desert Kidney Project released in 2016 which identified health impacts associated with elevated levels of nitrates and uranium as a serious public health issue in the Goldfields region. The appellant submitted that the PER did not adequately address the mobilisation of uranium in groundwater into the drinking water of Wiluna town, which is connected to the same aquifer that would be affected by the mine and the assumption that water would not be sourced downstream from the proposed mine is without evidence.

The appellant raised concern that the conditions recommended by the EPA are incapable of ensuring protection of water resources from contamination.

Consideration

In relation to the contamination of surface water, the proponent submitted that the surface water environments for both Lake Maitland and the proposed Millipede operations are near Lake Way, which is the most upstream lake in a salt lake chain system, extending to Lake Maitland in the south-east.

The EPA noted that the Lake Way system is a low gradient low energy lake system, which acts as a groundwater discharge zone through direct evaporation. The proponent submitted in the PER that surface water quality at Lake Way, when present, is generally saline or hypersaline with background concentrations of some trace elements, including copper, lead, arsenic and zinc, unexpectedly high. The proponent further submitted that the wettest period in the Wiluna rainfall record occurred in 1941/42 and represented between a 1-in-200 year and a 1-in-500 year wet season, however this did not result in water flowing from Lake Way.

In relation to drinking water for the Wiluna town, the EPA noted in report 1580 that the Wiluna town water supply is 25 km from, and up-gradient of, the proposed mining and processing areas and is not hydraulically connected to the operational area, and would thus be unaffected by implementation of the Proposed Extension.¹⁸

The EPA advised, in response to appeals, that long term fate and transport modelling of uranium from the Millipede and Centipede tailings storage facilities predicted movement of tailings seepage to be minimal and groundwater is lost through evaporation leaving contamination behind.

¹⁸ EPA, Report 1580, *Extension to the Wiluna Uranium Project*, September 2016, page 43.

The EPA advised that much of the groundwater below Lake Way is already naturally elevated in uranium and is hypersaline, and there is no potential for it to be used as potable water or for stock watering. In relation to conditions recommended by the EPA, it is noted that the objectives and outcomes focus on the protection of water resources for environmental values, including flora and vegetation and subterranean fauna.

Conclusion

From the information presented in respect to this ground of the appeals, it is noted that the EPA is of the view that the risks to human health from radiation exposure will be below relevant guidelines and that any risks associated with radiation can be adequately managed by other agencies without the need for conditions to be applied under Part IV of the EP Act.

Having regard to the above information, it is considered that the EPA has had appropriate regard and considered evaluation of issues raised by the appellants during its assessment, including consideration and the evaluation of the different exposure pathways for radiation and assessment of potential health impacts against established regulatory dose limits, the ephemeral nature of surface water, the minimal predicted movement of tailings seepage and that groundwater has no potential to be used as potable water. For the reasons described in this section it is recommended that this ground of appeal be dismissed.

GROUND 6: IMPACTS TO ABORIGINAL HERITAGE

An appellant submitted that although there has been consultation in regard to Aboriginal heritage, wishes of Traditional Owners of the area have not been respected and consultation does not imply consent. Appellants contended that areas surrounding the proposed mines are extremely important to Traditional Owners both spiritually and culturally.

An appellant submitted that the EPA's implementation condition to 'minimise' impacts does not ensure that heritage is not adversely affected.

Contamination of bush tucker is dealt with under Ground 5 of this report.

Consideration

The EPA identified Heritage as a key environmental factor for the proposal. The EPA's objective for Heritage is 'to ensure that historical and cultural associations, and natural heritage, are not adversely affected'.

In relation to appellants concerns about consultation and the importance of the area to Traditional Owners, the EPA advised that proponent has undertaken archaeological studies and site searches over the proposed Millipede, Lake Maitland and Southern Haul Road Development Envelopes. Surveys have also been undertaken over the area of the Approved Project and the proponent has consulted with the Wiluna Native Title Holders. The EPA advised that this is consistent with the requirements of Guidance Statement 41 - Assessment of Aboriginal Heritage.

The EPA advised that it had regard for Guidance Statement 41 *Assessment of Aboriginal Heritage* (Guidance Statement 41) in its assessment of this factor and that Guidance Statement 41 provides advice to proponents about the minimum requirements for environmental management of the heritage impacts of a proposal and specifies that the proponent is to undertake a competent analysis and report on the likelihood of the presence of matters of heritage significance to Aboriginal people.

The EPA advised that this process involved a comprehensive review of all existing information, anthropological and archaeological surveys, consultation and engagement with Aboriginal people, and clear demonstration that Aboriginal concerns relating to heritage factor have been addressed.

In considering these requirements, the EPA advised that it had regard for the following in its assessment:

- various surveys have been conducted within the proposed Development Envelope;
- the Aboriginal people identified by the proponent are the Wiluna Native Title claimant group; and
- the proponent has developed a Cultural Heritage Management Plan (CHMP), and has recently signed a mining agreement with the Wiluna Native Title holders which includes arrangements for protecting and managing Aboriginal cultural heritage (Toro 2016b).

The EPA further advised that as a result of archaeological survey work and continuing consultation with the Wiluna Native Title Holders, the proponent identified that mining at Millipede can be undertaken without any impact on registered heritage sites, other heritage places, or cultural heritage values identified by the Wiluna Native Title Holders. The EPA also noted that no registered sites or other heritage places have been recorded within the Lake Maitland development envelope. In this regard, the EPA advised that it considered that its objective for Heritage could be met subject to recommended condition 16 which requires the implementation of the CHMP to avoid and minimise impacts to sites and Aboriginal Heritage in consultation with the Traditional Owners and the Department of Aboriginal Affairs (DAA).

Contamination of water is dealt with in Ground 10, and bush tucker is dealt with in Appeal Ground 11.

Conclusion

From the information presented in respect to this ground of appeal, it is noted that the EPA had regard to the requirements of Guidance Statement 41, various surveys, consultation with the Wiluna Native Title claimant group and the proponent's commitment that mining at Millipede can be undertaken without any impact on registered heritage sites, other heritage places, or cultural heritage values identified by the Wiluna Native Title Holders.

Noting the recommended condition 16 and the role of the DAA in the development of the CHMP required by condition 16, it is recommended that this ground of appeal be dismissed.

GROUND 7: TAILINGS, REHABILITATION AND MINE CLOSURE

Key concerns raised in relation to this ground of appeal have been broadly summarised under the following headings:

- Tailings storage facilities; and
- Rehabilitation and mine closure

Tailings Storage Facilities

An appellant submitted that the EPA's assessment in relation to tailings storage facilities was inadequate as the proponent failed to provide sufficient information for an assessment in response to limitations identified during public and government agency review of the PER. Limitations included modelling and understanding of seepage rates from Millipede and Centipede, the effectiveness of capping of tailings and contamination from leakages. In addition, appellants contended that the assessment of containment of tailings during the

operational phase of the mine was inadequate, specifically in relation to hydrology and flood regimes.

Appellants submitted that contingencies in the event of bund failures and erosion risk have not been addressed and failed containment of radioactive mine waste or dust would impact on the ecology of two lake systems, biodiversity and public health.

An appellant contended that radiation pollution and Acid and Metalliferous Drainage (AMD) are potential issues for the Wiluna extension.

Appellants generally do not believe that waste from tailings can be isolated from the environment in a safe manner over the long term. An appellant raised concern that the proponent has not committed to the objective of physically isolating radioactive tailings for the standard of 10,000 years, adopted by the Western Australian Parliament in 2012. It was contended that the proponent has not provided any information on what successful closure and rehabilitation include.

An appellant raised concern that the EPA's recommended conditions are inadequate to ensure the rehabilitation to ensure no risk to public health and the environment for a period of 10,000 years.

Appellants submitted that the EPA did not apply the precautionary principle and the principle of intergenerational equity by omitting to require the necessary information and evidence to assess the storage and isolation of tailings in a floodplain.

Consideration

The EPA considered the storage of tailings in relation to the following key environmental factors and the EPA's objectives for these factors:

- Hydrological Processes, with the objective to maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected;
- Inland Waters Environmental Quality, with the objective to maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected; and
- Rehabilitation and decommissioning, with the objective to ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner.

The EPA advised, in response to appeals, that storage of tailings below ground can be considered best practice in that it avoids the risk of wall failures that can occur with above-ground tailings storage facilities, which is consistent with EPA Guidance Statement 55 'Implementing Best Practice in Proposals Submitted to the EIA Process'.

In relation to the bunding of tailings storage facilities, the EPA in Report 1580 stated that the perimeter flood protection bunds that were a Federal requirement for the Wiluna uranium proposal, would also prevent uncapped tailings from being discharged to the environment during a probable maximum-flood event.

The EPA stated in Report 1580 that the long-term performance of the in-pit tailings storage facilities is critical to successful closure, and tailings would be managed using engineered containment systems. The EPA noted that containment system proposed at Millipede is the same as that previously assessed at Centipede, including a low permeability clay liner in the base, water barriers around the sides, and a multi-layer cover to limit water influx. No tailings or mineralised wastes would be stored in the Lake Maitland pit void.

In relation to seepage from the tailing storage facilities, the proponent undertook fate and transport modelling in 2012 for the assessment of the Wiluna uranium proposal to estimate how far contaminants from the tailings storage facility could move over 10,000 years. Using conservative assumptions, the modelling predicted that after 100 years, the uranium concentration in groundwater would drop to less than 0.5 mg/L at 45 m from the pit. After 10,000 years the concentration would remain below 0.4 mg/L, and at distances greater than 250 m, the majority of uranium would have been adsorbed or precipitated out of solution.

The DER commented in its review of the Revised Response to Submission document on limitations of the fate and transport modelling, suggesting that uranium could be more soluble and mobile than suggested in the modelling. In a submission on the PER, the DEE stated that certain variables could result in further migration of contaminants than previously identified, and recommended that additional site sampling be undertaken of buffering minerals and conditions be undertaken with detailed plans being provided prior to approval.¹⁹

The EPA, in response to appeals, noted that any seepage from the additional tailings storage facility cells required for Millipede would have to pass under the Centipede tailings storage facility cells before reaching the lake. Given the predicted distances and concentrations for Centipede, the modelled maximum uranium concentrations are also valid for the tailings storage facility cells at Millipede.

The proponent commissioned, for the 'Extension to the Wiluna Uranium Project, a review of the previous fate and transport modelling and additional model simulations²⁰, including refined assumptions on groundwater chemistry.

The EPA, in response to appeals, advised that the modelling conducted by CSIRO predicted a maximum concentration of 0.4 mg/L at a distance of 10 m after 20 years and even less for 200 and 1000 years. The EPA noted that the eight scenario's investigated showed that with different assumptions the predictions are somewhat different. The EPA advised that it is important to recognise that this type of modelling is a tool to estimate the scale of an impact, highlighting that all the modelled scenarios show that the 'scale' for high uranium concentrations remained within ten to hundreds of metres from the pit edge.

The proponent confirmed it would be undertaking further studies to inform the design and operation of the tailings storage facility in consultation with CSIRO and the outcomes of these studies will be considered as part of the Mining Proposal to be presented to the DMP.²¹

The EPA noted, in response to appeals, that closure and rehabilitation of the mine would be undertaken in accordance with an approved Mine Closure Plan that would meet the requirements of the Guidelines for preparing mine closure plans (DMP & EPA 2015).

In relation to AMD, the proponent submitted that there no acid forming minerals present in the geological host material of the deposit and the presence of ore minerals and ore leach test confirmed that all deposits from the Wiluna Uranium Project and the proposed Wiluna Extension, are not associated with AMD.

The proponent submitted that that the proposed tailings storage facility cover system design consists of a 0.5 m radiation control layer placed directly above the consolidated tailings, a one to three metre shaping layer, 0.3 m capillary break/surface water shedding layer and 0.1

¹⁹ Toro Energy, *Revised Response to Submissions*, July 2016, pages 253-254.

²⁰ Prommer, H. et al; CSIRO, March 2015

²¹ Toro Energy, *Revised Response to Submissions*, July 2016, pages 253-254.

m layer of topsoil to promote vegetation growth on the final landform. The proponent also submitted that the estimated radon emission rate from the closed tailings storage facility with the cover system is not expected to exceed natural background levels.

In relation to the long-term risk of radiation, Report 1580 stated that the post-closure radiation assessment identified only one of the thirteen organism families studied, to exceed the screening dose rate. Noting that the dose rate of 10 micrograys per hour and assumptions were conservative and that lichens and bryophytes are extremely radioresistant, the EPA concluded that the risk from the Revised Project is not considered significant.

With respect to erosion, the EPA noted in Report 1580 that closure-specific landform evolution modelling over a period of 10,000 years, to assess the long-term stability of post-closure landforms, found that material across the Revised proposal area was not susceptible to erosion, including the rehabilitated tailings storage facilities.

The EPA noted, in response to appeals, that the approved Mine Closure Plan would include further research on the erosion rates of the vegetation cover, updated landform modelling, and on-ground data collection to calibrate the erosion models.

Rehabilitation and mine closure

An appellant raised concern that the EPA did not consider the requirements for adequate rehabilitation of the proposal and contended that a mine closure plan should be approved prior to the EPA's recommendation. Appellants further submitted that future submission of a mine closure plan to DMP for assessment is without public review, lacks transparency and denial of procedural fairness. Appellants submitted that the EPA's conditions are not adequate to ensure that the proposal poses no risk to the environment or public health for a period of 10,000 years, a standard adopted by the Western Australian Parliament in 2012.

An appellant contended that the lack of radiological baseline information will prevent the formulation of outcomes for mine closure. An appellant submitted that the EPA's recommendation that the DMP make updates of post-closure radiological doses publicly available is not possible as it implies 'intelligible' to readers 10,000 years into the future and it is unlikely that DMP will exist.

Appellants submitted that the precautionary principle should, for uranium mining, imply that it is not allowed.

Consideration

The EPA, in response to appeals, advised that rehabilitation and decommissioning for the proposal was considered in its assessment and addressed in its report.

The EPA, in its assessment of the proponent's Mine Closure Plan submitted during the assessment, determined that the proposal could be managed to meet its objectives for Rehabilitation and Decommissioning - 'to ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner', provided a Mine Closure Plan is prepared and implemented in accordance with the *Guidelines for Preparing Mine Closure Plans*, May 2015 or any subsequent revisions of the guidelines.

In reaching this conclusion the EPA had particular regard to:

- Relevant EPA policy and guidance pertaining to rehabilitation and decommissioning;
- The backfilling and rehabilitation of open pits;

- Landform evolution modelling over a period of 10,000 years, predicting that the rehabilitated landforms should not be subject to significant erosion that would expose the tailings;
- The proposed tailings storage facilities cover system which includes radiation control, capillary break, shaping, and topsoil layers; and
- The proponent committing to returning radiation levels to natural background levels.

It is noted that the EPA also considered in Report 1580 the performance of the tailings storage facilities post-closure over a modelled period of 10,000 years and backfilling and rehabilitation starting after completion of the first tailings storage facility cell in year four of the proposal.

The EPA advised, in response to appeals, that it independently conducted its assessment, based on a range of different technical and scientific studies and advice. As part of this process the EPA considered the statutory roles and responsibilities of relevant state government agencies and considered that the proposal could be adequately regulated under the Mining Act, given the clear statutory requirement in place.

The DMP in its advice to the EPA, confirmed that it can regulate mine closure for this proposal via the Mine Closure Plan required under the *Mining Act*. The DMP has noted that the provision of a Mine Closure Plan is a statutory requirement under the *Mining Act* and the Mine Closure Plan would need to be updated every three years to track the mine closure process.

The EPA and DMP stated in the *Mine Closure Guidelines* that mine closure planning is based on adaptive management and continual review and improvement throughout the life of mine. In line with this management approach, the mine closure plan will be a working document until closure.

The EPA noted in response to appeals, that a draft Mine Closure Plan was provided in the PER document, and that there was an opportunity for public comment on it during the public review period.

In response to concerns that the Mine Closure Plan is subject to assessment without public review, the EPA noted, in response to appeals, that the Conceptual Mine Closure Plan was made available for public review as part of the PER process.

The DMP, in its review of the Revised response to Submission, identified stakeholder consultation in relation to acceptance of post-mining land use and objectives as an area requiring further work. It is noted that the Mine Closure Guidelines include requirements for stakeholder engagement prior to the submission of revisions of the Mine Closure Plan.

It is also noted that should the proposal be implemented, DMP has the ability to make reviewed Mine Closure Plans publicly available.

With respect to outcomes and reporting for mine closure, the proponent submitted baseline data in the PER, including ground-level gamma radiation levels, measured radionuclide concentrations from dust monitoring, radon concentrations measured in air and radionuclide concentrations in groundwater, soil and vegetation.

Report 1580 identified the proposed tailings storage facilities cover system design, providing radiation control, sufficient that estimated radon emissions from the closed tailings storage facility would not exceed natural background levels. In relation to the timeframe for reporting,

it is noted that the *Mine Closure Guidelines* require for completion criteria to be achievable and time-bound to ensure that criteria can be monitored over an appropriate time frame.

In relation to application of the precautionary principle, the EPA advised, in response to appeals, that it has applied the precautionary principle to Rehabilitation and Decommissioning, that it does not pose a threat of serious or irreversible damage to the environment and that the health, diversity and productivity of the environment can be maintained if the recommended Mine Closure Plan is prepared and implemented in accordance with the *Guidelines for Preparing Mine Closure Plans*, May 2015.

Conclusion

From the information presented in respect to this ground of appeal, it is noted that the EPA independently had regard to rehabilitation and closure, that the public had opportunity to comment on the draft Mine Closure Plan, that the DMP have statutory obligations for regulation of mine closure and confirmed that it can regulate mine closure for this proposal via the Mine Closure Plan required under the *Mining Act*.

In relation to tailings storage facilities, it is noted that the EPA had regarded to comments submitted during public and government agency review of the PER. The EPA did however also consider the conservative assumptions used and the scale of the predicted impact to groundwater. The EPA, in forming its view that the below-ground tailings storage facility is a viable solution, had particular regard to:

- The limited scale of the impact to groundwater, predicted as ten to hundreds of metres from the mine pit edge;
- Long-term landform evolution modelling over a period of 10,000 years; and
- Results of a post-closure radiation assessment.

Having regard to the information above, it is considered that the EPA appropriately considered the potential impacts associated with rehabilitation, mine closure and tailings storage facilities.

However, noting the proponent' commitment to undertake the research to inform the design and operation of the tailings storage facility, it is recommended that this ground of appeal be allowed to the extent that a condition with the objective of 'minimising impacts to ground water as far as practicable from the design and operation of the tailings storage facility', be added. The achievement of this objective would require the development of a Tailings Storage Facility Management Plan in consultation with the DMP and including the details of the research plan to inform the design and operation of the tailings storage facility.

GROUND 8: REGULATORY FRAMEWORK

Various appellants raised concerns regarding the capacity of the current regulatory framework to ensure that potential environmental and human health impacts from the proposal can be managed effectively. Appellants contend that the project should be rejected on the basis that the existing regulatory framework does not meet the government's commitment to deliver World's Best Practice for uranium mining. In addition, appellants contended that the EPA deferred aspects of the proposal to other agencies for assessment.

Appellants also objected to the use of the term 'as far as practicable' in conditions as the proponent would be provided with an option to decide that a specific action is 'impracticable'. Appellants sought for the EPA to be specific and explicit about what is meant by 'practicality' if this term is included in recommended conditions.

Consideration

The EPA, in their response to appeals, confirmed that, in undertaking its assessment, the EPA considered the significance of the proposal's impacts on key environmental factors, the proposed mitigation strategies and determined if the proposal can meet its objective in each case. It is noted that the assessment is consistent with the EPA's Environmental Assessment Guideline (EAG) 8 – *Environmental principles, factors and objectives* and EAG 9 *Application of a significance framework in the EIA process*.

The EPA advised that it independently conducts its assessment, based on a range of different technical and scientific studies and advice. As part of this process the EPA considered the statutory roles and responsibilities of relevant state government agencies and then considered whether to recommend a ministerial condition in Report 1580 or whether the proposal can be adequately regulated through other processes.

In making this decision a decision about whether a proposal can be adequately regulated through other processes the EPA advised that it considers the capacity and experience of the regulator including:

- whether the regulator has established policies and guidelines to support its regulatory process related to the factor;
- whether the regulator has the technical skills and experience to manage the environmental impacts, particularly where non-standard technology is proposed or the type of proposal is not regularly considered by the regulator; and
- where the EPA considers that an opportunity for public comment is important, whether this is provided by the regulatory process

The current regulatory framework for mining activity in Western Australia has been established over time and is covered by several pieces of legislation. As with other resource projects in Western Australia, Uranium mining is subject to the multi-agency approval process to ensure that amongst other things, the environmental impacts of uranium mining are managed and mitigated. Environmental and human health aspects of the Extension to the Wiluna Uranium Project will be managed under the following key legislation:

- *Environmental Protection Act 1986*;
- *Mining Act 1978*; *Aboriginal Heritage Act 1972*;
- *Wildlife Conservation Act 1950*;
- *Rights in Water and Irrigation Act 1914*;
- *Mines Safety and Inspection Act 1994*;
- *Conservation and Land management Act 1984*;
- *Contaminated Sites Act 2003*;
- *Radiations Safety Act 1975*; and
- *Radiation Strategy (Transport of Radioactive Substances) Regulations 2002*.

The project will be subject to the environmental provision in the *Mining Act 1978*. The *Mining Act 1978* regulates effects on the environment through various provisions including allowing environmental conditions to be imposed on mining tenements, requirement for an approved mining proposal to demonstrate environmental mitigation and management prior to the commencement of works, requirement for annual environmental reporting and rehabilitation and environmental inspections for compliance.

The EPA advised that the Radiological Council is responsible for regulating the radiological aspects of the transport, mine closure and post closure monitoring, worker safety and public

safety. DMP is responsible for worker safety, aspects of public safety relating to the mine and mine closure under the *Mines Safety and Inspection Act 1994*.

To identify and manage risks specifically associated with human and non-human biota, radiation, EPA advised that a Radiation Management Plan (RMP) will be required to be assessed and approved by both the Radiological Council and DMP. Under the RMP, a radiation waste management plan and radiation protection program would be assessed in greater detail. Compliance with the Radiation Management Plan is subject to inspection by DMP officers.

Potential radiological impacts to human health, including exposure to radiological dust can also be regulated under DER and the DEE legislation.

The transport of uranium oxide product would be regulated by the Radiological Council regulated under the *Radiation Strategy (Transport of Radioactive Substances) Regulations 2002*.

The conservation, protection and management of water resources in Western Australia is regulated by the Department of Water, in particular the abstraction of water will be licenced. DMP and DoW have an Administrative Agreement in place for referral and advice on mining proposals and mine closure plans.

The appellants reference recent independent reviews of the existing regulatory framework, is understood to be a reference to the Uranium Advisory Group (UAG), led by the University of Western Australia, and CSIRO, who released its report (the UAG report) on the independent review of uranium mining regulation in Western Australia in April 2012.

In response to this element of the appeal EPA advised that the conclusions from the UAG review was that the regulatory framework was adequate to manage uranium mining in line with national and international standards. However the DMP should implement initiatives to improve transparency and communication, and look at adopting a risk-based approach to safety and environmental regulation. This is consistent with the findings of the previous 2009 Interagency Review.

EPA also advised that the DMP's response to the UAG Report has included actions that fall within its responsibilities, with the focus on improving efficiency and transparency of processes and it is understood that DMP has implemented a risk based and outcomes focused framework for environmental regulation, enhanced compliance powers and streamlined environmental approvals processes.

The DMP and Radiological Council have since developed a Memorandum of Understanding (December 2012) regarding radiation safety for mining operations working arrangements.

DMP advised that the regulatory regime and resources within the Department are more than adequate to manage potential safety and environmental impacts resulting from uranium mining throughout the life of the mine, including closure.

In relation to the use of the term 'as far as practicable', it is noted that the term 'practicable' is defined in the EP Act 1986 as follows:

practicable means reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge;

The EPA's approach to conditions is set out in *Environmental Assessment Guideline 11 - Recommending Environmental Conditions*. The Guideline outlines three model types for conditions:

1. Outcome-based conditions – these conditions identify a measurable environmental outcome that must be met (model 1);
2. Management-based conditions – these conditions identify a environmental objective that must be met; (model 2); and
3. Prescriptive conditions – these conditions require the implementation of specified actions or procedures (model 3).

While the EPA's preference is to set outcome-based conditions, it is recognised that this is not always possible. With respect to Model 2, EAG 11 states: 'The environmental objective in a model 2 condition will generally be expressed in terms such as 'minimising impacts as far as practicable' on an element of the environment, for example flora, vegetation or fauna.'

Conclusion

Based on the review of the regulatory framework in place to support existing uranium mining and the improvements that have been applied since the various reviews undertaken for regulation of uranium mining, it is considered that the EPA has appropriately applied EAG 8 and 9 in its assessment of the Revised Wiluna Uranium Mine Project.

In considering whether there is another statutory regime capable of regulating impacts from a particular factor, it is considered that the EPA has independently assessed impacts and had appropriate regard for the capacity of other agencies to adequately regulate environmental and health impacts from uranium mining. It is also applied conditions to the proposal consistent with EAG 11.

It is therefore recommended that this ground of appeal be dismissed.

OTHER MATTERS

Assessment process

An appellant contended that there are major flaws in the assessment process, including a potential manipulation by the proponent during site visits, a denial of procedural fairness and a lack of transparency.

The appellant submitted that the EPA's decision is vulnerable to influences from the economic downturn and subject to pressure as a refusal of the expanded proposal would call into question the decision of the first phase. It was further contended that the proponent has not adequately responded to concerns raised on information in the PER, and provided dismissive responses.

The EPA advised, in response to appeals, that it undertook the assessment consistent with the EP Act and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012* (Administrative Procedures 2012). Appendix 3 of Report 1580 showed how the EPA has had regard to the principles of the EP Act, including the precautionary principle, the principle of intergenerational equity and the principles of the conservation of biological diversity and ecological integrity.

The EPA rejected any suggestion that its decision making has been distorted either through interaction with the proponent, or through the economic downturn. The EPA advised that the proponent's response to submissions is provided for information only and does not form part of the EPA's report and recommendations.

Relevant significant environmental issues identified from this process have been taken into account by the EPA during its assessment. It is noted that the EPA required the proponent to submit additional information in relation to a number of issue, including flora and vegetation and subterranean fauna.

Uranium industry, lifecycle and waste

A number of appellants contend that EPA should have considered the whole of life cycle for uranium and the potential global impacts on human health and the environment. Many appellants referred to the impacts of the 2011 nuclear incident at Fukushima, issues of nuclear waste disposal and proliferation of nuclear weapons. It was also contended that EPA should have considered alternative sustainable energy sources with a focus on developing these projects over uranium.

In response to this matter the EPA noted the issues raised by appellants have been previously raised in public submissions and are outside of the scope of its assessment. The EPA's role includes conducting environmental impact assessments, preparing statutory policies for environmental protection, preparing and publishing guidelines for managing environmental impacts, and providing strategic advice to the Minister for Environment. The EPA has undertaken an environmental impact assessment of this proposal in accordance with Part IV of the EP Act and the *Administrative Procedures 2012*. The proposal is to mine four poly-metallic deposits containing commercial concentrations of uranium and to produce UOC and other metal concentrates. It does not include the consideration of the uranium or other metals life cycle.

The EPA further advised that the object of the EP Act is stated in s4A of the Act, and is to 'protect the environment of the State'. While broader issues associated with proposals can be considered by the Minister under s45 of the EP Act, it is not the role of the EPA to take into account environmental matters beyond the jurisdiction of the State. The EPA advised that in this case it determined the key environmental factors to assess the environmental acceptability of the proposal.

Lifecycle and global implications of uranium mining such as the generation of nuclear waste, the wider nuclear cycle, nuclear incidents and proliferation of nuclear weapons are issues outside the scope of the EPA assessment for this proposal. However, the life cycle of uranium would be subject to Commonwealth legislation, such as the *Nuclear Non-Proliferation (Safeguards) Act 1987* and Bilateral Co-operative Agreements with export countries.

Economics of the uranium industry

Appellants contended that the proposal may not be viable in the current economic situation for uranium. An appellant submitted that the international uranium industry is characterised by oversupply, stockpiling, falling uranium prices and uranium price forecasts that have been adjusted downward by an economic strategist to at least 2019²². The appellant noted that the current Australian uranium industry accounts for just 0.2 % of national export revenue and less than 0.01 % of all jobs in Australia.

Some appellants acknowledged that the EPA cannot consider economic conditions in making its assessment, while others contended that the EPA should consider relative information, such as uranium pricing. Appellants requested the Minister for Environment to

²² <http://www.economiccalendar.com/2016/07/27/uranium-prices-remain-below-cost-of-production-recovery-is-years-away/>

consider the risk of premature closure that is exacerbated by the instability in the uranium price, the negligible employment benefits and the economic outlook for uranium.

The EPA noted, in response to this matter, that commercial considerations relating to the economic viability of the proposal are outside the scope of the EPA's assessment under the EP Act.

Rehabilitation costs and financial assurance

Appellants submitted that, based on the contention that no uranium mine has been successfully rehabilitated that mine closure and rehabilitation should be provided for financially, prior to approval, otherwise in their view taxpayers are likely to be financially responsible for the rehabilitation costs. An appellant requested the Minister for Environment to consider that one abandoned uranium mine, with in their view extraordinary high costs of rehabilitation, could compromise the entire Mining Rehabilitation Fund. An appellant submitted that if the Minister approves the Extension to the Wiluna Uranium Project, applying a 100% bond to the proposal is the best way to provide certainty, to ensure rehabilitation of the site, and to maintain the Mining Rehabilitation Fund for other much needed rehabilitation work on Western Australia's approximately 11,000 abandoned mines¹⁷.

In response to this matter the EPA noted that the proponent has a responsibility under the EP Act to fulfil conditions applied under that Act. Failure to meet conditions, including rehabilitation and closure conditions, can result in enforcement actions. If requirements for rehabilitation and closure under the Mining Act are not met, they too are subject to enforcement actions. The DMP also has provisions to apply bonds in the event that a mine site represents a suitable degree of closure risk.

CONCLUSION AND RECOMMENDATIONS

Having regard to the information and advice presented in respect to the appeals from appellants, relevant Government agencies and the proponent, it is considered that the EPA had sufficient information to assess the proposal, that its conclusion that the proposal may be implemented subject to the recommended conditions is supported.

It is noted that there is an established regulatory framework in place to adequately manage and mitigate potential risks from the proposal which provided confidence that potential impacts related to human health, flora and vegetation, fauna, groundwater drawdown and hydrological processes, Aboriginal heritage, rehabilitation and closure and transport risks, can be adequately managed.

However, having had regard for all of the information presented and for the reasons detailed in this report, it is recommended that the appeals be allowed to the extent that the conditions should be amended as set out below.

Flora and vegetation

- Condition 9-2 be amended to include a suitable buffer to ensure that the *Tecticornia* sp. aff. *Burnerbinmah* 'inflated fruit' buffer zone remains contiguous to the land mass outside the mine pit.

Hydrological processes, water use and quality

Surface water

- Condition 11 is amended to remove references to surface water from 11-1 (1); 11-1 (2) and 11-3 (10) and that these requirements are included, where relevant, in condition 12; and

- Condition 12 is amended to include an additional objective that 'avoidance of impacts to the hydrological regimes and quality of surface water as far as practicable'.

Groundwater

- amend the title of condition 11 by amending the title to 'Groundwater drawdown' ensuring broader consideration in the relevant management plan than abstraction alone;
- Amend condition 7 by removing condition 7-1 (2) and amend condition 11 by adding and amending condition 7-1 (2) as an outcome to specify that the proposal should be managed in 'a manner that ensures there is no adverse impact to inferred groundwater dependent vegetation and subterranean fauna habitat outside 0.5 m Relative Level (mRL) groundwater drawdown contours as shown in Figure 2.

Tailings, rehabilitation and closure

- Add a management-based condition with the objective to minimise impacts to groundwater as far as practicable from the design and operation of the tailings storage facility. This condition should include a require to development a Tailings Storage Facility Management Plan in consultation with the DMP and include the details of a research plan to inform the design and operation of the tailings storage facility.

It is otherwise recommended that the appeals be dismissed.

Following the determination of these appeals, the decision as to whether or not the proposal may be implemented, and the precise wording of the conditions which apply to any such implementation, is made under section 45 of the Act.

Emma Gaunt
APPEALS CONVENOR

Investigating Officer:

Annarie Boer, Senior Appeals Officer

APPENDIX 1 - LIST OF APPELLANTS

- Environment House
- People for Nuclear Disarmament (WA)
- Kerrie-Ann Garlick
- Marcus Atkinson
- Anna Claire Hunter
- James Toren
- William Taylor
- Philippa Lucy Hancock
- Sam Glenister
- Brenda Conoche
- Robert Gulley
- Beth Tilley
- Conservation Council of Western Australia
- Karen Davis