DRAFT RECOMMENDATION REPORT

The clearing of vegetation at Kingvale Station, Queensland (Lot 1 on Survey Plan 280074) (EPBC 2016/7751)

RECOMMENDATION

That the proposed action, to undertake the clearing of vegetation at Kingvale Station (Lot 1 on Survey Plan 280074, Queensland) as described in the notification of referral decision [EPBC 2016/7751] (Attachment A) be approved subject to the conditions specified below.

Conditions	**Relevant paragraph in report**
1. The person taking the action must not **clear** more than 1,846 hectares on Kingvale Station (Lot 1 on Survey Plan 280074, Queensland). All **clearing** must be within the 'area of land use change' shown at Map 1 and have a gradient not more than two per cent.	7.117
2. a. The person taking the action must not **clear** within a 100 metre **buffer** from the **defining bank** of any **watercourse** or **natural wetland**. b. Within the **buffer** and in other areas not included in the 'area of land use change' at Map 1, the person taking the action must ensure that at all times of year at least 50 per cent **groundcover** of **native vegetation** is maintained.	7.117, 10.14, 10.22, 10.24, 10.34, 10.41, 10.47, 10.56, 10.67
3. a. The person taking the action must design and locate any new linear infrastructure including roads, tracks, fence lines and firebreaks in accordance with the **Queensland Soil Conservation Guidelines** Chapter 14 *Property Infrastructure.* b. The design and location of the **linear infrastructure** must be determined by a **suitably qualified person**.	7.117
4. a. After **clearing** and at least two months before the commencement of the following **wet season**, the person taking the action must use **contour banks** on **cleared** land to manage water flow within the 'area of land use change' shown at Map 1. b. The design and location of **contour banks** must be determined by a **suitably qualified person** and must be in accordance with the **Queensland Soil Conservation Guidelines** Chapter 7 *Contour Banks*. c. The person taking the action must ensure that all **contour banks** are repaired and maintained before the **commencement** of each **wet season**.	7.117

5. The person taking the action must: i. ensure there is at least 50 per cent **groundcover** on all **cleared** land before the **commencement** of the first **wet season** following **clearing**; ii. use **minimum tillage practices** and **cover crops** to maintain at least 50 per cent **groundcover** on all **cleared** land at all times.	7.117
6. The person taking the action must ensure that any **active erosion** in land identified as A3, A4 or A5 in Map 2 is repaired and stabilised before the **commencement** of each **wet season**.	7.117
7. Within 30 days after the **commencement** of the **action**, the person taking the action must advise the **Department** in writing of the actual date of **commencement**.	
8. The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval and make them available upon request to the **Department**. Such records may be subject to audit by the **Department**, or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **Department**'s website. The results of audits may also be publicised through the general media.	
9. Non-compliance with any of the conditions of this approval must be reported to the **Department** within 30 days of the person taking the action becoming aware of any non-compliance.	
10. Upon the direction of the **Minister**, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor and audit criteria must be approved by the **Minister** prior to the commencement of the audit. The audit report must address the criteria to the satisfaction of the **Minister**.	
11. If, at any time after 5 years from the date of this approval, the person taking the action has not substantially **commenced** the **action**, then the **person taking the action** must not **substantially commence** the **action** without the written agreement of the **Minister**.	

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Definitions:

Active erosion	Erosion that has occurred since the **commencement** of the action.
Buffer	An area reserved from **clearing** to minimise erosion and sedimentation of **watercourses**.
Clear, cleared or clearing	The cutting down, felling, thinning, logging, removal, killing, destroying, poisoning, ringbarking, uprooting or burning of **native vegetation**.
Commencement/ Commence	The first instance of any works that will reduce **groundcover** or woody vegetation or disturb the soil (or both), within the 'area of land use change' shown at Attachment A.
Contour banks	A grassed strip or constructed earth embankment which typically traverses a slope on or close to the contour to control or prevent (or both) the erosion of that slope.
Cover crops	A crop planted to keep nutrients from leaching, soil from eroding and weeds from establishing.
Department	The Australian Government Department or any other agency administering the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) from time to time.
Defining bank	The outer bank of a **watercourse** or **natural wetland** defined by a scour mark, depositional feature or floodplain.
Groundcover	Any plant material, alive or dead, on or near the soil surface that protects the soil against the erosive action of raindrops and overland flow. Average groundcover density must be measured using the Victorian Groundcover Measuring Tool. http://agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/erosion/groundcovering-measuring-toolper square metre
Minimum tillage practices	Soil conservation systems that use the minimum soil manipulation necessary for successful crop production and do not involve turning soil over.
Minister	The Minister administering the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and includes a delegate of the Minister.
Native vegetation	All naturally occurring local native plants, from small ground covers and native grasses to large trees.
Natural wetland	Areas that are permanently or intermittently inundated with water (whether static or flowing) and indicated as natural wetland in Map 1.

Queensland Soil Conservation Guidelines	Carey, BW, Stone, B, Norman, PL & Shilton, 2015, *Soil conservation guidelines for Queensland*, Department of Science, Information Technology and Innovation, Brisbane, Australia. https://publications.qld.gov.au/dataset/soil-conservation-guidelines
Suitably qualified person	A person with tertiary qualifications that include soil conservation earthworks design, erosion and sediment control design or similar qualification that demonstrates the expertise required and at least five years employment in a relevant position.
Watercourse	Areas shown as watercourses in Map 1.
Wet season	The wet season generally occurs in the period commencing on 1 November and ending on 30 April each year.

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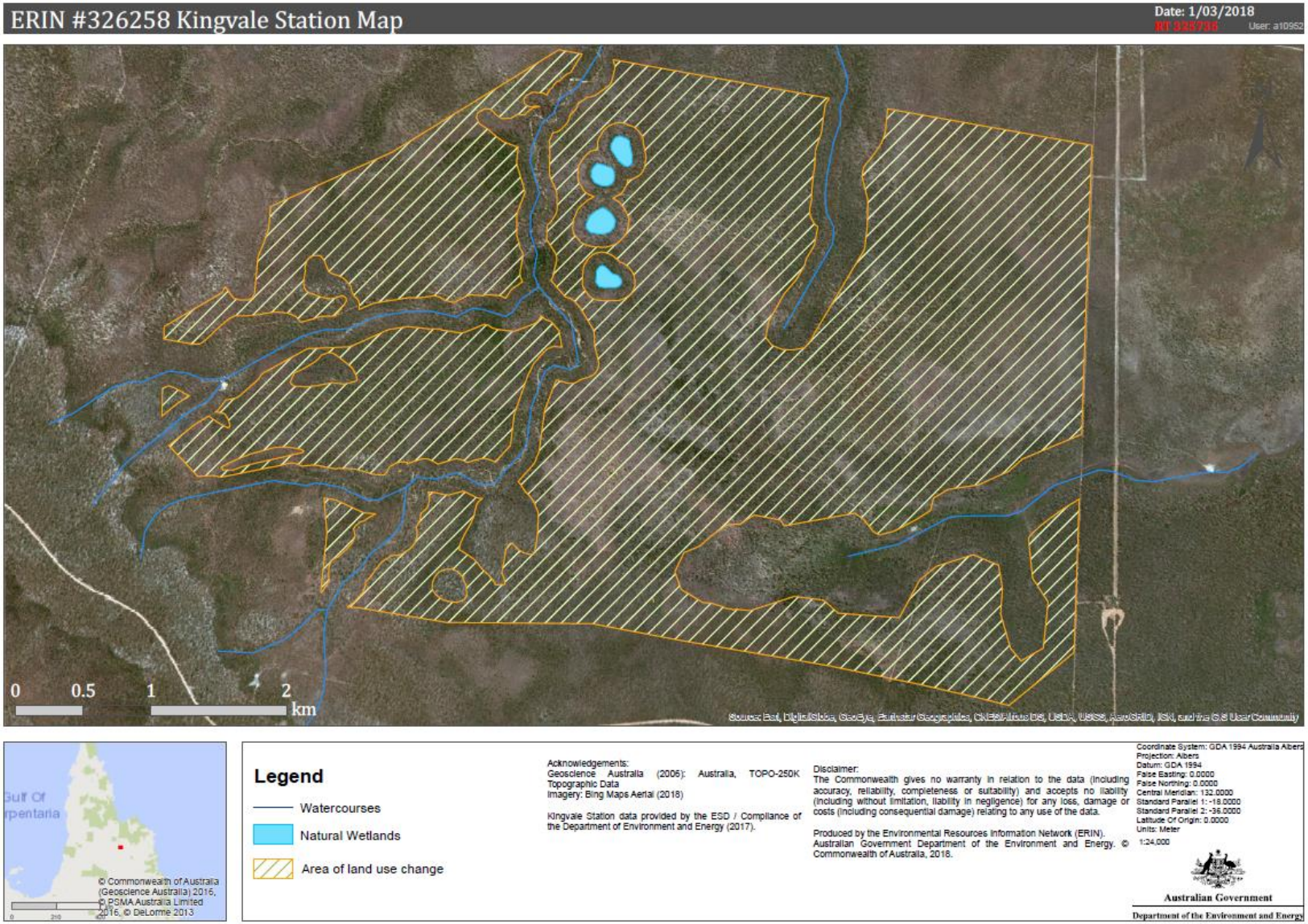
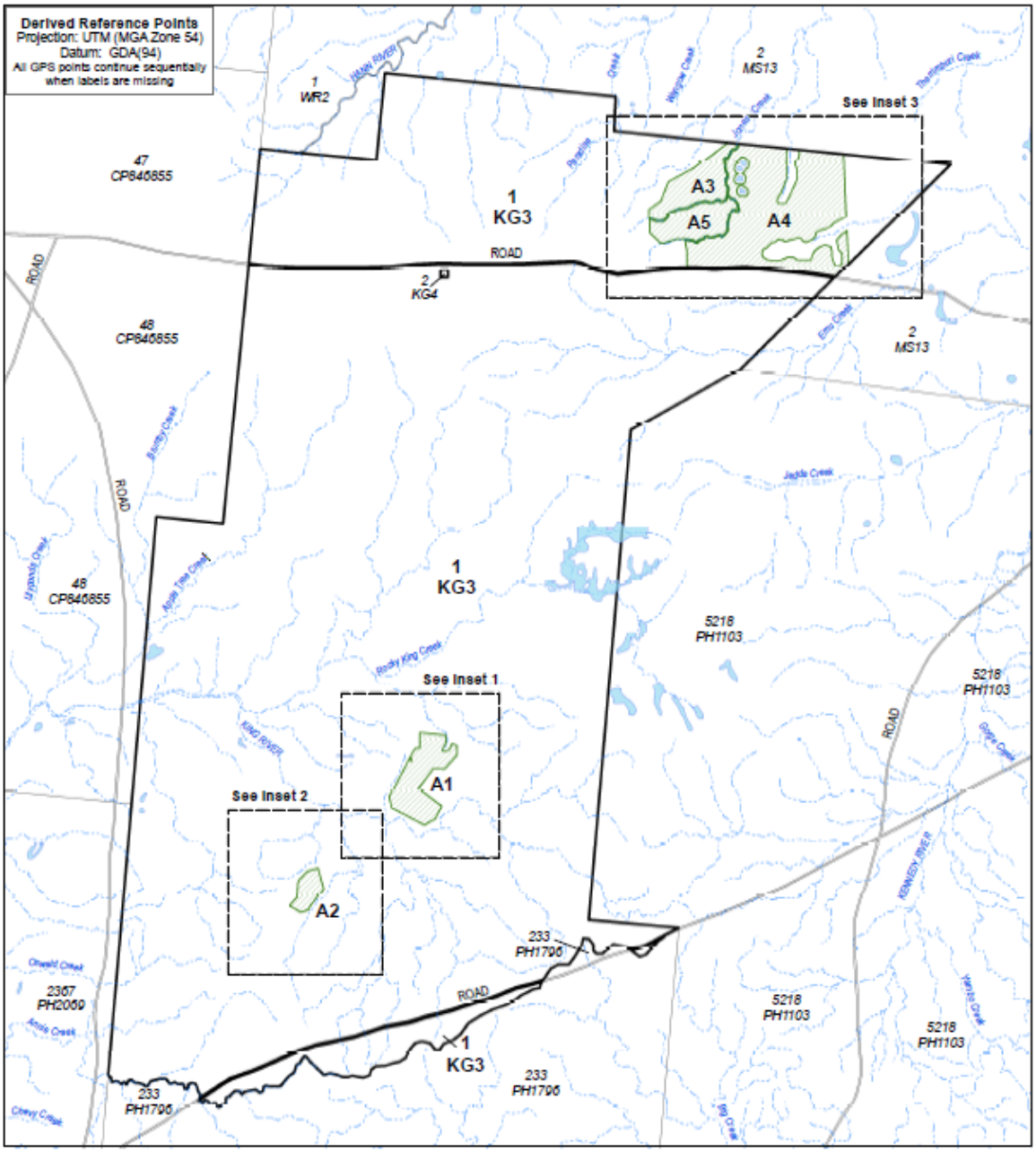
Map 1: Land use change area, watercourses and natural wetlands



Map 2: Areas A3, A4 and A5, Kingvale Station



1:130000 @ A3 size

0 1 2 3 4 5 6 7 8 9 10 km

Projection: UTM (MGA Zone 54) Datum: GDA94

Note: Derived Reference Points are provided to assist in the location of the Referral Agency Response boundaries. Responsibility for locating these boundaries lies solely with the landholder and delegated contractor(s).

The property boundaries shown on this plan are APPROXIMATE ONLY. They are NOT an accurate representation of the legal boundaries.

Note: This plan must be read in conjunction with Referral Agency Response 2014/000805

LEGEND

- Derived Reference Points for GPS
- Subject Lot(s)
- Area A
- Watercourse
- Wetlands

Referral Agency Response (Vegetation) Plan

Plan of Area A (Parts A1 - A5) in Lot 1 on KG3

N

Queensland Government

CENTRE: TOWNSVILLE LOCALITY OF LAURA	REGION: NORTH LOCAL GOVT: COOK SHIRE
Map Reference: 7566,7666,7766	Compiled from: DCDB, PVMP & VMO Notes
File Reference: 2014/000805	Prepared by: EMR Date: 3 March 2014

RARP 2014/000805
Sheet 1 of 3

1. BACKGROUND

1.1 On 16 April 2014, the Queensland Department of State Development, Infrastructure and Planning granted Mr Harris (the proponent) a development permit for operational work – clearing vegetation for the purposes of high value agriculture on Lot 1 of Kingvale Station (Queensland Development Permit [SDA-0214-008018]) (Attachment C), an area of approximately 2,863 hectares (ha) (Figure 2).

1.2 The Department has been in correspondence with the proponent and his representatives about whether the proposed action is a controlled action since 6 May 2015. Authorised officers under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) attended at Kingvale Station in December 2015 under a monitoring warrant, accompanied by Dr Jeffrey Shellberg, fluvial geomorphologist and Dr Bruce Thompson, ecologist.

1.3 Dr Shellberg provided advice about the potential erosion risk from the proposed action, and potential downstream risks to the Great Barrier Reef. Dr Thomson provided advice about the risks to listed threatened species from the proposed action. Copies of these reports were provided to the proponent.

1.4 On 23 June 2016, the proponent was requested to refer the clearing of the northern area proposed for clearing (approximately 2,100 ha), pursuant to section 70(1) of the EPBC Act.

1.5 On 13 July 2016, the proponent, through his solicitor, notified the Department that he did not intend to refer the proposed action.

1.6 On 8 August 2016, the delegate for the Minister determined that the proposed clearing and cropping on the northern part of Kingvale Station (approximately 2,100 ha) was deemed to have been referred under section 70 of the EPBC Act.

1.7 On 21 December 2017, the delegate for the Minister determined that the proposed action was a controlled action under section 75 of the EPBC Act because it was likely to have a significant impact on a world heritage property, a national heritage place, the Great Barrier Reef Marine Park and listed threatened species and communities.

2. Site specific information available to the Department

2.1 To inform the Department's consideration of the impacts of the proposed action, site specific advice was sought from several relevant experts. In addition, site specific advice prepared for the proponent was provided to the Department.

2.2 The site specific advice includes:

a) Peter Spies, Pinnacle Pocket Consulting provided the following advice:

(i) Spies, P. Pinnacle Pocket Consulting (2014). *Proposed Dryland Cropping of Sorghum and Forage Sorghum for green chop at Kingvale Station west of Laura.* Prepared for the proponent's Queensland Government Development Permit application (SDA-0214-008018) (Attachment E01).

(ii) Spies, P. Pinnacle Pocket Consulting (2015). *Assessment of Species and species habitat present on Kingvale. CAS 2097.* Prepared for the proponent and provided to the Department of Environment and Energy (Attachment E02).

b) Dr Jeffrey Shellberg, fluvial geomorphologist and adjunct Research Fellow with the Australian Rivers Institute of Griffith University provided the following advice:

(i) Shellberg, J. (2016). *Soil Erosion and Downstream Sedimentation Risk Associated with Proposed Vegetation Clearing for Agricultural Development on Kingvale Station, Lot 1 on Plan KG2, Cape York Peninsula.* Prepared for the Department of the Environment. January 2016 (Attachment E03).

(ii) Shellberg, J. (2017) Review of Buffer Zone Adequacy to Reduce Soil Erosion and Downstream Sedimentation Risks Associated with Proposed Vegetation Clearing for Agricultural Development on Kingvale Station, Lot 1 on Plan KG2, Cape York Peninsula. Prepared for the Department of the Environment and Energy (Attachment E04).

(iii) Shellberg, J. (2018) *Estimating the relative magnitude of expected increases in soil erosion from tree clearing and agricultural development on Cape York: Background Literature Review*. Prepared for the Department of the Environment and Energy (Attachment E05).

c) Dr Bruce Thomson, Director and Principal Scientist, Redleaf Environmental provided the following advice:

(i) Thomson, B. (2015) *Kingvale Station - MNES Preliminary Survey, December 2015, and assessment of species occurrence.* Redleaf Environmental. Prepared for the Department of the Environment. (Attachment E06)

d) Dr Robert Loch, Soil Scientist and Director of Landloch Pty Ltd provided the following advice:

(i) Loch, R. (undated) Kingvale Station – *Geomorphology and hydrology assessment of potential impacts of proposal to clear approximately 2100ha for agricultural development.* Prepared the Department of the Environment and Energy. (Attachment E07)

(ii) Loch, R. (2017) *re: Kingvale Station Development Proposal.* Advice provided to the Department of the Environment and Energy dated 1 December 2017. (Attachment E08)

e) Dr Noel Preece, Terrestrial ecologist and Director of Biome5 Pty Ltd provided the following advice:

(i) Preece, N. (2016) *Kingvale Station Matters of National Environmental Significance. Stage 1 – Reconnaissance survey, desktop study and report.* Prepared for the Department of the Environment. (Attachment E09)

f) Shane Garozzo, Rural Development Consultant and Director ILA Consulting provided the following advice:

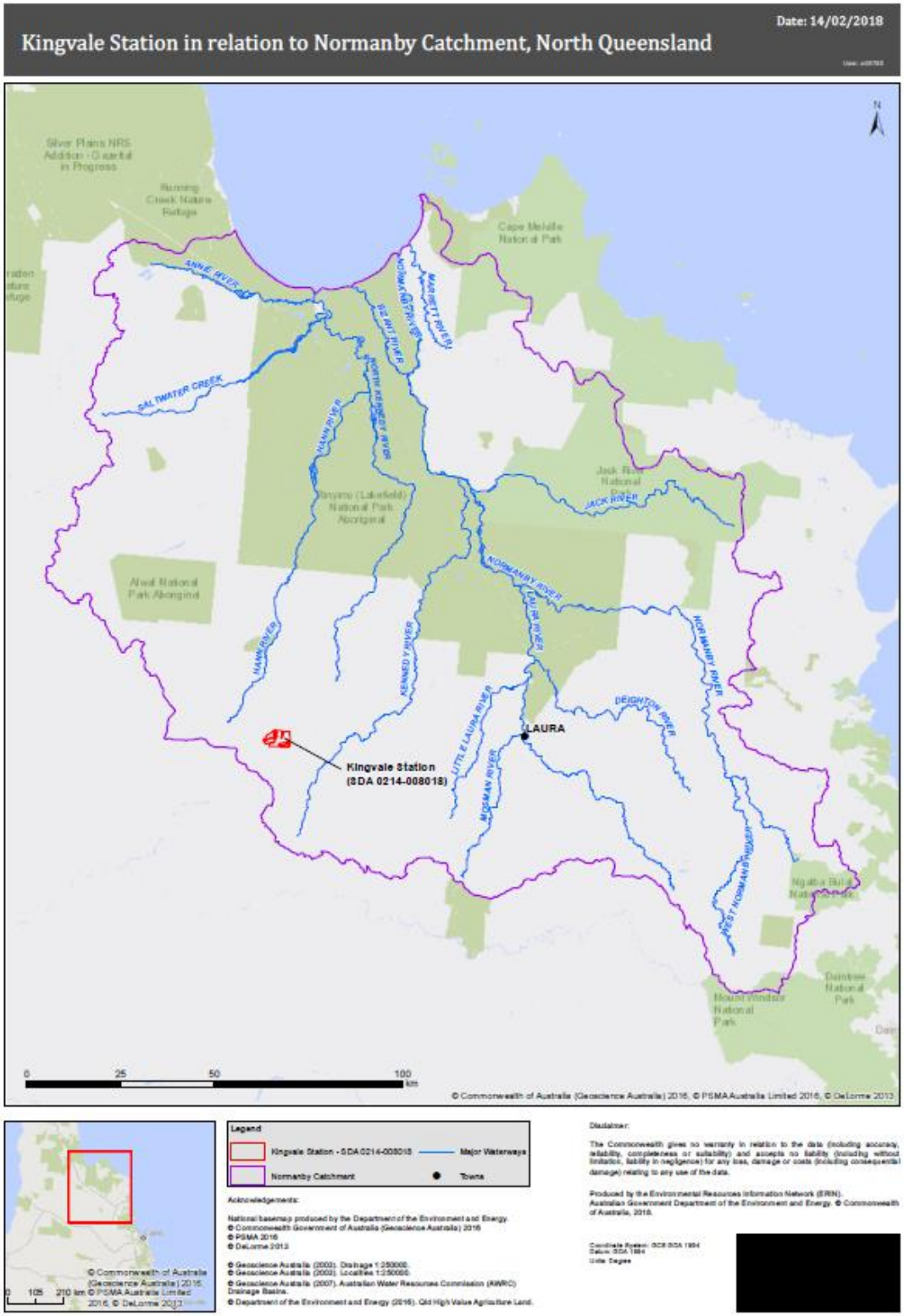
(i) Garozzo, S. (2017). *Slope and Watercourse Assessment of DPP 2014-000805 Sub Areas A3, A4 and A5 – Kingvale Station.* Prepared for the proponent, August 2017 (Attachment E10).

3. Description of the proposal and location

Location

3.1 Kingvale Station is approximately 23 kilometres (km) south-west of Laura on Cape York Peninsula, Queensland (Figure 1).

Figure 1: Kingvale Station Queensland Development permit area in relation to Normanby Catchment



Description of the proposed action

3.2 The proposed action was described as follows in the deemed referral notice:

> *The clearing of vegetation at Kingvale Station (Lot 1 on Survey Plan 280074, Queensland) as described in the development permit issued to Mr Scott Alexander Harris on 16 April 2014 by the Queensland Department of State Development, Infrastructure and Planning, to the extent that it occurs in the areas identified as A3, A4 or A5 on the map (see Attachment 1), the subsequent use of that cleared land for the production of sorghum, and intensification of cattle grazing.*

3.3 The description of the proposed action was subsequently refined to the following in the section 75 notice:

> *The clearing of vegetation at Kingvale Station (Lot 1 on Survey Plan 280074, Queensland) as described in the development permit issued to Mr Scott Alexander Harris on 16 April 2014 by the Queensland Department of State Development, Infrastructure and Planning, to the extent that it occurs in the areas identified as A3, A4 or A5 of the map (see Attachment 1) and the subsequent use of that cleared land for cropping and other agricultural activities.*

3.4 The key difference between the description of the proposed action in the deemed referral notice, and the description in the section 75 notice, is the removal of the reference to 'intensification of cattle grazing'. The delegate for the Minister accepted the proponent's submissions that the proposed clearing won't result in the intensification of cattle grazing.

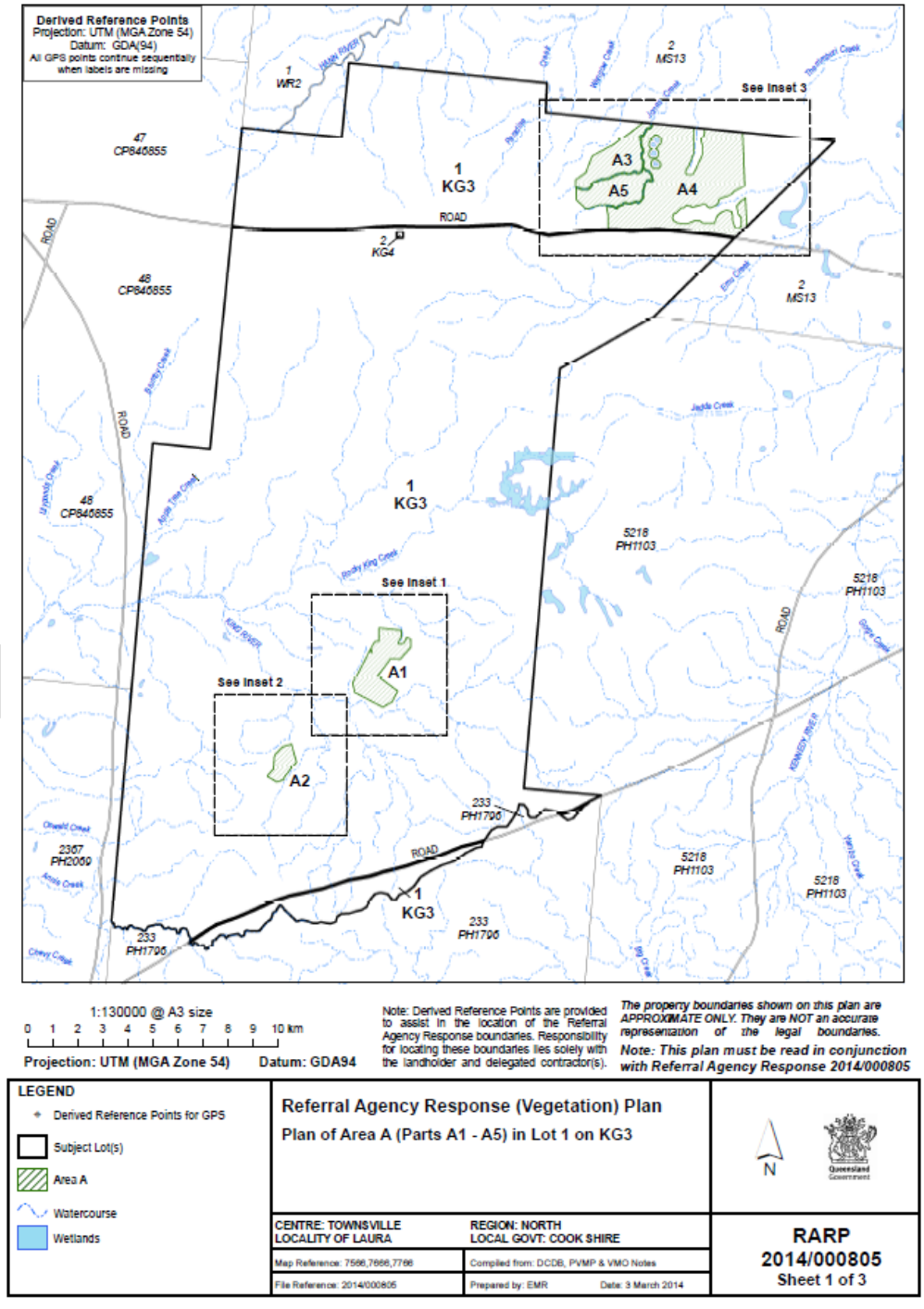
3.5 Documents submitted to the Queensland Government by the proponent as part of the Queensland Development Permit (SDA-0214-008018) describe the proposed action as follows:

> *Clearing is for broad acre cropping of rain-grown grain Sorghum and forage Sorghum for green chop (ensiling) as part of the "Strathmore" Harris Operations plan. Grain Sorghum will be stored on farm and silage pits will be established. Kingvale will be used as a holding depot for Cattle from Cape York until transported south to the main operation at "Strathmore", west of Georgetown.*
>
> *Timing of Operations*
>
> *Harris Operations will be employing practices that avoid soil compaction. The proposed timing of clearing and ground preparation for rain-grown (dryland) sorghum is as follows:-*
>
> *a. Pull timber after the wet season (after April) when it is dry enough to get dozers on country;*
>
> *b. September – burn the fallen timber. This avoids the more intense dry period later in the year;*
>
> *c. September – December – stick rake the area and ground preparation by using disc ploughs;*
>
> *d. On receipt of the first showers of rain the proponents will spray weeds with ground rig and start planting using a large Multiplanter (zero tillage machines that can direct sow and have high clearance); and*

e. Stubble will be retained following harvest/forage chopping throughout the year. Cattle will graze the residue sorghum stubble and reduce trash for the following cultivation/planting.

3.6 The Department considers that the proposed action, as described in paragraph 3.3, is not restricted to the initial clearing of vegetation and ground preparation as described in the State approval. Specifically, the Department considers that the proposed action includes the subsequent cultivation of sorghum in the cleared area, as well as the use of cattle to reduce sorghum stubble and trash.

Figure 2: Kingvale Station referral area (A3, A4 and A5)



Alternatives

3.7 No alternative to undertaking the proposed action has been put forward by the proponent.

4. Description of the environment

4.1 The proposed action is in the upper reaches of the Normanby catchment in the Cape York region, Queensland.

4.2 The Normanby catchment is located in the wet-dry tropics where climate is characterised by extreme wet (summer) and dry (winter) seasons with 95% of rainfall occurring between the months of November and April.

4.3 The Normanby catchment is Cape York's largest catchment and cover 24,399 km^2 (57% of the Cape York region). The catchment area is divided by two main waterways, the smaller Hann River in the north-western corner and the extensive reaches of the Normanby River that drain the rest of the catchment area.

4.4 Rainfall averages 1,104 millimetres (mm) a year, which results in river discharges to the coast of about 3,707 gigalitres (GL) each year.

4.5 In the Normanby Catchment, it is estimated that 76% of the land area is used for grazing, 0.14% for horticulture, and the remaining for natural conservation and forestry (Shellberg 2016). Horticulture (bananas, passion fruit, etc.) within the catchment is mainly limited to the rich clay soils around Lakeland, on the upper reaches of the Laura River.

4.6 The action area on Kingvale Station is within the Hann River catchment. Other parts of Kingvale Station have a generally westward water flow, away from the Great Barrier Reef, and clearing in these areas is not part of the proposed action.

4.7 The proposed action is located just below the eastern edge of the Kimba Plateau. The action area drains via several watercourses into the Hann and Kennedy rivers which drain into the Great Barrier Reef (the Reef) approximately 200 km downstream at Princess Charlotte Bay.

Vegetation

4.8 The vegetation in the action area is broadly described as open Eucalypt forest and Melaleuca seasonal swamplands on sandplains, and Corymbia forest on basalt derived red earths and erosional surfaces (Thomson 2015).

4.9 The Queensland regional ecosystems in Table 1 were identified as occurring on the action area by Thomson in the following report: *Kingsvale Station – MNES Preliminary survey, December 2015, and assessment of species occurrence.*

Table 1: Regional ecosystems. Source: Thomson (2015)

Regional Ecosystem	Description
3.5.7	*Eucalyptus tetrodonta* +/- *Corymbia clarksoniana* woodland on sand plains
3.3.50	*Melaleuca viridiflora* +/- *Petalostigma pubescens* +/- *M. stenostachya* low open woodland on low plains
3.5.12	*Eucalyptus tetrodonta* +/- *Corymbia nesophila* +/- *C. clarksoniana* woodland on undulating rises
3.3.49	*Melaleuca viridiflora* low open woodland on low plains
3.12.10	*Eucalyptus cullenii* +/- *Corymbia clarksoniana* woodland on acid volcanic ranges
3.11.11	*Corymbia stockeri* +/- *Eucalyptus tetrodonta* woodland on hills and erosional surfaces
3.11.7	*Eucalyptus cullenii* and *Corymbia clarksoniana* woodland on low metamorphic hills and rises
3.3.25	*Eucalyptus leptophleba* +/- *Corymbia tessellaris* +/- *E. platyphylla* woodland on riverine levees and floodplains

4.10 Spies (2014) described the vegetation in the action area as:

> *"…….woodlands and tall woodlands on deeply weathered plateaus and remnants. The canopy is broken and made up mostly of the dominant* E. tetrodonta *and bloodwoods particularly Clarkson's Bloodwood* (C. clarksoniana). *The only other (but minor) constituent being Cooktown ironwood* (Erythrophleum chlorostachys)*, constantly present but never in abundance.*
>
> *Other large trees occurring singly or in small groups here and there are Cullen's ironbark* (E. cullenii), *Molloy Box* (E. leptophleba) *and some scattered Dallachy's gum* (C. dallachiana).
>
> *Of the smaller understory trees, those that are uncommon generally but common where found are* Acacia spp. (leptocarpa, platycarpa, calyculata?*),* Alphitonia sp. Terminalia spp. *Pandanus in drainage lines,* Melaleuca spp*, and* Grevillea spp*. There are occasional patches of* Petalostigma banksii *or Grewia.*
>
> *These woodlands best fit the RE descriptions within RE 3.5.7, 3.9.2, 3.5.12 and 3.3.49 in the drainage lines."*

4.11 The proposed clearing on Kingvale Station would increase the cleared area in the Normanby catchment by 8.5 per cent and would double the existing cleared area in the Hann sub-catchment (Shellberg 2016).

Elevation, slope and hydrology

4.12 The western portion of the action area is in the headwaters of the Jones Creek, a tributary of Wangow Creek which then flows to the Hann River. The south-eastern part of the action area drains via a tributary of Emu Creek to the Kennedy River.

4.13 Elevations within the proposed clearing area range from 150 m to 200 m with average slopes less than 1.2%, but with greater local slopes along banks of creeks and

drainage valleys (Shellberg 2016).

4.14 The majority of the action area consists of a gently rolling landscape with wide shallow ridges of sandy soils, periodic wetland pans on ridges and shallow valleys (dambos) and larger creeks. Dambos are seasonally waterlogged, predominantly grass-covered, shallow, linear depressions, commonly without a marked stream channel, that occur at the upper ends of a drainage system. Wetland pans are shallow, seasonally flooded, swampy closed depressions.

4.15 The definition of what is a watercourse and what constitutes a riparian environment is not distinct. Shellberg (2017) argues that in some cases the seasonally wet drainage depressions in the action area (dambos) could be classified as seasonal wetlands, depending on whether wetland plants and soils are present. The distribution of these seasonal wetlands on the action area has not been well documented.

Soils

4.16 Peter Spies, an agricultural consultant engaged by the proponent, reviewed the available soils information for the area and completed some on-site soil tests to assist the preparation of his land suitability report provided to support the proponent's Queensland Development Permit (SDA-0214-008018) application (Spies, 2014).

4.17 Three dominant soil types were identified by Spies as occurring in the action area (Figure 3).

a) Kimba (suitable for cropping) – a very deep sandy surfaced gradational red massive Kandosol. The soils of this family have well drained sand to sandy loam textures to depths of 60 centimetres (cm) or more and there is a gradual increase in clay, content to sandy clay loam or light clay in the subsoils.

b) Clark (suitable for cropping) – a very deep yellow Kandosol. These soils are similar to those of Kimba family but subsoils are yellowish brown or brownish yellow, more than 90 cm deep.

c) Lydia (not suitable for cropping) – a deep bleached gradational or duplex mottled hard setting grey soil.

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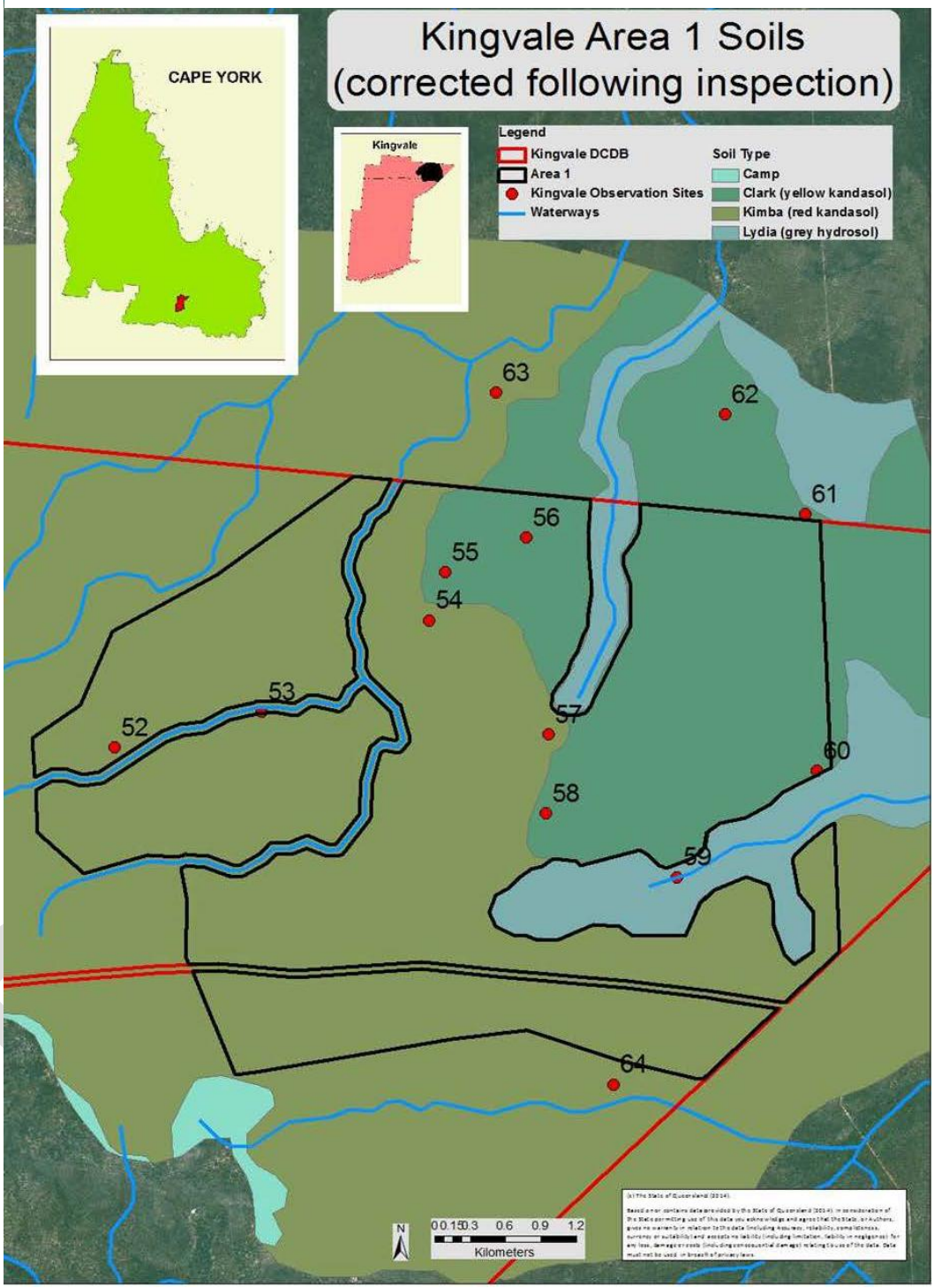
Figure 3: *Soils on referral area. Source: Spies 2014 Proposed Dryland Cropping of Sorghum and Forage Sorghum for green chop at Kingvale Station west of Laura*



5. Controlling provisions, assessment approach and public consultation

5.1 On 8 August 2016, the delegate for the Minister determined that the proposed action was deemed to have been referred under section 70(3) of the EPBC Act.

5.2 On 21 December 2017, the delegate for the Minister determined that the proposed action was a controlled action under section 75 of the EPBC Act.

5.3 The controlling provisions for the proposed action are as follows:

- sections 12 and 15A (World Heritage properties)
- sections 15B and 15C (National Heritage places)
- sections 24B and 24C (Great Barrier Reef Marine Park)
- sections 18 and 18A (Listed threatened species and communities).

5.4 Also on 21 December 2017, the delegate decided under section 87 of the EPBC Act, that the relevant impacts of the proposed action would be assessed on referral information.

Public submissions

5.5 The proposal was published on the Department's website on 8 August 2016 and public comments were invited until 22 August 2016. Approximately 6,100 public submissions were received. Most are campaign submissions. Seven non campaign submissions were received from environmental groups, individuals or parliamentarians.

5.6 The submissions raised issues including:

a) that the proposed clearing would cause increased sediment to flow into the Great Barrier Reef;

b) that the proposed clearing would cause further impact on coral that has recently suffered severe bleaching;

c) that the proposed clearing would result in loss of habitat for listed threatened species;

d) impacts related to altered hydrology;

e) that sediment and nitrogen pollution need to be reduced by 50 per cent and 80 per cent respectively, to meet the Reef 2050 targets that were put before the World Heritage Committee;

f) plans to strengthen Queensland's tree clearing laws failed and it is therefore crucial that the federal government ensures that sediment does not increase;

g) that a large amount of government funding has been spent addressing threats to the Great Barrier Reef, such as sedimentation, on Cape York Peninsula; and

h) whether there is evidence to indicate that any matters protected by Part 3 of the EPBC Act, apart from the Great Barrier Reef, are relevant to the proposed action.

Comments from Commonwealth Ministers

5.7 By letter dated 8 August 2016, the following Ministers were invited to comment on the referral:

a) The Hon Barnaby Joyce MP, then Minister for Agriculture and Water Resources; and

b) Senator the Hon Matt Canavan, Minister for Resources and Northern Australia.

5.8 Minister Joyce responded on 22 August 2016 and noted that:

a) the clearing of land at Kingvale Station as a proportion of the whole catchment represents a small area;

b) there is insufficient evidence to determine that the proposed action will cause a decline in water quality; and

c) the approval of land clearing at Kingvale Station by the State Government and subsequent intervention by the Commonwealth Government demonstrates the difficulties farmers face dealing with different jurisdictions.

5.9 Minister Canavan responded on 25 August 2016 and noted that:

a) there is insufficient evidence for the Minister to request the person proposing to undertake the action to refer the proposal;

b) that the level of significance was not established at the time the proposed action was deemed referred under the EPBC Act;

c) there is insubstantial evidence that the action in question may be or is a controlled action; and

d) he expects that a permit issued by the Queensland Government would have had environmental impacts investigated prior to the granting of the approval.

Comments from State Ministers

5.10 By letter dated 8 August 2016, Mr Chris Loveday, delegate of the then Queensland Minister for Environment and Heritage Protection was invited to comment on the referral.

5.11 Dr Bill Dixon, the then Queensland Department of Environment and Heritage Protection responded on 19 August 2016 and advised that the proposal will not be assessed using the Environmental Impact Statement (EIS) process in Chapter 3 of the *Environmental Protection Act 1994* (Qld) and that the Coordinator-General has not received a request for declaration of this proposal as a coordinated project under Part 4 of the *State Development and Public Works Organisation Act 1971* (Qld). He also advised that the Department of Infrastructure, Local Government and Planning has not advised that the proposed development will be assessed under Chapter 9, Part 2 of the *Sustainable Planning Act 2009* (Qld).

Submissions from the proponent

5.12 The proponent was invited by the Department to make submissions about whether the proposed action is a controlled action, and was advised of the particular controlling provisions likely to be of relevance, and the materials the Department proposed at that time to consider.

5.13 The proponent's solicitor made submissions on his behalf on 21 September 2016.

5.14 Those submissions summarised the proponent's position in four key points:

Submission 1 – The only proposed action which the Minister can properly consider pursuant to section 75 of the EPBC Act is that for which the proponent sought development approval from Queensland, being operational work – vegetation clearing for the purposes of high value agriculture (dryland sorghum);

Submission 2 – There have been no matters of national environmental significance identified on Kingvale Station in the material provided by the Department of the Environment;

Submission 3 – At no time prior to 6 May 2015 or since has the Minister undertaken an assessment of the State regulation or planning process that applied to the development approval to satisfy himself that the "risks" were not eliminated by the State regulation in response of the proposed tree clearing. The proponent has not pointed to any specific requirements to advance his case that the permit requirements eliminate these risks; and

Submission 4 – There is no evidence of a matter of national environmental significance on Kingvale Station that will, or may, suffer a significant impact as a result of the proposed tree clearing. Further, there is no evidence that the proposed tree clearing will, or may have, an impact upon any matter of national environmental significance.

5.15 The proponent made further submissions by his solicitor on 16 and 18 October 2016, 27 January 2017 and 18 September 2017 which both relate to Submission 2, and to processes by which matters of national environmental significance might be better scoped, and potential impacts on them mitigated.

5.16 The submission made by the proponent on 18 September 2017 also provided ground truthed slope data for the property prepared by Mr Shane Garozzo, ILA Consulting and advice provided by Dr Robert Loch, soil scientist and principal consultant of Landloch Consulting.

5.17 On 23 March 2018, the proponent submitted comments on a draft recommendation report, in particular proposed conditions.

State Assessment and Approval

5.18 The *Queensland Vegetation Management Framework Amendment Act 2013* (VMFA Act) was passed in May 2013 to facilitate the clearing of land for high value agriculture ventures.

5.19 Clearing for agricultural activities can occur in areas where the proposed development satisfies a range of criteria, including land suitability, demonstrating business viability and avoiding or minimising environmental impacts.

<u>Queensland Development Permit (SDA-0214-008018)</u>

5.20 On 16 April 2014, the Queensland Department of State Development, Infrastructure and Planning granted the proponent a Queensland Development Permit (SDA-214-08018) (Attachment C) for vegetation clearing for the purposes of high value agriculture (dryland sorghum) on Lot 1 of Kingvale Station, an area of approximately 2,863 ha.

5.21 The Queensland Development Permit (SDA-0214-008018) requires the clearing to be undertaken in accordance with the following conditions:

a) Vegetation clearing must only occur for high value agriculture to establish dryland sorghum crops within the area identified as Area A on the accompanying Referral Agency (Vegetation) Response Plan 2014/000805, dated 3 March 2014.

b) Vegetation clearing debris must not be pushed into gullies, watercourses, other drainage lines or waterlogged areas.

c) Where contractors, employees, subcontractors, agents or any other person, that is not the applicant or the permittee, are to be engaged or employed to carry out the clearing of any vegetation under this development permit, the permittee is to provide them with a copy of the permit, including the attached conditions and attached Referral Agency (Vegetation) Response Plan 2014/000805, dated 3 March 2014 and ensure that they are aware of what clearing is authorised by this development permit.

d) Vegetation clearing must be undertaken in accordance with erosion management actions outlined in the document 'Proposed dryland cropping of sorghum and forage sorghum for green chop at Kingvale Station west of Laura', prepared by Consultant Peter Spies, dated 5 February 2014 (Attachment E01).

The consultant's report provides the following measures:

- *using herbicide for weed control instead of tillage in most instances*
- *avoiding major farm works (that causes soil disturbance or loss of ground cover) during the wet season*
- *retain/maintain existing drainage pattern*
- *maintaining sufficient ground cover (crop cover of sorghum matched at time of highest rainfall during wet season) and through minimum or zero tillage practices*
- *fallow block management includes a cover or green manure crop established with minimum or zero cultivation during high rainfall risk periods (December to April)*
- *using herbicide or cattle grazing, rather than cultivation, for weed control or postharvest crop destruction instead of ploughing out*
- *any waterways, headlands, drains, etc. are well grassed and maintained in a stable condition*
- *using filter strips – of a suitable width and ground cover – to filter run-off before it enters a water body or watercourse (see maps at Attachment A of report by Peter Spies).*

6. ASSESSMENT

Mandatory Considerations – section 136(1)(a) Part 3 controlling provisions

6.1 In deciding whether to approve the proposed action, and what conditions to attach to such an approval, you must consider matters relevant to any matter protected by a provision of Part 3 that is a controlling provision for the action. The controlling provisions for the proposed action are set out in paragraph 5.3 of this report.

7. World heritage properties (sections 12 and 15A)

Great Barrier Reef World Heritage Area (GBRWHA)

7.1 Sections 12 and 15A of the EPBC Act provide that a person must not take an action that has, will have or is likely to have a significant impact on the world heritage values of a declared world heritage property.

7.2 The GBRWHA was declared a World Heritage Area in 1981, recognised by the World Heritage Committee for its outstanding universal value. It is listed for all four natural criteria below:

Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

Criterion viii: be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;

Criterion ix: be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals; and

Criterion x: contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

7.3 The GBRWHA stretches more than 2,300 km along the north-east coast of Queensland, from the tip of Cape York to just north of Bundaberg. Its width varies from around 90 km up to 300 km.

7.4 The world heritage values of the GBRWHA, being the natural and cultural values contained in the property, are the values the property has as a result of meeting the above criteria, as well as the property's integrity. These values contribute to the property's Outstanding Universal Value (OUV). The protection and management regime in place for the property aims to protect its OUV.

7.5 In 2014, the Australian Government, including the Great Barrier Reef Marine Park Authority (GBRMPA), and the Queensland Government completed a Comprehensive Strategic Assessment of the GBRWHA and adjacent coastal zone (GBR Strategic Assessment). In addition, the Great Barrier Reef Outlook Report (2014) (Outlook Report 2014) provides an important stocktake on the state of the Reef and its outlook, based on the best available information at the time. The Outlook Report 2014 identifies that the greatest impacts to the Reef are climate change, land-based run-off, coastal land-use change and some aspects of direct use.

7.6 In March 2015, the Australian and Queensland governments released the Reef 2050 Long Term Sustainability Plan (Reef 2050 Plan), which addresses the findings of the Outlook Report 2014, and builds on the comprehensive GBR Strategic Assessment. The Reef 2050 Plan is the overarching framework for protecting and managing the Reef until 2050. The Plan responds to the pressures facing the Reef, and will address cumulative impacts and increase the Reef's resilience to longer term threats such as climate change.

7.7 The Scientific Consensus Statement 2017 examines land use impacts on Reef water quality and ecosystems. It reviews and adds to the scientific knowledge of water quality issues in the Reef from the 2013 Scientific Statement. It draws heavily on the regional water quality improvement plans and supporting studies, specific research and monitoring results as well as published science to date related to ecological processes operating in the Reef.

7.8 The 2017 Statement concludes that:

a) The decline of marine water quality associated with landbased run-off from the adjacent catchments is a major cause of the current poor state of many of the coastal and marine ecosystems of the Reef. Water quality improvement has an important role in ecosystem resilience.

b) The main source of the primary pollutants (nutrients, fine sediments and pesticides) from Reef catchments is diffuse source pollution from agriculture. These pollutants pose a risk to Reef coastal and marine ecosystems.

<u>Risk of erosion and sediment to the world heritage values of the GBRWHA</u>

7.9 The proposed area to be cleared drains via several watercourses to the Hann and Kennedy rivers, which in turn drain into the GBRWHA at Princess Charlotte Bay.

7.10 There is the potential for change in land use to lead to erosion causing increased amounts of sediment and nutrients to be transported from Kingvale Station into the GBRWHA.

7.11 Sediments can be surface soil from sheet or rill erosion or subsoil from scalds, gullies or streambanks. The soil particles can be mobilised by run-off or, in the case of streambank erosion, stream flow. Whilst erosion is a naturally occurring process that affects all landforms, soil erosion is exacerbated by agricultural activities (Bartley et al., 2010; Bartley et al., 2014; Thorburn and Wilkinson, 2013) and cropping (Carroll et al., 1997; Hughes A.O. et al., 2009; Murphy et al., 2013).

7.12 The Scientific Consensus Statement 2017 (Chapter 2) notes that analysis of the sediment contained in flood plumes in Princess Charlotte Bay over the 2011-2012 and 2012-2013 wet seasons is ongoing but suggests the source of sediment is from the upper catchment, in which Kingvale Station is located.

7.13 The upper catchment supports the majority of land use activities that have the potential to degrade (or improve) water quality (Brooks et al. 2013). Brooks (2013) identified a range of land use practices that can degrade water quality and increase sediment sources including:

a) *over grazing cattle and cattle pads along river frontage (floodplains and terraces) can reduce ground cover, disturb fragile soils, enhance water runoff, stimulate rill and gully erosion, and accelerate sediment mobilisation;*

b) *poorly designed and maintained roads and fence lines can increase rill and gully erosion and accelerate sediment mobilisation;*

c) *intensive agricultural activity can be a periodic source of intensified water runoff and erosion, especially where cover is reduced at the start of the wet season. Increases in nutrient concentrations from agricultural land use have also been documented in the Laura River (Howley, 2010).*

7.14 In the Normanby Catchment, there is evidence of a catchment-wide acceleration of gully erosion within the last 100 years or so (Brooks et al. 2013) and this can be tied to

the introduction of cattle into the catchment. Brooks (2013) notes a number of triggers for the increase in gully erosion, including:

a) cattle concentrating along river frontage and hollows on steep banks;

b) overgrazing and reduction of perennial grass cover and erosion resistance;

c) directly disturbing fragile sodic soils reducing infiltration capacity; and

d) cutting cattle pads that concentrate water runoff from floodplains into steep banks, hollows and older channel networks.

7.15 The proposed action involves four elements relevant to assessing the potential for increased sediment and nutrient load:

a) the initial removal of vegetation to allow for cropping;

b) the tilling of the soil to plant the crops;

c) the application of fertiliser to the crops (which is planned to include high levels of nitrogen and phosphorous [Spies 2014; p9]); and

d) the use of cattle to reduce the stubble and trash by grazing following harvest.

7.16 The risk of erosion and sedimentation associated with changes in land use are outlined in the *EPBC Act Referral Guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area* (2014).

7.17 Catchment modelling (Olley et al. 2013) suggests that subsoils are the dominant source of sediments in the Normanby Catchment. Erosion rates have been estimated for several alluvial gully complexes in the Normanby Catchment (Brooks et al. 2016), showing that erosion at the top of gullies can increase by upwards of tens of metres per year in some areas.

7.18 The Department sought advice from Dr Shellberg, a fluvial geomorphologist, and Dr Loch, Soil Scientist and principal consultant of Landloch Consulting, about the risk of soil erosion and downstream sedimentation associated with the proposed action.

7.19 Loch (undated) states that the potential for agricultural development to de-stabilise fluvial systems may be more significant than the erosion occurring on the cropping land itself, and that the key issues will be:

a) *presence/absence of soils with dispersive (highly unstable) subsoils that will be highly susceptible to gullying; and*

b) *management plans addressing the stability of flow lines and the management of buffer zones.*

7.20 Shellberg (2016) concluded that soil erosion will increase following the proposed action. Shellberg also advised that the increase will come from a variety of cumulative sources on site: sheet erosion, rill and gully erosion, bank erosion, road and fence erosion, and possible sub-surface erosion (piping). The advice concluded that nutrient and herbicide loads could also increase; and that fine sediment pollution from Kingvale Station is likely to contribute to poor water quality in the GBRWHA.

7.21 Loch (undated), provides advice about the risk of soil erosion and downstream sedimentation associated with the proposed action. The report concluded that further investigations of elevations and gradients is desirable as erosion modelling indicates that clearing and cropping should be constrained to areas with gradients <2 per cent

and that likely rates of sediment mobilisation from the cropped area are unlikely to have a significant impact on the large volumes of sediment mobilisation within the Normanby Catchment and delivered from that catchment to the Reef. Further modelling was undertaken by Garozzo (2017). From this data Loch (2017) confirmed the restriction of clearing to areas with gradients <2 per cent was required to manage the risks associated with erosion and sedimentation.

7.22 Advice provided by GBRMPA to the Department in August 2016 states that the proposed action is certain to increase erosion and it is almost guaranteed that the erosion from clearing will result in fine sediment entering Princess Charlotte Bay during flood events.

Approaches to reducing sediment impacts on the GBRWHA

7.23 New research (Scientific Consensus Statement 2017 Chapter 5) has confirmed existing knowledge about the effectiveness of many agricultural management practices in reducing water quality impacts to the Reef, in particular:

a) sediment delivery from gullies and streambank erosion is now recognised as more significant than previously thought and requires greater focus.

b) to reduce sediment loss from cropping lands, research supports existing practices including:

(i) reducing or eliminating tillage and maximising soil cover (via crop residue retention and grassed inter-rows); and

(ii) adopting controlled traffic, opportunity cropping and contour embankments.

7.24 Established practices to reduce sediment loss from rangeland grazing (Scientific Consensus Statement 2017and Howley et al 2014) include:

a) maintaining ground cover and forage biomass at the end of the dry season;

b) setting appropriate stocking rates;

c) excluding stock from riparian and frontage country and from rilled, scalded and gullied areas; and

d) locating and constructing linear features (roads, tracks, fences, firebreaks and water points) using best practice management techniques to help minimise erosion risk.

7.25 Shellberg (2016 and 2017) recommended that further assessment of the area is required to fully understand the areas of greatest risk of erosion and that a Soil Conservation Plan should be developed that includes the following:

a) the use of precision agriculture techniques;

b) buffer areas around small creeks and dambo wetlands;

c) filter strips on contour or contour banks;

d) placing roads and fences in stable locations; and

e) the use of whoa boys to safely disperse overland flow.

7.26 In addition, Loch (undated) recommended the development of a Soil Conservation Plan to address strategies for erosion and sediment control both during land clearing and subsequent cropping activities. Measures recommended by Loch include:

For clearing:

a) pre-clearing assessment to ground-truth topography and flow lines;

b) delineation of appropriate buffer zones for flow lines;

c) consideration of management and placement of cleared tree debris to stabilise existing flow paths and any areas of existing or potential instability; and

d) options for maximising surface vegetation cover and minimising runoff during initial land preparation.

For on-going cropping activities:

a) options to use contour grass strips to reduce sediment movements;

b) establishing farming practices on the contour as much as possible;

c) cover levels to be adopted for management of stubble grazing (to ensure that stubble cover is kept at levels that will control erosion risk at planting);

d) methods to maximise erosion control by stubble, which may include methods to ensure sorghum stems lie on the surface of the soil rather than being upright;

e) potential for installation of managed grass buffers to reduce movements of sediment and herbicides from cropped areas to flow lines;

f) requirements for buffer zone management, including potential to exclude stock from buffered flow lines within the cropped area either permanently or for key periods within the year; and

g) management of flow lines to maintain their stability.

7.27 In his report Loch (undated) also recommends the development of an Erosion Management Plan to address erosion risk in both the cropped and adjoining areas of the development. Loch highlights the importance of managing stability and control sediment mobilisation associated with:

a) Roads, tracks and creek crossings; and

b) Flow lines.

7.28 While Loch concluded in his December 2017 advice that the limiting of clearing to gradients < 2 per cent was adequate to control the risks, the Department considers that the following key mitigation measures to reduce erosion and sedimentation impacts on the GBRWHA will address the recommendations by Loch (undated) and Shellberg (2016 and 2017) for soil conservation and erosion management plans.

- *Not clearing on land with a gradient greater than 2 per cent*
- *Retention of vegetated buffers*
- *Maintenance of minimum groundcover*
- *Expert advice on the design, location and maintenance of contour banks in accordance with State guidelines*

- *Expert advice on the design and location of linear infrastructure in accordance with State guidelines*

Not clearing on land with a gradient greater than 2 per cent

7.29 In response to the information provided by Shellberg and Loch, the proponent sought the advice of Mr Garozzo, Director of ILA Consulting, to ground truth the action area to help determine the risk of erosion associated with slope and watercourses on the project site. The report (Garozzo, 2017) surveyed 16 sites across the 1,200 ha action area and concluded that:

a) almost all of the site of the proposed action to the east of the watercourse cluster is flat at below 2 per cent slope. Minor incursions of higher slope are regularly below 2.5 per cent slope with unusual incidence of >2.5 per cent slope within very localised spots;

b) the western section of the site is associated with watercourses. The area though dominated by slopes <2 per cent also demonstrated large moderately sloped areas marginally above 2 per cent but not greater than 2.5 per cent. These areas are associated with rises from watercourses and general slightly rougher topography between watercourse confines;

c) limited areas of >2.5 per cent slope were associated with watercourse margins and smaller localised rises. Those areas did not dominate the landscape outside of limited watercourse associations.

7.30 As discussed in paragraph 7.21, Loch has stated that erosion modelling indicates that clearing and cropping should be constrained to areas with gradients <2 per cent to reduce sediment mobilisation. This view was supported by Shellberg (2016).

7.31 The proponent has offered not to clear areas that have a slope greater than two per cent (paragraph 7.106).

7.32 The Department considers there is sufficient research (as cited in the Scientific Consensus Statement 2017) and expert advice (Shellberg 2016 and 2017, Loch undated and 2017 and Garozzo 2017) to support the need to avoid clearing on slopes greater than two per cent as a mechanism to reduce erosion and sediment movement.

Retention of vegetated buffers

7.33 The Scientific Consensus Statement 2017 (Chapter 5) concludes that excluding stock from riparian and frontage country and from rilled, scalded and gullied areas is one of the key measures to reduce erosion and sediment movement.

7.34 As discussed in paragraphs 7.25 and 7.26, reports provided to the Department supported the use of buffers for watercourses and wetland areas. Shellberg (2016 and 2017) recommended that the width of all buffers from the edge of the watercourse or natural wetland be 100 m. On 1 November 2017 the proponent proposed 50 m buffers (paragraph 7.106).

7.35 In December 2017, the Department obtained further advice from Shellberg and Loch regarding the proponent's proposed 50 m buffers and their adequacy to mitigate the risk of erosion and sedimentation.

7.36 Shellberg maintained the view that the buffers proposed by the proponent (paragraph 7.106) would not adequately mitigate the risk of erosion and sedimentation of watercourses on Kingvale Station (Shellberg 2017).

7.37 The advice was supported by research previously undertaken by Shellberg and others (Scientific Consensus Statement 2017 Chapter 2, Brooks et al 2016) in relation to the land use causes of erosion and the sources of fine sediment pollution to the Reef.

7.38 Loch advised that buffering should be consistent with Queensland Government guidance and that cropping development will establish a higher value land use, and create both incentives and resources for any flow path de-stabilisation that occurs to be treated and managed.

7.39 The Department considers there is sufficient research (Scientific Consensus Statement 2017 Chapter 2, Brooks et al 2016) and expert advice (Shellberg 2016 and 2017) to support the need for 100 m buffers as an effective mechanism to reduce erosion and sediment movement.

Maintenance of minimum groundcover

7.40 While the Reef Water Quality Protection Plan 2013 established a target, to be achieved by 2018 of a minimum of 70 per cent late dry season groundcover on grazing lands, the Plan did not recommend specific groundcover targets for cropping land or vegetated buffers and was not specific to the Normanby Catchment. The Normanby Catchment Water Quality Management Plan (Howley et al 2014) sets an end of dry-season perennial grass cover target of 50%-80% for the Normanby Catchment. The Department considers this range is more specific to the region and is therefore an appropriate requirement for cropping areas and vegetated buffers on Kingvale Station.

7.41 The results of an experiment at Mt Mort, near Ipswich illustrate the importance of groundcover in reducing erosion. The experiment compared runoff and soil loss during a single 54 mm storm from three differently treated experimental catchments. Treatment C, with almost no groundcover, lost more than 700 times as much soil and more than 20 times as much runoff as did Treatment A with almost complete cover. Treatment B with 69 per cent level of cover still experienced much reduced levels of soil loss and runoff (Finlayson and Silburn 1996).

Table 2:Results from a 54mm storm at Mt Mort, SE Queensland

Treatment	A	B	C
Percent cover	87	69	6
Total runoff from storm (mm)	1.5	14	38
Percent of rainfall that ran off	3	26	70
Soil loss (t/ha)	0.03	0.3	22
Depth of soil lost (mm)	0.002	0.02	1.7
Sediment concentration (g/L)	1.5	1.9	63
Nitrogen removed (kg/ha)	0.14	1.9	15.3
Phosphorous removed (kg\ha)	0.02	0.26	4.3

7.42 In his report to support the proponent's development application to the Queensland Government, Mr Spies (Spies 2014) includes a number of measures which the proponent will use to maximise groundcover. These are listed at paragraph 7.103 and

include the use of cover crops and minimum or zero tillage in cropping areas and well grassed waterways, headlands and drains.

7.43 The proponent is proposing to use cattle to reduce the crop stubble and trash by grazing. The Department considers that there is a risk that the proposed action will therefore concentrate cattle and provide the circumstances described by Brooks (Brooks et al. 2013) as the causes of increased erosion (paragraph 7.13).

7.44 Further, the Department notes a report prepared for the proponent by Mr Spies, agricultural consultant (Spies, 2014) as part of the proponent's Queensland Development Permit (SDA-0214-008018) application, which concludes: "*Clearing and subsequent cultivation, with stubble retention through zero or minimum tillage, will not result in soil erosion stemming from mass movement, gully erosion, rill erosion, sheet erosion, wind erosion or scalding*".

7.45 The Department considers there is sufficient research (Finlayson and Silburn 1996; Howley et al 2014 and DIPNR 2005) and expert advice (Shellberg 2016 and 2017) to demonstrate the importance of a minimum of 50 per cent groundcover as an effective mechanism to reduce erosion and sediment movement.

Design, location and maintenance of contour banks

7.46 Contour banks intercept runoff before it concentrates and starts to cause erosion. The water is then channeled into stable areas such as grassed waterways, natural depressions, or vegetated buffers.

7.47 The Scientific Consensus Statement 2017 (Chapter 4) identifies contour banks on cropping land as a key measure to redistribute the pressure of agricultural activities away from areas vulnerable to erosion.

7.48 The Queensland Government website (https://www.qld.gov.au/environment/land/soil/erosion/management) provides that approximately 80% of soil lost as a result of poor cover can be trapped in the paddock by contour banks.

7.49 As discussed in paragraph 7.25 - 7.26, Shellberg and Loch recommend the use of contour grass strips or banks in the proposed action area to reduce the risk of erosion.

7.50 While in his December 2017 advice, Loch concludes that the restriction of clearing to areas of >2 per cent slope will adequately minimise the risks associated with erosion and sedimentation, the Department considers there is sufficient expert advice (Shellberg 2016 and 2017 and Loch undated) and available published information, to demonstrate the importance of including contour banks as an effective mechanism to reduce erosion and sediment movement. The Queensland Soil Conservation Guidelines Chapter 7 provides planning, design and construction principles for contour banks.

Design and location of linear infrastructure

7.51 New research has confirmed existing knowledge about the efficacy of many agricultural management practices including locating and constructing linear features (roads, tracks, fences, firebreaks and water points) using best practice management techniques to help minimise erosion risk (Scientific Consensus Statement 2017 Chapter 4). This is supported by Shellberg (2016) and Loch (undated) who recommends placing roads and fences in stable locations to reduce erosion risk (paragraph 7.25 -7.27).

7.52 Poorly located farm infrastructure can exacerbate existing erosion and/or initiate new erosion (Queensland Government Soil Conservation Guidelines, Chapter 14).

7.53 Road erosion has been identified as a major source of elevated sediment loads in the Normanby catchment, degrading the water quality of surrounding streams and rivers (Gleeson 2012, Brooks et al 2013). Studies have shown that unsealed roads can be a greater source of sediments than agricultural land use (Motha et al. 2004).

7.54 Smaller roads, tracks, and fence lines have been identified as a significant source of erosion and sediment run-off. Shellberg and Brooks (2013) measured 240 to 660 tonnes/km/year (900 to 1600 tonnes/ha/year) eroding off station dirt roads on steep banks in the upper Normanby.

7.55 The Department considers there is sufficient research (Gleeson 2012, Brooks et al 2013) and expert advice (Shellberg 2016 and 2017) to demonstrate the importance of using best practice to plan and construct linear infrastructure to reduce erosion and sediment movement. The Soil Conservation Guidelines for Queensland Chapter 14 provides planning, design and construction principles for linear infrastructure.

<u>Assessment of impacts on the natural heritage values of the GBRWHA</u>

7.56 Based on the *EPBC Act Referral Guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area* (2014), the Department considers that the following attributes of the natural heritage of the GBRWHA may be affected by the proposed action:

a) visual amenity – superlative natural beauty above and below the water (criterion vii); unique and varied seascapes and landscapes (criterion viii).

b) coral communities – coral assemblages of hard and soft corals (criterion vii); coral spawning (criterion vii); coral reef ecosystem (criterion viii); inshore fringing reefs (criterion viii); significant diversity of reef and island morphologies that reflects ongoing geomorphic, oceanographic and environmental processes (criterion ix); coral reefs, sand banks and coral cays (criterion ix); evolution of hard corals (criterion ix); coral reefs (400 species of corals in 60 genera) (criterion x).

c) seagrass – diversity of seagrass (criterion x); diversity supporting marine and terrestrial species (global conservation significance) (criterion x); plant species diversity and endemism (criterion x).

d) marine turtles – Green Turtle breeding (criteria vii and x), nesting turtles (criterion vii), marine turtle (criterion x), marine turtle rookeries (criterion x).

e) marine mammals – migrating whales (criterion vii); other fauna including microfauna (criterion ix); diversity supporting marine and terrestrial species (global conservation significance) (criterion x); Dugong (*Dugong dugon*) (criterion x); species of whales (criterion x); species of dolphins (criterion x); Humpback Whale (*Megaptera novaeangliae*) calving (criterion x).

f) mangroves – vast mangrove forests (criterion vii); diversity of mangroves (criterion x).

g) fish – thousands of species of reef fish (criterion vii); significant spawning aggregations of many fish species (criterion vii); over 4,000 species of molluscs and over 1,500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans, and many others (criterion ix).

h) human interaction with the natural environment - acknowledged in the statement of universal value at Attachment A to the *EPBC Act Referral Guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area* (2014) (criterion ix).

Visual amenity

7.57 Visual amenity impacts occur from changes in the physical environment which may give rise to changes in its visual character and how this is experienced. This may in turn affect the value of the visual environment.

7.58 Princess Charlotte Bay is recognised for the relatively unspoilt nature of the remote area that contributes to the high aesthetic value of the world heritage area. In its description of Princess Charlotte Bay, the GBR Strategic Assessment Report states that "*the relatively unspoilt nature of the remote area contributes to its high aesthetic value* (GBR Strategic Assessment Report 2014)".

7.59 Sediments from the catchment are transported to Princess Charlotte Bay from the Normanby Catchment during the wet season. Turbid plumes impact the visual amenity of the area as seen from the land, air and boats as well as appreciation of the underwater environment by swimmers, snorkelers and divers.

Coral communities

7.60 Coral reefs are the cornerstone of the Reef ecosystem and its evolutionary history. Their species diversity, habitat value and natural beauty are major contributors to the Reef's OUV as a world heritage area (Outlook Report, 2014), and therefore to its natural heritage. The Outlook Report (2014) states that a series of disturbances has reduced coral cover in the southern two-thirds of the Reef, and some are not yet showing signs of recovery. The condition of inshore reefs (Wet Tropics to Fitzroy region) marginally improved between 2014 and 2015 but is still rated moderate to poor, depending on the region (Scientific Consensus Statement 2017 Chapter 1).

7.61 Until the 2016 bleaching event, the coral reef ecosystems in the Cape York region were typically in good condition (Scientific Consensus Statement 2017 Chapter 1). Coral reefs in the Princess Charlotte Bay region were known to have significantly higher levels of coral cover and coral species diversity, higher coral recruitment and recruit survival rates compared to similar near shore reefs off the Wet Tropics and other regions of the Reef.

7.62 The abundance of fish on corals in Princess Charlotte Bay are around three times greater than in the Wet Tropics (Howley et al. 2013). The Flinders Group of Islands and their associated reefs are approximately 25 km northeast from the mouth of the Normanby River, while major reefs such as Corbett and Clark are over 30 km away.

7.63 The Department considers that the key potential impacts from the proposed action to coral assemblages in Princess Charlotte Bay will be through the potential for increased turbidity levels from sediment plumes. Sediments generated by erosion may affect corals by smothering associated with the settlement of sediments, and by reducing light availability. High levels of sedimentation and suspended sediments (light attenuation) can lead to coral stress, which may then lead to disease, reduced calcification and growth rates, and if persistent, coral bleaching and eventually mortality.

7.64 Major flood plumes from the Normanby and other Princess Charlotte Bay rivers regularly inundate the Flinders Group of Islands and their associated reefs north-east from the mouth of the Normanby River and major reefs such as Corbett and Clark.

Fish

7.65 Fish are an important component of the Reef ecosystem. There are approximately 1625 known fish species in the GBRWA. The abundance of fish on corals in Princess Charlotte Bay are around three times greater than in the Wet Tropics (Howley et al. 2013).

7.66 Princess Charlotte Bay is a Declared Fish Habitat Area. The designation places limits on certain activities that may affect fisheries habitat values. The Declared Fish Habitat Area of Princess Charlotte Bay is for the protection and conservation of barramundi habitat and associated wetlands.

7.67 In 2009, the Normanby, North Kennedy and Bizant Rivers flowing into Princess Charlotte Bay were closed to commercial netting. These rivers were identified as the most likely critical or remnant habitat for freshwater sawfish and speartooth sharks, both of which are thought to be extremely rare or absent from the remainder of Queensland's east coast. The Green Sawfish is listed as a threatened species in the vulnerable category under the EPBC Act.

7.68 The Department considers that the key potential impacts from the proposed action to fish in Princess Charlotte Bay include smothering of habitat (including seagrasses and corals) by fine sediment generated by erosion. The likely impacts to corals and seagrass habitat are discussed in paragraphs 7.60 – 7.64 and 7.69 - 7.75 respectively. Suspended sediments may also impact the ability of fish to find and catch food due reduced visibility caused by higher turbidity levels.

Seagrass

7.69 Seagrass meadows are an important component of the Reef ecosystem. They are the main food source for Dugongs and Green Turtles, provide nursery habitat for many commercial fisheries species, are a major source of primary production, and sequester significant amounts of carbon (Outlook Report 2014).

7.70 The condition and trend at a Reef-wide scale for seagrass meadows and seagrasses was rated as poor and deteriorating in the 2014 Outlook Report. The Scientific Consensus Statement 2017 found that inshore seagrass meadows remain in poor condition, despite improvements in some seagrass condition indicators in some regions. There were overall improvements in abundance, however, reproductive effort declined, indicating a low capacity to recover from disturbances with the available seed resources.

7.71 The Scientific Consensus Statement 2017 noted that light is one of the most critical variables affecting seagrass growth and survival. The report states that pulses of pollutants from river run-off containing suspended sediments, nutrients (which can trigger phytoplankton blooms) and coloured dissolved organic matter reduce the levels of light reaching seagrass. The impact of reduced light on seagrass is exacerbated by higher seawater temperatures.

7.72 Seagrass health can be directly affected by sediment deposition close to river mouths as a result of flood events; however, of greater concern is the legacy of finer sediments in floodwaters, which continually resuspend (for at least six to eight months) and hinder recovery during the growth season (Scientific Consensus Statement 2017; Chapter 1).

7.73 The Great Barrier Reef Strategic Assessment Report (2014) highlights the extensive areas of seagrass beds and high conservation value of Princess Charlotte Bay.

Seagrass meadows are present on the majority of intertidal coastal and reef areas of Princess Charlotte Bay, covering an area of 11,446 ha (Carter et al. 2012).

7.74 Seagrass meadows are sensitive to changes in water quality, particularly increases in nutrients or sediments, or the presence of herbicides. Seagrass species can also bio-accumulate metals and other contaminants, which can be ingested and accumulated in turtles and Dugongs (Hayes 2001).

7.75 The Department considers that the key potential impacts from the proposed action to seagrass meadows in Princess Charlotte Bay will be through the potential for increased turbidity levels from sediment plumes. Sediments generated by erosion may affect seagrass by smothering associated with the settlement of sediments and by reducing light availability. High levels of sedimentation and suspended sediments (light attenuation) can lead to reduced photosynthesis.

Marine turtles

7.76 At least six species of marine turtles are known to use Princess Charlotte Bay as a feeding ground (including the Green Turtle, Olive Ridley Turtle [*Lepidochelys olivacea*], Hawksbill Turtle [*Eretmochelys imbricata*], Loggerhead Turtle [*Caretta caretta*], Flatback Turtle [*Natator depressus*] and Leatherback Turtle [*Dermochelys coriacea*]). These turtles are all listed as threatened under the EPBC Act and the entire area is considered to be of international significance for the species (Limpus 2008).

7.77 Princess Charlotte Bay is one of the most important Green Turtle feeding areas in the GBRWHA (Dobbs 2001). A large number of Flatback Turtles forage within the bay and nest on the Flinders Islands and coastal area.

7.78 The critically endangered (IUCN 1996) Hawksbill Turtle nests on many islands between Princess Charlotte Bay and the northern boundary of the Great Barrier Reef Marine Park (GBRMP).

7.79 The Department considers that the key potential impacts from the proposed action to marine turtles in Princess Charlotte Bay will be through the potential for increased turbidity levels from sediment plumes.

7.80 Marine turtles may also be indirectly affected by impacts on seagrass meadows, through the potential for increased turbidity levels from sediment. Impacts on seagrass from increased turbidity is discussed at paragraphs 7.69 - 7.75.

Marine mammals (whales, Dugong, dolphins)

7.81 The attributes of the natural heritage of the GBRWHA relevant to marine mammals are described in paragraph 7.56. The GBRWHA is home to a globally significant population of Dugongs, which was one of the reasons why it was inscribed on the World Heritage List in 1981 (GBRMPA 1981).

7.82 Dugongs, together with the seagrass habitats upon which they depend, contribute to the recognition of the Reef's outstanding universal value, including its significant ongoing ecological and biological processes, and significant natural habitats for the conservation of biological diversity.

7.83 Surveys over a 10-year period indicate that between 25 to 56 per cent of Dugongs in the northern Reef region reside in Princess Charlotte Bay for at least part of their life (CRC Reef Research Centre 2002).

7.84 Princess Charlotte Bay is a declared 'Special Management Area' to protect Dugong within the bay. The Special Management Area requires commercial net fishers to obtain a permit to operate within Princess Charlotte Bay.

7.85 Dugongs feed almost exclusively on seagrass and spend most of their time in the vicinity of seagrass beds. They must consume large quantities each day to fulfil their energy requirements. The Dugong's preference for inhabiting inshore areas exposes them to a range of human-related marine and land-based activities (Marsh et al. 2002).

7.86 The bay is also home to a number of other marine mammals including the Snub Fin (*Orcaella heinsohni*) and Humpback Dolphins (*Sousa chinensi*) (Carter et al. 2012) and Humpback Whale (*Megaptera novaeangliae*).

7.87 Other species of whales and dolphins that could occur in Princess Charlotte Bay include the Minke Whale (*Balaenoptera acutorostrata*), Common Dolphin (*Delphinus delphus*), Risso's Dolphin (*Grampus griseus*), Spotted Dolphin (*Stenella attenuata*), Indian Ocean Bottlenose Dolphin (*Tursiops aduncus*), and Bottlenose Dolphin (*Tursiops truncatus*). While many of these species favour offshore habitats, Indian Ocean Bottlenose Dolphin prefers nearshore waters, and species such as the Bottlenose Dolphin may occur in nearshore environments from time to time.

7.88 The Department considers that the key potential impacts from the proposed action to marine mammals in Princess Charlotte Bay will be through the potential for increased turbidity levels from sediment plumes.

7.89 Dugongs are long-lived with a low reproductive rate, long generation time, and a high investment in each offspring. Like many other long-lived species, Dugongs delay breeding in adverse environmental conditions, such as the loss of seagrass.

7.90 Dugongs may be indirectly affected by impacts on seagrass meadows, through the potential for increased turbidity levels from sediment. Impacts on seagrass from increased turbidity is discussed at paragraphs 7.69 - 7.75.

7.91 Other marine mammal species are likely to be indirectly impacted as a result of reduced marine ecosystem health caused by impacts from the proposed action to coral communities discussed at paragraphs 7.60 – 7.64 and seagrass discussed at paragraphs 7.69 – 7.75.

<u>Mangroves</u>

7.92 Princess Charlotte Bay is one of the largest tidal wetland systems in Cape York Peninsula. Extensive mangrove forests provide important fish habitat and provide critical nursery areas for many fish and crustaceans (Danaher 1995).

7.93 Mangroves and saltmarshes are ecologically important habitats that link the marine and terrestrial environments and are vital to the biological productivity and food webs of coastal waters. They provide an important buffer between land and reef, as they filter land runoff and improve the quality of water entering Princess Charlotte Bay.

7.94 The Department considers that the key potential impacts from the proposed action to mangroves in Princess Charlotte Bay will be through the potential for increased turbidity levels from sediment plumes. Sediments generated by erosion may affect mangroves by smothering associated with the settlement of sediments.

7.95 High levels of sedimentation and suspended sediments (light attenuation) can lead to reduced photosynthesis in other species, however mangroves are not sensitive to

reduced light as a result of increased turbidity, but are intolerant of high levels of sedimentation (Adame et al, 2009).

7.96 Natural sedimentation rates in mangrove forests vary. Excess levels of sedimentation can cause stress to mangroves as a result of smothering and burial of root systems. This can lead to reduced vigour to death, depending on the amount and type of sedimentation, and the species under consideration.

7.97 The increased sedimentation which may occur as a result of the action will be intermittent in nature. Plumes occurring during times of high river flow. Due to the intermittent nature of the increased sedimentation, it is unlikely that smothering and burial of root systems will occur as there will be time for a dispersal of sediment between plume events.

7.98 The Department therefore considers it unlikely that the increased sedimentation in Princess Charlotte Bay resulting from the action will significantly affect the mangroves in the GBRWHA.

Human interaction with the natural environment

7.99 Human interaction with the natural environment (acknowledged in the statement of universal value at Attachment A to the *EPBC Act Referral Guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area* [2014] [criterion ix]) acknowledges:

> *Human interaction with the natural environment is illustrated by strong ongoing links between Aboriginal and Torres Strait Islanders and their sea country, and includes numerous shell deposits (middens) and fish traps, plus the application of story places and marine totems.*

7.100 The Lama Lama people are the Traditional Owners for the land and sea country around Princess Charlotte Bay. The bay and the rivers flowing into it have important cultural and spiritual values for the Traditional Owners (Howley et al. 2013). The nearby Flinders Island group contains Aboriginal rock art sites, shell middens and stone arrangements. The rock art on Stanley, Flinders and Clack islands is of international significance (Context Pty Ltd 2013).

7.101 The values of the area relate to plants and animals such as fish, turtles, and Dugongs; spiritual beliefs and ceremonies; sacred story places; and water for drinking and many other purposes. The health of the area, including the rivers, and the plants and animals it supports, is integral to the cultural, spiritual and physical wellbeing of the Traditional Owners.

7.102 The Department considers that the key potential impacts from the proposed action to human interaction with the natural environment of the GBRWHA in Princess Charlotte Bay will be through the potential for increased turbidity levels from sediment plumes directly and/or indirectly impacting on marine species such as fish, turtles, and Dugongs and also the impacts to visual amenity.

Proponent's proposed mitigation measures to reduce sediment run-off

7.103 The Queensland Development Permit (SDA-0214-008018) (see paragraph 5.21) requires the vegetation clearing to be undertaken in accordance with erosion management actions in the document '*Proposed dryland cropping of sorghum and forage sorghum for green chop at Kingvale Station west of Laura*', prepared by Consultant Peter Spies, dated 5 February 2014.

The consultant's report provides the following measures:

- *using herbicide for weed control instead of tillage in most instances*
- *avoiding major farm works (that causes soil disturbance or loss of ground cover) during the wet season*
- *retaining/maintaining existing drainage pattern*
- *maintaining sufficient ground cover (crop cover of sorghum matched at time of highest rainfall during wet season) and through minimum or zero tillage practices*
- *fallow block management including a cover or green manure crop established with minimum or zero cultivation during high rainfall risk periods (December to April)*
- *using herbicide or cattle grazing, rather than cultivation, for weed control or postharvest crop destruction instead of ploughing out*
- *any waterways, headlands, drains, etc. are well grassed and maintained in a stable condition*
- *using filter strips – of a suitable width and ground cover – to filter run-off before it enters a water body or watercourse (see maps at Attachment A of report by Peter Spies).*

7.104 The proponent stated in correspondence to the Department that the erosion mitigation measures proposed by Spies (2014) and required to be implemented under the Queensland Development Permit (SDA-0214-008018) are sufficient to ensure there will be no impact to any matters protected under the EPBC Act.

7.105 The Department considers the mitigation measures required under the Queensland Development Permit (SDA-0214-008018) are mostly intended to reduce the risk of erosion on the cropping land. The Department considers that further measures are needed to address the increased run-off from the proposed action causing an increased risk of gully and streambank erosion in nearby watercourses and flowlines.

7.106 On 1 November 2017, the proponent offered, through his solicitor, not to clear:

a) in areas that have a slope greater than 2 per cent;

b) within 100 m of a natural wetland;

c) within 50 m of the edge of identified watercourses; and

d) within 100 m of watercourses where the adjacent land has a slope greater than 2 per cent.

7.107 The proponent did not propose any further mitigation measures (beyond the above measures, or those required under the Queensland Development Permit SDA-0214-008018).

<u>Conclusion on impacts on the Great Barrier Reef World Heritage Area</u>

7.108 The proponent has stated in correspondence to the Department that the proposed action will not impact on the Great Barrier Reef (correspondence dated 21 September 2016). However, the Scientific Consensus Statement 2017 and other research cited in the discussion above indicates that there is a high risk of increased

erosion from clearing and the proposed changed land management practices and a high risk of that sediment entering the GBRWHA.

7.109 As discussed above, the proponent:

a) is required to comply with the conditions of the Queensland Development Permit (SDA-0214-008018), which includes various erosion control measures; and

b) has proposed some additional measures to reduce the risk of erosion and of sediment entering the GBRWHA.

7.110 For the reasons set out in paragraphs 7.111 - 7.117, the Department considers additional measures are needed to reduce the risk of impacts to the Reef's world heritage values of the GBRWHA.

7.111 Gully and streambank erosion as a consequence of increased water run-off caused by clearing is now recognised as a more significant impact on water quality of the GBRWHA than previously thought (Scientific Consensus Statement 2017).

7.112 Studies in semi-arid rangeland areas in Queensland suggest that converting forest to pasture can increase run-off by ~80% at sub-catchment scales and that clearing of forest can result in an almost doubling of run-off (Thornton et al. 2007). These areas then export higher quantities of sediment and phosphorus than the uncleared catchments (Elledge and Thornton 2017).

7.113 The Department has received reports from Dr Shellberg (2016 and 2017) that advise that implementing the conditions of the Queensland Development Permit and the additional measures offered by the proponent on 1 November 2017 will not adequately reduce the risk of erosion and of sediment entering the GBRWHA. Shellberg (2016 and 2017) advises that the proposed action is likely to cause erosion and sediment movement which is likely to impact the Reef.

7.114 The advice from the GBRMPA notes that the proposed action is likely to impact key values and attributes of the GBRWHA through increasing the amount of fine sediments and nutrients entering the Reef. Increases in sedimentation and nutrients may result in loss of biodiversity by promoting algae growth and reducing the light availability for coral, seagrass, and benthic organisms; which may result in detrimental impacts to the marine ecosystem.

7.115 The Department notes that the proposed action is to clear a large area of approximately 2,100 ha (~21 km^2), with the result that even low rates of increased erosion create a potential for large amounts of sediment and nutrient movement into waterways over time.

7.116 Given the size of the area to be cleared, the conclusions of the Scientific Consensus Statement 2017 about the sources and causes of erosion, the advice from the GBRMPA and the site specific concerns raised by Shellberg about erosion management (Shellberg 2016 and 2017), the Department recommends that you attach conditions of approval that require the proponent to undertake additional erosion mitigation measures to those specified in his Queensland Development Permit (SDA- 214-008018).

7.117 Specifically, the Department recommends you attach conditions that:

a) *Condition 1*: Only allow the clearing of land in areas shown as 'area of land use change' in Map 1. The 'area of land use change' in Map 1 excludes

areas of unsuitable soils and known areas with a gradient greater than two per cent. There may be other areas within the 'area of land use change' with a gradient greater than two per cent so this requirement is clarified in the condition. Buffer areas along watercourses and around natural wetlands are also excluded from the 'area of land use change' in Map 1. These buffers are a requirement of condition 2.

As discussed in paragraph 7.21, Loch has stated that erosion modelling indicates that clearing and cropping should be constrained to areas with gradients <2 per cent to reduce sediment mobilisation. This view was supported by Shellberg (2016).

The proponent has proposed to not clear areas that have a slope greater than two per cent (paragraph 7.106). This condition reflects that offer and reduces the risk of erosion by constraining clearing to land with a lower slope and to land away from drainage features. This will reduce the risk of sediment mobilisation.

b) *Condition 2*: Prevent the clearing of land within 100 m of the edge or defining bank of any watercourse or natural wetland and require management of these buffer areas to maintain a minimum of 50 per cent groundcover of native vegetation to maintain gully stability.

As discussed in paragraphs 7.33 – 7.39, the Scientific Consensus Statement 2017, Shellberg (2016 and 2017) and Loch (undated and 2017) recommended the use of buffers to watercourses and natural wetlands. As discussed in paragraphs 7.40 – 7.45, the requirement to maintain a minimum of 50 per cent groundcover will reduce the risk of erosion and sediment entering the GBRWHA by trapping sediment, slowing the flow of water.

c) *Condition 3*: To minimise the erosion risk, require the design and location of linear features (roads, tracks, fences, firebreaks) in accordance with the *Queensland Soil Conservation Guidelines Chapter 14: Property Infrastructure*.

The Scientific Consensus Statement 2017 identified the construction of new linear infrastructure as a significant source of sediment entering the GBRWHA and in his report, Shellberg recommended placing roads and fences in stable locations to reduce erosion risk (paragraph 7.25). In his report Loch also highlights the importance of managing stability and control of sediment mobilisation associated with roads, tracks and creek crossings (paragraph 7.26).

As discussed in paragraphs 7.51 – 7.55, this recommended condition reduces the risk of erosion and sediment entering the GBRWHA.

d) *Condition 4*: Require the use of landscape contouring to manage water run-off and soil erosion in accordance with the *Queensland Soil Conservation Guidelines Chapter 7: Contour Banks* (discussed in paragraphs 7.46 – 7.50). This condition also requires the contour grass strips or banks to be maintained to maximise their effectiveness in reducing the risk of erosion and sediment entering the GBRWHA.

The Scientific Consensus Statement 2017 notes that studies indicate that clearing of vegetation can almost double the rate of water run-off. As discussed in paragraphs 7.25 - 7.26, Shellberg and Loch recommend the use of contour grass strips or banks to reduce the risk of erosion.

This condition reduces the risk of sediment entering the GBRWHA by slowing the flow of water across the cleared area.

e) *Condition 5*: Require the use of minimum tillage practices and cover crops to ensure there is a minimum 50 per cent groundcover on cleared land before the wet season rains.

Loch (undated) and Spies (2014) recommend measures, including minimum tillage, to maximise surface vegetation cover (paragraphs 7.26 and 7.103).

The Scientific Consensus Statement 2017 notes that studies indicate that clearing of vegetation can double run-off.

As discussed in paragraphs 7.40– 7.45, there is a very high risk of erosion following clearing if sufficient groundcover is not present. The Reef Water Quality Protection Plan 2013 and the Scientific Consensus Statement 2017 recognise groundcover as an important approach to reducing sediment impacts on the reef. A minimum of 50 per cent groundcover has been identified in research undertaken in the Normanby Catchment (Howley et al 2014) as a level of groundcover that is likely to prevent excessive run-off and erosion in this region.

This condition reduces the risk of erosion and sediment entering the GBRWHA by reducing the area of land without soil binding vegetation before the wet season rains begin.

f) *Condition 6*: Require the repair and stabilisation of any active erosion in the cleared and uncleared areas.

As discussed in paragraph 7.17, subsoils are the dominant source of sediments in the Normanby Catchment. Spies (2014, discussed in paragraph 7.103) and Loch (undated, discussed in paragraph 7.26) both recommend ongoing maintenance of flowlines to ensure greater soil stability.

This condition will reduce the risk of the expansion or deepening of erosion areas that occur as a result of the action which will reduce the risk of sediment entering the GBRWHA.

8. Sections 15B and 15C - National Heritage places

Great Barrier Reef National Heritage place

8.1 In May 2007, the Reef was placed on the National Heritage List. This list comprises natural and cultural places that contribute to our national identity, providing a tangible link to past events, processes and people. As set out in the Commonwealth of Australia Gazette No. S 99 (21 May 2007), the GBR National Heritage place has national heritage values in respect of the following national heritage criteria:

a) the place has outstanding heritage value to the nation because of the place's importance in the course, or pattern, of Australia's natural or cultural history;

b) the place has outstanding heritage value to the nation because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history;

c) the place has outstanding heritage value to the nation because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history;

d) the place has outstanding heritage value to the nation because of the place's importance in demonstrating the principal characteristics of:

(i) a class of Australia's natural or cultural places; or

(ii) a class of Australia's natural or cultural environments;

e) the place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.

8.2 The Reef was included on the National Heritage List on the basis that its world heritage values cause the place to meet the above national heritage criteria. As such, the relevant national heritage values impacted by the proposed action, outlined in paragraph 7.56, correspond to the relevant world heritage values of the Great Barrier Reef.

8.3 As such, the Department considers that:

a) the impacts of the proposed action to the national heritage values of the Great Barrier Reef National Heritage place are commensurate with the impacts from the proposed action on the world heritage values of the Great Barrier Reef World Heritage property (described in paragraphs 7.56 to 7.117 of this recommendation report); and

b) the measures we have recommended to mitigate the proposed action's world heritage impacts are equally applicable to the proposed action's impacts on the Great Barrier Reef National Heritage place.

9. Sections 24B and 24C (Great Barrier Reef Marine Park)

9.1 Sections 24B and 24C of the EPBC Act provide that a person must not take outside the Great Barrier Reef Marine Park (GBRMP), but in the Australian jurisdiction, an action that has, will have or is likely to have a significant impact on the environment in the GBRMP.

9.2 Section 528 defines 'environment' as including:

a) ecosystems and their constituent parts, including people and communities

b) natural and physical resources

c) the qualities and characteristics of locations, places and areas

d) heritage values of places

e) the social, economic and cultural aspects of a thing mentioned in paragraph a), b), c) or d).

9.3 Covering more than 344,000 km^2, the GBRMP is one of the largest protected marine areas in the world. It is a vast multiple-use Marine Park which supports a wide range of uses, including commercial marine tourism, fishing, ports and shipping, recreation, scientific research and Indigenous traditional use.

Assessment of impacts to the Great Barrier Reef Marine Park

9.4 The area of the GBRMP is a subset (approximately 98 per cent) of the GBRWHA. Princess Charlotte Bay forms part of the Marine Park. Accordingly, the Department considers that the conclusions drawn (in paragraphs 7.108 - 7.117) and recommendations made above regarding the impacts of the proposed action on the Great Barrier Reef World Heritage property are equally applicable to the GBRMP.

10. Listed threatened species and ecological communities (sections 18 and 18A)

10.1 The Department's Environment Reporting Tool (ERT) identifies that 19 listed species and no listed threatened ecological communities may occur within 10 km of the proposed action (see the ERT report at Attachment B).

10.2 The Department has also considered the advice provided by Thomson (2015) and Preece (2016) when considering the likely impacts on listed threatened species and communities. Based on the location of the proposed action, and likely habitat present in the area of the proposed action, the Department considers that impacts potentially arise in relation to the following matters:

- Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus*) – Vulnerable
- Northern Quoll (*Dasyurus hallucatus*) – Endangered
- Golden-shouldered Parrot (*Psephotus chrysopterygius*) – Endangered
- Red Goshawk (*Erythrotriorchis radiatus*) – Vulnerable
- Gouldian Finch (*Erythrura gouldiae*) – Endangered
- Buff-breasted Button-quail (*Turnix olivii*) – Endangered
- Masked Owl (*Tyto novaehollandiae kimberli*) – Vulnerable
- Black-footed Tree-rat (north Queensland) (*Mesembriomys gouldii rattoides*) – Vulnerable
- Ghost Bat (*Macroderma gigas*) – Vulnerable
- Green Turtle (*Chelonia mydas*) – Vulnerable (also listed migratory, marine)
- Olive Ridley Turtle (*Lepidochelys olivacea*) – Endangered (also listed migratory, marine)
- Hawksbill Turtle (*Eretmochelys imbricata*) – Vulnerable (also listed migratory, marine)
- Loggerhead Turtle (*Caretta caretta*) – Endangered (also listed migratory, marine)
- Flatback Turtle (*Natator depressus*) – Vulnerable (also listed migratory, marine)
- Leatherback Turtle (*Dermochelys coriacea*) – Endangered (also listed migratory, marine)
- Humpback whale (*Megaptera novaeangliae*) – Vulnerable (also listed migratory)
- Green Sawfish (*Pristis zijsron*) – Vulnerable (also listed migratory)

Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus*) – Vulnerable

Description

10.3 The Bare-rumped Sheathtail Bat is a large insectivorous bat with a head and body length of 81-97 mm and a weight of 48-55 grams (g). It has reddish-brown to dark brown fur on its back and is slightly paler underneath. It can be distinguished from other Australian sheath-tail bats by irregular white flecks of fur on its back and the naked rump. A throat pouch is present in males and is rudimentary in females. The species is known to occur in north-eastern Queensland and the monsoonal tropics of the Northern Territory and is likely to occur in areas of the Kimberley in Western Australia. In Queensland, it occurs from Ayr to the Iron Range, including Magnetic and possibly Prince of Wales islands.

10.4 There are relatively few records of the subspecies across its range, either suggesting that the subspecies is rare or it has a fragmented distribution. However, issues relating to its detection currently compromise the precise delineation of the subspecies' range and subpopulations: it is morphologically very similar to the Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*); is difficult to capture as it mostly flies above the canopy; and its echo-location call pattern is difficult to distinguish from freetail bats and other sheath-tail bats within its range.

10.5 The Bare-rumped Sheathtail Bat usually occurs in wet eucalypt and riparian forest along the northeast coast of Cape York. Bare-rumped Sheathtail Bats roost in tree hollows and forage over adjacent woodlands and forests. In Australia, all known roost sites are from deep tree hollows in *Eucalyptus platyphylla, Eucalyptus miniata* and *Eucalyptus tetrodonta.*

10.6 The *National recovery plan for the bare-rumped sheathtail bat* Saccolaimus saccolaimus nudicluniatus (2007) and the Approved Conservation Advice for *Saccolaimus saccolaimus nudicluniatus* (bare-rumped sheathtail bat) (2016) identify the following threats to the species: habitat loss, vegetation change, timber collection and targeted tree removal, competition for tree hollows, disease and climate change.

Assessment of impacts

10.7 The referral information describes the vegetation in the action area as open Eucalypt forest and Melaleuca seasonal swamplands on sandplains, and Corymbia forest on basalt derived red earths and erosional surfaces. In information submitted by Peter Spies, Pinnacle Pocket Consulting on behalf of Mr Harris, the canopy is identified as being broken and "made up mostly of the dominant Darwin Stringybark *(E. tetrodonta)* and bloodwoods" (emphasis added) (Spies 2014).

10.8 The extent and geographic location of current populations is poorly known, as is the movement of the species due to a lack of surveys undertaken in the region. However, there is a recent known record of the species from a site 50 km east of Laura on the Normanby River. There are also other known records of the species to the east and north of Kingvale Station.

10.9 Advice from the Department's Biodiversity Conservation Division, states that the action area is within the species range and that the Bare-rumped Sheathtail Bat is likely to occur in the action area.

10.10 Thomson (2015) and Preece (2016) state that the action area provides suitable habitat for the Bare-rumped Sheathtail Bat. The results of echo-location surveys undertaken in

the action area are consistent with the Bare-rumped Sheathtail Bat being present, but they do not definitively identify that particular species of bat.

10.11 The proponent has not identified any avoidance or mitigation measures to reduce the impacts of the proposed action to the species. Instead, the proponent disputes (in correspondence dated 15 February 2016) the occurrence of the Bare-rumped Sheathtail Bat "within 100 km of the permitted clearing area." The proponent also maintained this position in general terms in his 21 September 2016 submission, and later correspondence, mainly on the basis of the species not being seen on the property in the course of cattle grazing operations.

10.12 Thomson (2015) notes the importance of riparian corridors (from targeted surveys) as areas where the species fly low to drink and catch insects.

10.13 While the Department does not have a conclusive detection of this species on Kingvale Station at this time, it considers the proposed action is likely to impact the species by removing up to 1933.9 ha of potential foraging habitat.

10.14 To maintain areas of riparian habitat for the Bare-rumped Sheathtail Bat and minimise the impacts to the species, the Department recommends that you attach a condition of approval that requires the proponent to maintain a 100 m buffer from the edge of watercourses and natural wetlands as prescribed in condition 2 at the beginning of this recommendation report.

Northern Quoll (*Dasyurus hallucatus*) – Endangered

Description

10.15 Northern Quolls are nocturnal predators of invertebrates, but they also eat small mammals, reptiles, birds, carrion and fruit. During the mating season, males expend considerable energy fighting other males and do not survive to breed a second year. Females den in rock crevices and tree hollows. At the end of the breeding season, the Northern Quoll population is comprised almost entirely of mature females and their young.

10.16 The Northern Quoll formerly occurred across northern Australia from Western Australia to south-east Queensland. Its distribution has declined dramatically, especially in the more arid parts of its range, with populations declining rapidly after the arrival of the cane toad. The current distribution of Northern Quoll is discontinuous across northern Australia, with core populations in rocky and/or high rainfall areas (Hill and Ward 2010). In Queensland, some populations of Northern Quoll have persisted following colonisation by cane toads. These areas include, but are not restricted to, upland rocky areas and several coastal sites in north and central Queensland.

10.17 Daytime den sites provide important shelter and protection for Northern Quolls from predators and weather and can include rocky outcrops, tree hollows, termite mounds, goanna burrows and human dwellings.

10.18 The *National Recovery Plan for the Northern Quoll* Dasyurus hallucatus (2010) identifies the following threats to the species: poisoning by cane toads, clearing, inappropriate fire regimes, and habitat degradation through over grazing, predation by feral and domestic animals and destruction by humans.

Assessment of impacts

10.19 Advice from the Department's Biodiversity Conservation Division states that the action area is within the species range and that the Northern Quoll is likely to occur in the action area.

10.20 There is a known record from 2009 of the Northern Quoll from 106 km south-east of the action area.

10.21 Thomson (2015) states that the Northern Quoll is likely to occur along rocky ridges and extend into open woodlands in the action area and that the proposed action is likely to clear suitable foraging habitat for the Northern Quoll and reduce population connectivity for the species.

10.22 Preece (2015) supports this view that suitable habitat for the Northern Quoll is present on the site and that the species is likely to be impacted by the proposed action. The retention of buffer zones in riparian areas as proposed to be included in condition 2 will provide shelter in hollow logs and termite mounds and foraging habitat for the species. The buffer zones will also provide corridors for movement of the species between rocky ridges used for denning.

10.23 While Peter Spies (2015), states that a number of measures will be put in place which will mitigate the impact of the proposed action on the Northern Quoll, including the retention of some rocky areas on the Fairview property (this is not part of the Kingvale property and is not owned by Mr Harris), the Department notes that the proponent has not put forward any mitigation measures on Kingvale Station that will minimise the impacts to the Northern Quoll. Thomson (2015) stated that the clearing of vegetation is likely to impact population connectivity of the species.

10.24 To maintain areas of foraging habitat for the Northern Quoll and minimise the impacts to the species, the Department recommends that you attach a condition of approval that requires the proponent to maintain a 100 m buffer from the edge of watercourses and natural wetlands as prescribed in draft condition 2 at the beginning of this recommendation report.

<u>Golden-shouldered Parrot (*Psephotus chrysopterygius*) – Endangered</u>

Description

10.25 The male Golden-shouldered Parrot is turquoise with a black crown, bright yellow on the wing and forehead and with a salmon pink belly. Females and immature birds are mostly green with a turquoise rump. The species occurs in tropical savanna woodland, nests in termite mounds and feeds on a range of annual and perennial grasses. The species once occurred across most of Cape York Peninsula, but is now restricted to two small areas to the north (Morehead River) and south (Staaten River) of the proposed action. Throughout the dry season, Golden-shouldered Parrots feed on the fallen seeds of annual grasses, particularly fire grass (*Schizachyrium* spp).

10.26 The *Recovery Plan for the Golden-shouldered Parrot* Psephotus chrysopterygius *2003-2007* (2002) lists the following threats to the species:

a) a shortage of food that occurs annually in the early wet season and which can be made worse by a lack of burning and intense cattle and pig grazing; and

b) altered fire patterns and grazing that have resulted in an increase in the density of woody shrubs which, it is thought, increases the vulnerability of the parrots to predators.

Assessment of impacts

10.27 There is a known record from 2015 of the species from 35 km north-east of the action area. Thomson (2015) states that the species has been recorded north and south of the action area. This report also observes that there are termite mounds (that is, potential nest sites) within the proposed clearing area.

10.28 Important habitat identified in the recovery plan (Garnett and Crowley 2002) includes *Eucalyptus cullenii* woodland and *Eucalyptus tetrodonta* woodland which occur on the area proposed for clearing.

10.29 Preece (2015) states that the action area included suitable foraging habitat for the Golden-shouldered Parrot, particularly during the dry season when they feed on fallen seeds of annual grasses. In addition, Spires (2015) states that fire grass (*Schizachyrium* spp.), a known food source, occurs at Kingvale Station.

10.30 Advice from the Department's Biodiversity Conservation Division states that the action area is within the species range and that the Golden-shouldered Parrot is likely to occur in the action area.

10.31 Clearing of vegetation and planting of sorghum as part of the proposed action will remove termite mounds that has the potential to be used for breeding. Peter Spies (2015) identifies breeding habitat as critical habitat for the species.

10.32 Preece (2015) and the recovery plan (Garnett and Crowley, 2002) list a number of termite species that are associated with the termite mounds that the Golden-shouldered Parrot uses for nesting. There is uncertainty about the species of termites associated with the mounds present on Kingvale Station.

10.33 The proponent has not proposed any avoidance or mitigation measures that will reduce the impacts to the species from the proposed action.

10.34 As the suitable habitat occurs mostly along grassy drainage flats fringed by woodland (Garnett and Crowley 2002), the Department recommends that you attach a condition of approval that requires the proponent to maintain a 100 m buffer from the edge of all watercourses and natural wetlands as prescribed in draft condition 2 at the beginning of this recommendation report.

<u>Red Goshawk (*Erythrotriorchis radiatus*) – Vulnerable</u>

Description

10.35 The Red Goshawk is a large and powerful rufous-brown hawk, growing to a length of 45-60 cm, with a wingspan of 100-135 cm. The species occurs in a patchy, widespread distribution across coastal and sub-coastal regions of northern and eastern Australia. Historically it occurred from north-east New South Wales, across Queensland and the Northern Territory, to the north of Western Australia. There is a lack of more recent sightings in NSW and south-east Queensland suggesting the population is smaller than previously estimated and that the species range may have contracted to the north. As is common with large raptors, Red Goshawks have a large home range of up to 200 km^2.

10.36 On Cape York Peninsula, Red Goshawks are mainly found in vegetation types dominated by *Eucalyptus tetrodonta*, *Corymbia* spp. or *Melaleuca* spp. Nesting habitat

is within tall stands of trees, preferably within one kilometre of water (Department of Environment and Resource Management 2012).

10.37 The Approved Conservation Advice for the *Erythrotriorchis radiatus* (red goshawk) (2015) and *National recovery plan for the red goshawk* Erythrotriorchis radiatus (2012) list the following threats to the species: vegetation clearance for agriculture and urban development, reduced fire frequencies, and declines in abundance of their key prey species.

10.38 Preece (2016) states that there is a known record of the species 65 km north of the action area and therefore within the range of the species. Preece states that if a breeding pair was present on Kingvale Station, there is only likely to be one pair due to the large territory occupied by the species.

Assessment of impacts

10.39 The clearing of vegetation at Kingvale Station will remove woodland habitat suitable for the Red Goshawk.

10.40 The proponent has not proposed any avoidance or mitigation measures that will reduce the impacts to the species from the proposed action.

10.41 The retention of riparian vegetation will provide habitat for the Red Goshawk and its prey. The Department therefore recommends that you attach a condition of approval that requires the proponent to maintain a 100 m buffer from the edge of watercourses and natural wetlands as prescribed in draft condition 2 at the beginning of this recommendation report.

Other species

10.42 The Department has considered the impact to the following species of the proposed clearing of vegetation on Kingvale Station. While habitat for these species may be present, the clearing of vegetation on Kingvale Station is unlikely to impact the species as the property provides low quality or marginal habitat and the requirement for riparian buffers will retain sufficient habitat on the property.

Gouldian Finch (*Erythrura gouldiae*) – Endangered

Description

10.43 The Gouldian Finch is about 12 to 15 cm in length and weighs about 14 to 15 g. The adults are vividly multi-coloured, and exhibit three different facial colour-morphs: black-headed (most common), red-headed and yellow-headed (rare). The adult male is mainly emerald green above, with a light-blue upper tail, and a large black, red or orange mask (depending on the morph) that is bordered behind by a light-blue band; and yellow below with a purple breast and cream under tail. The adult female is similar to the adult male, but is duller and paler overall, and has a shorter tail. Adults of both sexes have black-brown irises, a ring of pale bluish-grey skin around each eye, pinkish-orange legs and feet, and a beak that varies in colour from white with a red or (rarely) yellow tip in the non-breeding season to pearl (in males) or dark grey (in females) in the breeding season.

10.44 The species is found in northern Australia from Cape York Peninsula through north-west Queensland and the north of the Northern Territory to the Kimberley region of Western Australia. In Queensland there are no recent breeding records. However the birds have been sighted on at least three sites on Cape York Peninsula, on the Atherton Tablelands and at several sites in and around Boodjamulla National Park.

10.45 Habitat for the species is open woodlands dominated by Eucalyptus trees that support a ground cover of sorghum and other grasses. The species prefers a ground cover of dense grasses including *Chrysopogon fallax*, *Alloteropsis semialata* and *Triodia bitextura*.

10.46 Gouldian Finches feed almost exclusively on grass seed and depend on a relatively small number of grass species which seed at different times of the year.

Assessment of impacts

10.47 While suitable eucalypt woodland is present on the property, Thomson (2015) and Preece (2016) do not list the Gouldian Finch as one of the species likely to be impacted by the proposed clearing of vegetation at Kingvale Station. The Department has considered the information provided in Spies (2015), Thomson (2015) and Preece (2016) and concluded that while the species may be present at Kingvale Station, the retention of riparian buffers, as recommended in condition 2 of the draft conditions, will provide foraging and nesting habitat, including access to fresh water, for the species.

Buff-breasted Button-quail (*Turnix olivii*) – Endangered

Description

10.48 The Buff-breasted Button-quail is a large (18-22 cm long), plump, pale-eyed button quail. The plumage is plain with few black markings in the upperparts. The species nests, roosts and feeds on the ground making it vulnerable to ground predators.

10.49 The Buff-breasted Button-quail is endemic to north-eastern Queensland. It has been reported from scattered localities in eastern areas of the Cape York and Wet Tropics bioregions as well as the very eastern fringe of the Einasleigh Uplands bioregion.

10.50 The species is most frequently reported from stony and or grassy woodland and forests. *Melaleuca viridiflora* and/or *M. minutifolia* are often common mid-storey species. They have also been noted from grassy clearings within rainforest patches.

10.51 The *National recovery plan for the buff-breasted button-quail* Turnix olivii (2009) lists the following threats to the species: habitat clearing and degradation and predation by native and feral animals.

Assessment of impacts

10.52 Although there is a known record from Laura, 23 km from action area, Preece (2016) considered the nature of the habitat present in the action area, and concluded that there was a low chance the Buff-breasted Button-quail would be impacted by the clearing of vegetation at Kingvale Station.

Masked Owl (*Tyto novaehollandiae kimberli*) – Vulnerable

Description

10.53 The Masked Owl is a large owl with a prominent heart-shaped facial disc and plumage that is highly patterned by speckling and is generally darker on the back and paler below.

10.54 The distribution of the Masked Owl is very poorly known. Three subpopulations have been identified in the Approved Conservation Advice for the *Tyto novaehollandiae kimberli* (masked owl) (northern) (2015): Kimberly, Northern Territory and Cape York. In Queensland, there are historical records from the Normanton region, and from Pascoe, Archer, Chester and Watson rivers on Cape York Peninsula. The owl occurs

along the southern rim of the Gulf of Carpentaria, Cape York Peninsula and south to Atherton Tablelands and the Einasleigh-Burdekin divide.

10.55 The Conservation Advice (2015) lists the following threats to the species: shortage of food as small and medium-sized native mammals become increasingly uncommon across much of northern Australia and inappropriate fire regimes.

10.56 There are no known records of the species near the property. Habitat for the Masked Owl includes riverside forests, rainforest, open forests, melaleuca swamps and mangroves. Preece (2016) concludes that while the species may utilise riparian corridors, the removal of vegetation on Kingvale Station is unlikely to impact the Masked Owl. The Department considers the retention of riparian buffer zones, as proposed in draft condition 2, will maintain foraging habitat for the species.

Black-footed Tree-rat (north Queensland) (*Mesembriomys gouldii rattoides*) – Vulnerable

Description

10.57 The Black-footed Tree-rat is a nocturnal medium-sized native mammal and one of the largest rodents in Australia. It has long shaggy medium grey to black fur on top, pale underside, large ears and a distinctive long hairy tail with terminal white brush.

10.58 The distribution of the black-footed tree-rat is poorly known, it has been recorded mostly from eucalypt forests and woodlands (but not in rainforests) around Mareeba, but there are records sparsely across Cape York Peninsula, including recent records from Mungkan Kandju National Park and the Australian Wildlife Conservancy's Piccaninny Plains and Brooklyn wildlife sanctuaries.

10.59 The species dens mostly in tree hollows, but occasionally in dense foliage and occasionally in buildings. The diet is comprised of mostly fruits and seeds but also includes some invertebrates, flowers and grass.

10.60 The Approved Conservation Advice for the *Mesembriomys gouldii rattoides* (Black-footed Tree-rat) (north Queensland) (2015) lists the following threats to the species: inappropriate fire regimes, habitat loss and fragmentation, predation by feral cats, dogs and dingoes, habitat change due to exotic invasive grasses and resource depletion due to livestock and feral herbivores, and poisoning and trapping.

10.61 Thomson (2015) concludes that habitat for the species, which it describes as tall *Eucalyptus miniata* forest with shrub understorey, was not found on Kingvale Station, but notes that records are known from near Laura and to the south near the Palmer River. Preece (2016) concludes that suitable habitat for the species, including tree hollows and fallen hollow timber, is present.

10.62 The Department considers that while it is unlikely that the species occurs on the property, that the retention of riparian buffers will maintain some areas of suitable habitat for the species.

Ghost Bat (*Macroderma gigas*) – Vulnerable

Description

10.63 The Ghost Bat is the largest microchiropteran bat in Australia, with a head and body length of 10-13 cm and a wingspan of 60 cm. It is Australia's only carnivorous bat. Its fur is light to dark grey above and paler below. It has long ears which are joined together, large eyes, a simple noseleaf and no tail.

10.64 The species current range is discontinuous, with geographically disjunct colonies occurring in the Pilbara, Kimberly, northern Northern Territory, Gulf of Capentaria, coastal and near coastal eastern Queensland from Cape York to near Rockhampton and western Queensland.

10.65 They occupy habitats ranging from the arid Pilbara to tropical savanna woodlands and rainforests. During the daytime they roost in caves, rock crevices and old mines. Roost sites used permanently are generally deep natural caves or disused mines with a relatively stable temperature of 23^{o}-28^{o}C and a moderate to high relative humidity of 50-100 per cent. They are carnivores, with a broad diet comprising small mammals including other bats, birds, reptiles, frogs and large insects.

10.66 The Approved Conservation Advice for the *Macroderma gigas* (ghost bat) (2016) lists the following threats to the species: habitat loss and degradation due to mining activities, modification of foraging habitat, collision with fences, disease, poisoning by cane toads, and competition for prey with foxes and feral cats. The species slow reproductive rate, and the lack of suitable habitat which restricts its movement, renders it vulnerable to threats and localised extinctions.

Assessment of impacts

10.67 The Ghost Bat was not detected in bat surveys undertaken by Thomson (2015). Although Preece (2016) concludes that it is possible that the species occurs on the site, the Department concludes that the property is unlikely to include suitable roosting sites. The Department's recommendation to require the proponent to retain riparian buffers (condition 2) will ensure areas of suitable foraging habitat are retained on Kingvale Station.

Other species

10.68 The likely impacts associated with the following species are discussed in paragraphs 7.65 - 7.68 and 7.76 – 7.80 of this recommendation report. The Department considers that the recommended conditions in relation to the GBRWHA (discussed in paragraph 7.117) will ensure protection of the following species:

- Green Turtle (*Chelonia mydas*) – Vulnerable (also listed migratory, marine)
- Olive Ridley Turtle (*Lepidochelys olivacea*) – Endangered (also listed migratory, marine)
- Hawksbill Turtle (*Eretmochelys imbricata*) – Vulnerable (also listed migratory, marine)
- Loggerhead Turtle (*Caretta caretta*) – Endangered (also listed migratory, marine)
- Flatback Turtle (*Natator depressus*) – Vulnerable (also listed migratory, marine)
- Leatherback Turtle (*Dermochelys coriacea*) – Endangered (also listed migratory, marine)
- Humpback whale (*Megaptera novaeangliae*) – Vulnerable (also listed migratory)
- Green Sawfish (*Pristis zijsron*) – Vulnerable (also listed migratory)

11. CONSIDERATIONS FOR APPROVAL AND CONDITIONS

Mandatory considerations – section 136(1)(b) Economic and social matters

11.1 Section 136(1)(b) of the EPBC Act provides that you must consider economic and social matters when deciding whether or not to approve the project and what conditions to attach to such an approval.

Economic

11.2 The proposed action is the clearing of vegetation and the subsequent use of that area for cropping and other associated agricultural activities. The proponent has not provided the Department with any details regarding the economic value of the proposed action.

11.3 The proponent provided to the Queensland Government, as part of his Queensland Development Permit (SDA-0214-008018) application for clearing for high value agriculture, a detailed business plan to establish economic viability of the new crop development.

Social

11.4 The Queensland Department of Aboriginal and Torres Strait Islander Partnerships notified the proponent that the Cultural Heritage Unit recorded three sites on the Department's Aboriginal and Torres Strait Islander Cultural Heritage Database as a result of inspections of clearing areas on Kingvale Station in December 2015.

11.5 The Cultural Heritage Duty of Care Guidelines at Section 5.20 states:

> *An activity under category 5 that will excavate, relocate, remove or harm Aboriginal cultural heritage entered on the Aboriginal Cultural Heritage Register or the Aboriginal Cultural Heritage Database should not proceed without the agreement of the Aboriginal Party for the area or a Cultural Heritage Management Plan undertaken pursuant to Part 7 of the Act.*

11.6 The Department of Aboriginal & Torres Strait Islander Partnerships recommended the proponent contact the Olkola People to assist in managing the impacts on these places. The Department is unaware of whether the proponent made contact with the Olkola People or whether the Olkola People have concerns relating to the proposed action.

Factors to be taken into account – section 136(2)(a) Principles of ecologically sustainable development

11.7 In deciding whether or not to approve the taking of an action and the conditions to attach to an approval, you are required to take into account the principles of ecologically sustainable development. The principles of ESD, as defined in section 3A of the EPBC Act, are:

a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;

b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

c) the principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;

d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making; and

e) improved valuation, pricing and incentive mechanisms should be promoted.

11.8 In addition, section 391 of the EPBC Act provides that you must take into account the precautionary principle in deciding whether or not to approve the taking of an action; namely, that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

11.9 In formulating this recommendation report, the Department has taken into account the principles of ecologically sustainable development and the precautionary principle. In particular:

a) The Department considers that the likely environmental impacts of the proposed action are satisfactory having regard to its long term and short term social and equitable effects.

b) That there is sufficient scientific information to conclude that the proposed action is unlikely to result in unacceptable impacts to the relevant matters of national environmental significance, if taken in accordance with the recommended conditions.

c) The recommended conditions of approval include measures that the Department considers are adequate for mitigating impacts to the relevant matters of national environmental significance. The recommended conditions allow for the project to be delivered and operated in a sustainable way to protect matters of national environmental significance and the environment for future generations.

d) The importance of conserving biological diversity and ecological integrity was a fundamental consideration in deciding whether to recommend the approval of this action, having regard to its impacts on EPBC Act protected matters.

e) The Department has sought to ensure that financial costs of compliance with the proposed approval decision are reasonable to the extent that the proposed action can proceed whilst also making a fair contribution to environmental protection.

Factors to be taken into account – section 136(2)(ba) – referral information

11.10 In accordance with section 136(2)(ba), this document forms the recommendation report relating to the action given to the Minister under section 93(5) of the EPBC Act.

Person's environmental history – section 136(4)

11.11 Under section 136(4), when deciding whether to approve an action taken by a person and what conditions (if any) to attach to an approval, you may consider whether the person is a suitable person to be granted an approval, having regard to:

a) the person's history in relation to environmental matters; and

b) if the person is a body corporate, the history of its executive officers in relation to environmental matters; and

c) if the person is a body corporate that is a subsidiary of another body or company, the history of the parent body and the executive officers of its parent body respectively in relation to environmental matters.

11.12 The Department is aware that the proponent has been charged with offences under Queensland legislation relating to unauthorised vegetation clearing at another of his properties, Strathmore Station. The proponent is charged with 14 counts under s578(1) of the *Sustainable Planning Act 2009* (Qld) and two counts under s611(2).

11.13 These charges have not yet been heard by a court and the outcome of proceedings is unknown. No other information is available to the Department regarding the proponent's environmental history. Accordingly, the Department does not have evidence that the proponent has any established unsatisfactory record of environmental management or non-compliance with environmental laws.

Considerations in deciding on condition – section 134

11.14 In accordance with section 134(1), the Minister may attach a condition to the approval of the action if he or she is satisfied that the condition is necessary or convenient for:

a) *protecting a matter protected by a provision of Part 3 for which the approval has effect (whether or not the protection is protection from the action); or*

b) *repairing or mitigating damage to a matter protected by a provision of Part 3 for which the approval has effect (whether or not the damage has been, will be or is likely to be caused by the action).*

For the reasons set out in the Assessment section above, you can be satisfied that all recommended conditions are necessary or convenient to protect, or repair or mitigate to, a matter protected by provision of Part 3 for which this proposed approval has affect.

11.15 In accordance with section 134(4), in deciding whether to attach a condition to an approval the Minister must consider:

a) *any relevant conditions that have been imposed, or the Minister considers are likely to be imposed, under a law of a State or self-governing Territory or another law of the Commonwealth on the taking of the action; and*

The Queensland Department of State Development, Infrastructure and Planning has granted the proponent a Development Permit (SDA-0214-008018) for vegetation clearing for the purposes of high value agriculture. The permit requires the clearing to be undertaken in accordance with specified conditions (see paragraph 5.21).

(aa) information provided by the person proposing to take the action or by the designated proponent of the action;

The information provided by the proponent is referenced in this recommendation report, variously above.

b) *the desirability of ensuring as far as practicable that the condition is a cost effective means for the Commonwealth and a person taking the action to achieve the object of the condition*

The Department considers that the conditions proposed are a cost effective means of achieving their object. The proposed conditions of approval complement the conditions imposed by the state.

Requirements for decisions about World Heritage – section 137

11.16 In deciding whether or not to approve, for the purposes of section 12 or 15A, the taking of an action and what conditions to attach to such an approval, the Minister must not act inconsistently with:

a) Australia's obligations under the World Heritage Convention; or

b) the Australian World Heritage management principles; or

c) a plan that has been prepared for the management of a declared World Heritage property under section 316 or as described in section 321.

World Heritage Convention

11.17 Australia is a State Party to the World Heritage Convention and ratified the convention on 22 August 1974. The World Heritage Convention is available at: http://whc.unesco.org/en/convention/.

11.18 The World Heritage Convention aims to promote cooperation among nations to protect heritage around the world that is of such outstanding universal value that its conservation is important for current and future generations. It is intended that properties on the World Heritage List will be conserved for all time.

11.19 The Convention establishes a system for recognising natural and cultural sites and for imposing duties on Parties to identify, protect, conserve, present and transmit sites of natural and cultural heritage.

11.20 This report identifies the key impacts of the project to the world heritage values of the GBRWHA, examines how those values would be affected, and recommends a series of conditions which, if implemented, would avoid and mitigate those impacts (see paragraphs 7.117).

11.21 The recommended conditions are necessary or convenient to protect the world heritage values of the GBRWHA, and to repair or mitigate damage to those values, based on the assessed impacts of the project (see section 7).

11.22 Having regard to the matters discussed in paragraphs 11.17 to 11.21, the Department considers that you can be satisfied that approving the proposed action, subject to conditions, is not inconsistent with Australia's obligations under the World Heritage Convention.

World Heritage management principles

11.23 The World Heritage management principles are accessible at Schedule 5 of the EPBC Regulations: https://www.legislation.gov.au/Series/F2000B00190

11.24 The Department does not consider that the proposed action would result in a change in the protection and management mechanisms of the World Heritage Area. The proposed action, if approved, would be managed through a range of conditions imposed by Commonwealth and/or Queensland Governments. Therefore, the Department considers that you can be satisfied that approving the proposed action, subject to conditions, is not inconsistent with World Heritage management principles.

A plan for the management of Great Barrier Reef World Heritage Property

11.25 Section 316(1) of the EPBC Act provides that the Minister must make a written plan for managing a property on the World Heritage List and entirely within one or more Commonwealth areas, as soon as practicable after the property is included in the

World Heritage List or becomes entirely within one or more Commonwealth areas. A management plan for the Great Barrier Reef World Heritage Property has not been prepared under section 316 of the EPBC Act.

Requirements for decisions about National Heritage places – section 137A

11.26 In deciding whether or not to approve for the purposes of section 15B or 15C of the EPBC Act the taking of an action, and what conditions to attach to such an approval, the Minister must not act inconsistently with:

a) the National Heritage management principles; or

b) an agreement to which the Commonwealth is party in relation to a National Heritage place; or

c) a plan that has been prepared for the management of a National Heritage place under section 324S or as described in section 324X.

National Heritage management principles

11.27 The National Heritage management principles are accessible at schedule 5B of the EPBC Regulations: https://www.legislation.gov.au/Series/F2000B00190

11.28 For the reasons set out in paragraphs 11.29 to 11.30, the Department considers that you can be satisfied that approving the proposed action, subject to conditions, is not inconsistent with the National Heritage management principles.

Agreement or plan for the management of a National Heritage place

11.29 A management plan for the Great Barrier Reef National Heritage place has not been prepared under section 324S of the EPBC Act.

11.30 The Commonwealth has not reached agreement with any party in relation to the management of the National Heritage values of the Great Barrier Reef.

Requirements for decisions about listed threatened species and communities – s139

11.31 In deciding whether or not to approve for the purposes of a subsection of section 18 or section 18A the taking of an action, and what conditions to attach to such an approval, the Minister must not act inconsistently with:

a) Australia's obligations under:

(i) the Biodiversity Convention; or

(ii) the Apia Convention; or

(iii) CITES; or

b) a recovery plan or threat abatement plan.

11.32 In addition, under section 139(2) of the EPBC Act, if:

a) the Minister is considering whether to approve, for the purposes of a subsection of section 18 or section 18A, the taking of an action; and

b) the action has or will have, or is likely to have, a significant impact on a particular listed threatened species or a particular listed threatened ecological community;

the Minister must, in deciding whether to so approve the taking of the action, have regard to any approved conservation advice for the species or community.

The Biodiversity Convention

11.33 The Biodiversity Convention is available at: http://www.austlii.edu.au/au/other/dfat/treaties/ATS/1993/32.html.

11.34 The objectives of the Biodiversity Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

11.35 The Biodiversity Convention promotes environmental impact assessment to avoid and minimise adverse impacts on biological diversity. This report forms part of an environmental impact assessment process under Part 8 of the EPBC Act.

11.36 This report identifies the likely impacts of the proposed action on listed threatened species and ecological communities, and recommends measures to avoid and mitigate those impacts. The conditions have been recommended having regard to the Convention's aim to conserve listed threatened species in the wild.

11.37 As explained earlier in this report (see section 10), the Department considers that the proposed action will not have unacceptable impacts on listed threatened species and communities if it is taken in accordance with the recommended conditions.

11.38 For this reason the Department considers that you can be satisfied that approving the proposed action, subject to conditions, is not inconsistent with Australia's obligations under the Biodiversity Convention.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

11.39 CITES is available at: http://www.austlii.edu.au/au/other/dfat/treaties/ATS/1976/29.html.

11.40 CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

11.41 The Department considers that the approval of the proposed action, subject to conditions, is not inconsistent with CITES as the proposed action does not involve international trade.

Convention on the Conservation of Nature in the South Pacific (Apia Convention)

11.42 The Apia Convention is available at: http://www.austlii.edu.au/au/other/dfat/treaties/ATS/1990/41.html.

11.43 The Apia Convention encourages the creation of protected areas which together with existing protected areas will safeguard representative samples of the natural ecosystems occurring therein (particular attention being given to endangered species), as well as superlative scenery, striking geological formations, and regions and objects of aesthetic interest or historic, cultural or scientific value.

11.44 The Apia Convention was suspended with effect from 13 September 2006. While this Convention has been suspended, Australia's obligations under the Convention have been taken into consideration. The Department considers that the approval of the proposed action, subject to conditions, is not inconsistent with the Apia Convention which has the general aims of conservation of biodiversity.

Recovery Plans and Threat Abatement Plans

11.45 The recovery plans relevant to the proposed action and assessment are:

a) Department of the Environment and Energy (2017). *Recovery Plan for Marine Turtles in Australia*. Commonwealth of Australia, Canberra.

b) Department of the Environment (2015). *Sawfish and River Sharks Multispecies Recovery Plan*. Commonwealth of Australia, Canberra.

c) Schulz, M. & B. Thomson (2007). *National recovery plan for the bare-rumped sheathtail bat* Saccolaimus saccolaimus nudicluniatus. Report to Department of the Environment and Heritage, Canberra. Brisbane: Queensland Parks and Wildlife Service.

d) Hill, B.M. & S.J. Ward (2010). *National Recovery Plan for the Northern Quoll* Dasyurus hallucatus. Department of Natural Resources, Environment, The Arts and Sport, Darwin.

e) Garnett, S.T. & G.M. Crowley (2002). *Recovery Plan for the Golden-shouldered Parrot* Psephotus chrysopterygius *2003-2007*. Report to Environment Australia, Canberra. Queensland Parks and Wildlife Service, Brisbane.

f) Department of Environment and Resource Management (2012). *National recovery plan for the red goshawk* Erythrotriorchis radiatus. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra. Queensland Department of Environment and Resource Management, Brisbane.

g) O'Malley, C. (2006). *National Recovery Plan for the Gouldian Finch* (Erythrura gouldiae). WWF-Australia, Sydney and Parks and Wildlife NT, Department of Natural Resources, Environment and the Arts, NT Government, Palmerston.

h) Mathieson, M.T. & G.C. Smith (2009). *National recovery plan for the buff-breasted button-quail* Turnix olivii. Report to Department of the Environment, Water, Heritage and the Arts, Canberra. Department of Environment and Resource Management, Brisbane.

11.46 The Recovery Plans have been considered in this recommendation report in respect of each listed threatened species and community (see discussion above in section 10).

11.47 The threat abatement plans relevant to the proposed action are:

a) Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009). *Threat abatement plan for the impacts of marine debris on vertebrate marine life*. Commonwealth of Australia, Canberra.

b) Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). *Threat abatement plan for predation by the European red fox*. DEWHA, Canberra.

c) Department of Sustainability, Environment, Water, Population and Communities (2012). *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses*. Department of Sustainability, Environment, Water, Population and Communities.

d) Department of Sustainability, Environment, Water, Population and Communities (2011). *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads*. Commonwealth of Australia, Canberra.

e) Department of the Environment (2015). *Threat abatement plan for predation by feral cats*. Commonwealth of Australia, Canberra.

f) Department of the Environment and Energy (2017). *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (Sus scrofa) (2017)* Commonwealth of Australia, Canberra.

11.48 The Threat Abatement Plans have been considered in this recommendation report in respect of each listed threatened species and community to which the Threat Abatement Plan is relevant (see discussion above in section 10).

11.49 The Department has considered all relevant recovery plans and threat abatement plans and considers that you can be satisfied that approval of the proposed action, subject to conditions, would not be inconsistent with the above recovery plans and threat abatement plans.

Conservation Advice

11.50 The approved conservation advices relevant to this proposed action are:

a) Department of the Environment, Water, Heritage and the Arts (2008). *Approved Conservation Advice for* Dermochelys coriacea (Leatherback Turtle). Department of the Environment, Water, Heritage and the Arts, Canberra.

b) Threatened Species Scientific Committee (2015). *Conservation Advice* - Megaptera novaeangliae - *humpback whale*. Department of the Environment, Canberra.

c) Department of the Environment, Water, Heritage and the Arts (2008). *Approved Conservation Advice for Green Sawfish*. Department of the Environment, Water, Heritage and the Arts, Canberra.

d) Threatened Species Scientific Committee (2016). *Conservation Advice* Saccolaimus saccolaimus nudicluniatus *bare-rumped sheathtail bat*. Canberra: Department of the Environment and Energy.

e) Threatened Species Scientific Committee (2015). *Conservation Advice* Tyto novaehollandiae kimberli *masked owl (northern)*. Canberra: Department of the Environment.

f) Threatened Species Scientific Committee (2015). *Conservation Advice* Mesembriomys gouldii rattoides *Black-footed tree-rat (north Queensland)*. Canberra: Department of the Environment.

g) Threatened Species Scientific Committee (2016). *Conservation Advice* Macroderma gigas *ghost bat*. Canberra: Department of the Environment.

h) Threatened Species Scientific Committee (2016). *Conservation Advice* Erythrura gouldiae *Gouldian finch*. Canberra: Department of the Environment and Energy.

i) Threatened Species Scientific Committee (2015). *Conservation Advice* Erythrotriorchis radiatus *red goshawk*. Canberra: Department of the Environment.

j) Threatened Species Scientific Committee (2017). *Conservation Advice* Psephotus chrysopterygius *(golden-shouldered parrot, alwal)*. Canberra: Department of the Environment and Energy.

11.51 The Department has had regard to the approved conservation advices relevant to the proposed action and has given consideration to the likely impacts of the proposed action on listed threatened species and ecological communities. The Department is of the view that approval of this action would not be inconsistent with the conservation advices listed above (see discussion above in sections 10).

Bioregional Plans section 176(5)

11.52 In accordance with section 176(5), you are required to have regard to a bioregional plan in making any decision under the Act to which the plan is relevant.

11.53 The proposed action is not located within or near an area designated by a bioregional plan. The Department considers that there are no bioregional plans relevant to the proposed action.

12. Duration of approval

12.1 The Department recommends that the approval remain valid for a period of 30 years to allow sufficient time to cover the clearing of vegetation and the implementation of measures to protect matters of national environmental significance.

13. Conclusion

13.1 The Department considers that the likely impacts of the proposed action on the GBRWHA, Great Barrier Reef National Heritage Place, the GBRMP and listed threatened species and communities will not be unacceptable, provided the proposed action is undertaken in accordance with the recommended conditions.

13.2 Having considered all matters required to be considered under the EPBC Act, the Department recommends the proposed action be approved, subject to the recommended conditions.

14. Material used to prepare recommendation report

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Recovery plans, Conservation advice, Threat abatement plans Recovery plans

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ATTACHMENTS

A: Referral documentation

A1 Also referred to as B2(i) - Correspondence (23 June 2015). Department to Mr Harris. Request to refer.

Also referred to as B 2(ii) - Correspondence (29 June 2016). Kempton to Department. Request for information.

Also referred to as B 2(iii) - Correspondence (4 July 2016). Department to Kempton providing information including Shellberg Report (2016) and Compliance Inspection Report (2016).

Also referred to as B 4(iv) - Correspondence (13 July 2016). Kempton to Department. Harris does not intend to refer.

A2 Decision instrument (8 August 2016). Decision to Deem Referral. Includes findings on which determination was based.

B: ERT Report

C: Queensland Development Permit (SDA-0214-008018) – Queensland Department of State Development, Infrastructure and Planning (2014) *Development permit for operational work – vegetation clearing for the purposes of high value agriculture (dryland sorghum)*.

D: Referral decision notice signed

E: Reports

E01: Spies, P. Pinnacle Pocket Consulting (2014). *Proposed Dryland Cropping of Sorghum and Forage Sorghum for green chop at Kingvale Station west of Laura*.

E02: Spies, P. Pinnacle Pocket Consulting (2015). *Assessment of Species and species habitat present on Kingvale*. CAS 2097

E03: Shellberg, J. (2016). *Soil Erosion and Downstream Sedimentation Risk Associated with Proposed Vegetation Clearing for Agricultural Development on Kingvale Station, Lot 1 on Plan KG2, Cape York Peninsula*. Prepared for Department.

E04: Shellberg, J. (2017) *Review of Buffer Zone Adequacy to Reduce Soil Erosion and Downstream Sedimentation Risks Associated with Proposed Vegetation Clearing for Agricultural Development on Kingvale Station, Lot 1 on Plan KG2, Cape York Peninsula*. Prepared for the Department.

E05: Shellberg, J. (2018) *Estimating the relative magnitude of expected increases in soil erosion from tree clearing and agricultural development on Cape York: Background Literature Review*. Prepared for the Department.

E06: Thomson, B. (2015) Kingvale Station - *MNES Preliminary Survey, December 2015, and assessment of species occurrence*. Redleaf Environmental. Prepared for the Department.

E07: Loch, R. (undated) Kingvale Station – *Geomorphology and hydrology assessment of potential impacts of proposal to clear approximately 2100ha for agricultural development.* Prepared for Department. Received December 2016.

E08: Loch, R. (2017) *re: Kingvale Station Development Proposal.* Advice provided to the Department dated 1 December 2017.

E09: Preece, N. (2016) *Kingvale Station Matters of National Environmental Significance. Stage 1 – Reconnaissance survey, desktop study and report*. Prepared for Department.

E10 Garozzo, S. (2017). *Slope and Watercourse Assessment of DPP 2014-000805 Sub Areas A3, A4 and A5 – Kingvale Station*. Prepared for the proponent, August 2017.