Ord River Irrigation Area Stage 2 (M2 Supply Channel), Kununurra

Part 2 – Management

Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and Water Corporation of Western Australia

Report and recommendations of the Environmental Protection Authority

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Summary and recommendations

This report

This report provides the second part of the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment and Heritage on a proposal by Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains, near Kununurra in the Kimberley region of Western Australia (WA).

The proposal is being assessed jointly by the Western Australia (WA) EPA and the Northern Territory (NT) Department of Lands, Planning and Environment (DLPE). As such, this report will address the whole of the project area and will not be limited to that portion of the project area within respective State borders. The Commonwealth through Environment Australia (EA) has been involved in the assessment under cooperative arrangements with WA and NT.

In August 2000, the EPA provided advice and recommendations to the Minister for the Environment (EPA, 2000a) on the biodiversity implications of clearing 30,500 hectares (ha) of land for the Ord River Irrigation Area Stage 2 (M2 Supply Channel) development (hereafter referred to as the M2 Project). Accordingly, this report should be read in conjunction with Bulletin 988.

The proposal

The proposal includes the:

- development of 30,500 hectares (ha) for irrigated agriculture;
- development of 3,000 ha for water supply and land protection infrastructure;
- establishment and management of 42,500 ha of land as a buffer for conservation purposes;
- construction of a raw sugar mill, with the capacity to produce approximately 400,000 tonnes per annum (tpa) of raw sugar and 160 000 tpa of molasses, near the centre of the M2 Area, in Western Australia; and
- development of raw sugar and molasses storage and handling facilities at Wyndham.

The issues arising from the proposal

The EPA is cognizant of issues associated with the clearing of large areas of vegetation and also irrigated agriculture, and the environmental issues associated with other agricultural developments such as those along the Murray Darling River and the Ord Stage 1 development. Key issues associated with the proposal are:

- the potential loss of biodiversity as a result of clearing large areas of land within one bioregion;
- the long-term potential for groundwater impacts as a result of both clearing the land and its use for irrigated agriculture;
- the effect on riparian ecosystems and recreational use of the Ord River of diverting large quantities of water from the Ord River during the dry season;
- the effect of irrigated tail water discharges on the hydrology, water quality, ecology and recreational use of the Keep River downstream;
- the potential adverse effects of chemical and fertiliser application to the irrigated farmland on the adjacent farm land and riverine environment;
- the potential for an increase in the incidence of mosquito-borne diseases as a result of the creation of large areas of potential all-year breeding grounds for mosquitoes;
- the potential for loss of sites of Aboriginal heritage or cultural value within the irrigated farmlands; and

- the need for best practice management of the irrigated farmlands to ensure minimal adverse environmental impact.

Other issues associated with the project include its potential to:

- contribute to greenhouse gas emissions; and
- create substantial quantities of atmospheric particulates and dust during construction.

Relevant environmental factors

In response to these issues, the EPA identified the following environmental factors as needing to be addressed by the co-proponents:

(a) Biodiversity – management of the riparian zone, hydrological function and buffer area;
(b) Mosquitoes and disease vectors – management to reduce the risk of increased infection ;
(c) Particulates and dust – management of dust during construction, particulate fallout during cane harvesting, atmospheric emissions from the sugar mill and dust associated with transport from the Project Area to Wyndham ;
(d) Chemicals – management of the use of chemicals and their impacts;
(e) Greenhouse gas emissions – management of greenhouse gas emissions arising from the project including the burning of cane;
(f) Groundwater quality and quantity – management of rising groundwater levels and discharge of groundwater to the estuarine portion of the Keep River;
(g) Surface water quality and quantity – management of surface water from farm operations, and surface water discharges to the Keep River, Border Creek and Sandy Creek;
(h) Recreation – maintenance of recreational values within the Project Area;
(i) Aboriginal heritage and culture – ethnographic and archaeological surveys and Aboriginal values and use of the land;
(j) Management structure – management structure and legal responsibility; and
(k) Environmental management programme – pre-construction and construction, and specific components of the plan.

The issue of biodiversity protection as it relates to the clearing of 30,500 ha of land for irrigated agriculture has already been assessed and reported in Bulletin 988 (EPA, 2000a). In summary the EPA advised that if the conditions proposed by the EPA were implemented by the co-proponents, then the revised proposal will meet its criteria in the following ways:

- it is unlikely that any species of flora or fauna will become extinct;
- the target of the retention of at least 30% of each vegetation association/ community and each vegetation group is achieved for all but two vegetation associations/ communities;
- riparian zones around watercourses and wetlands have been excluded from the development;
- buffer areas will, in many cases, be a component of a much larger conservation system as a consequence of Western Australian (WA) and Northern Territory (NT) Government conservation reserve initiatives; and
- where additional information on biota is required, this will be obtained and incorporated into the final project design prior to construction.

The issue of water allocation and impact on the Ord River is being dealt with as a separate assessment of the Water and Rivers Commission's Interim Water Allocation Plan which is yet to be completed.

Conclusion

The EPA has considered the environmental implications for management of the proposal by Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains.

The EPA has assessed this proposal on the basis of sugar cane being the predominant crop. However, it has also considered the long-term development as an irrigated horticulture proposal, without assuming any specific crops. Management will need to be flexible and offer sufficient assurance to cater for the full range of possible future demands.

The EPA notes that:

- the matter of ownership, control and management of the buffer area needs to be resolved, prior to the completion of detailed design and development commencing;
- there is a need for a management structure and a legal entity to achieve, ensure and report on compliance with conditions and commitments;
- the Environmental Management Programme that includes environmental management plans on a range of topics is fundamental in achieving best practice management across the whole of the Project Area (irrigated farmland and buffer area) for the life of the proposal;
- management will need to be of a very high quality and have substantial proponent commitment throughout the life of the development;
- development of the Weaber, Knox and Keep River Plains for irrigated agriculture will result in seasonal changes to the hydrological cycles leading to increased rate of water infiltration (accession) to underlying aquifers and a consequent rise in groundwater levels;
- the Aboriginal Socio-Economic Impact Assessment (ASEIA) is an outstanding issue and consideration of management of the social impacts associated with the proposal have yet to be completed;
- it has been argued and accepted through the Federal Court that the Miriuwung and Gajerrong people have maintained connection and use of the land for spiritual purposes (ie dreaming), sacred sites, hunting and gathering and medicinal purposes;
- aspects of the operation and management of the project may affect Aboriginal heritage values which have been identified through the Native Title process;
- no comprehensive archaeological and ethnographic surveys have been undertaken for the Western Australian portion of the Project Area.

The EPA is satisfied that, on the basis of information available to it and subject to the conditions and commitments set out in Appendix 2 and summarised in Section 4, the development of the land and its use for irrigated agriculture is capable of being managed to meet the EPA's objectives related to management.

Summary of environmental costs and benefits

Environmental costs of the project include:

- the loss of 33,500 ha of predominantly pastoral grasslands;
- reduced flow down the Ord River during summer resulting from the diversion of water to the proposal;
- rise in groundwater levels; and
- modification of the hydrology of the Keep River.

The environmental benefits to the community include:

- substantially expanded conservation reserves around the proposal;
- management of the project buffer area primarily to protect its conservation values; and
- the opportunity for an Indigenous Land Use Agreement (ILUA) with indigenous peoples.

The environmental risks to the community are:

- the need for best practice management over the short and long-term to maintain environmental acceptability of the project; and
- the capacity of the land owners to undertake the necessary management in the long-term.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment and Heritage:

1. That the Minister notes that this report is Part 2 – Management, and addresses the management component of the proposal by Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains.

2. That the Minister notes that a report on the proposal, Part 1- Biodiversity Implications, was submitted in August 2000 (EPA Bulletin 988).

3. That the Minister considers the report on the relevant environmental factors related to management as set out in Section 3 of this report.

4. That the Minister notes that the EPA has been constrained in its assessment of Aboriginal heritage and culture by the limited available information on Aboriginal values but further notes that the co-proponents have committed to further work on cultural heritage and also an Aboriginal Socio-Economic Impact Assessment to the satisfaction of the Miriuwung and Gajerrong people.

5. That the Minister notes that the EPA has concluded that development of the land and its use for irrigated agriculture:

   (a) is capable of being managed to meet the EPA's objectives related to the relevant factors of biodiversity, mosquitoes and disease vectors, particulates and dust, chemicals, greenhouse gas emissions, groundwater quality and quantity, surface water quality and quantity, recreation, management structure and environmental management plan, subject to the conditions and co-proponents' commitments set out in Appendix 2 and summarised in Section 4.

   (b) is, on the basis of current information and subject to the conditions and co-proponents' commitments set out in Appendix 2 and summarised in Section 4, capable of being managed for the relevant factor of Aboriginal heritage and culture (see also Recommendation 4).

6. That the Minister notes that the conditions and procedures recommended in Appendix 2 combine recommendations from Bulletin 988 and this report.

7. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report.

Other Advice

The EPA has provided advice in relation to other issues associated with the project. These issues include:

- water allocation planning for the Ord River and provision of water to the M2 Project;
- the ILUA between the co-proponents and the Miriuwung and Gajerrong people to resolve native title issues;
- the Community and Economic Development Agreement between the State and the Miriuwung and Gajerrong people;
- implications of the *Environmental Protection and Biodiversity Conservation Act 1999* for the M2 Project and the M2 Water Licence;
- the Ord River Irrigation Area Stage 1 in terms of attaining best practice land and water management;
- the need for a performance guarantee to assure delivery of management; and
- the scope of the *Environmental Protection Act 1986* to the Project Area and other activities such as the conversion of the construction camp to a designated townsite following construction of the M2 Project.

Conditions

It is the intention of the Western Australian and Northern Territory (NT) Governments that environmental conditions issued under the Western Australian *Environmental Protection Act 1986* should be applied to the whole of the Project Area. The environmental conditions, however, cannot be set for the whole of the Project Area until enabling legislation is passed by the NT Parliament. In the meantime, any Statement of Approval issued under the *Environmental Protection Act 1986* can only apply to that portion of the Project Area located within WA.

Having considered the co-proponents' commitments and information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the proposal by Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains is approved for implementation. These conditions are presented in Appendix 2. Several of these conditions, specifically conditions 8 (Buffer Management Plan), 9 (Flora and Fauna Protection Plan), 11 (Final Project Design) and 14 (Regional Conservation Initiatives) have previously been recommended by the EPA in Bulletin 988 and are included in this report with minor adjustments for completeness. It should be noted that condition 14 is a procedure involving the WA and NT governments and is not subject to co-proponent compliance. Matters addressed in the conditions include the following:

(a) that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 2;

(b) that the proponent be required to establish a legal entity and environmental management structure to ensure compliance with environmental conditions and commitments;

(c) that the proponent be required to prepare, make publicly available and implement an Environmental Management Programme that includes environmental management plans as listed in Table 1, Appendix 2, as well as environmental management plans for:
   - chemicals management;
   - the Sugar Mill and associated activities;
   - sodic soil management; and
   - infrastructure maintenance (including flood levee location and management);

(d) that the proponent be required to prepare, make publicly available and implement a Buffer Management Plan;

(e) that the proponent be required to prepare, make publicly available and implement a Flora and Fauna Protection Plan, prior to the preparation of the Final Project Design Layout. This plan requires the proponent to:

- undertake additional surveys of terrestrial fauna including frogs, bats and reptiles;
- undertake additional surveys of aquatic fauna within the Keep River (including estuarine fauna);
- protect vegetation associations/ communities G1, G4, EM8, EM9, Gt2 and ET4 within proposed reserves adjacent to the Project Area; and
- identify and protect subterranean fauna.

(f) that the proponent be required to prepare and make publicly available a Hydrodynamic Survey Plan for the Keep River, Border Creek and Sandy Creek, as part of the Environmental Management Programme, prior to intended discharge of harvested groundwater or drainage from the project development area. The plan shall be implemented at least 18 months prior to the intended discharge from the project and include:

- surveys of the flushing characteristics of the Keep River;
- surveys of the flushing characteristics of Sandy Creek;
- surveys of the flow characteristics of Border Creek; and
- hydrodynamic investigations of the estuarine portion of the Keep River,

(g) that the proponent be required to prepare a Final Project Design Layout for the Project Area, following the completion of the buffer management plan and additional biological surveys, make that plan publicly available and implement that plan;

(h) that the proponent be required to prepare and implement a Decommissioning Plan; and

(i) that the proponent shall submit a Performance Review Report, every three years and annual reports on compliance and monitoring results.

Contents

1. Introduction and background

This report provides the second part of the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal by Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia (hereafter referred to as Wesfarmers, Marubeni and the Water Corporation) to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains, near Kununurra.

The proposal is being assessed jointly by the Western Australia (WA) EPA and the Northern Territory (NT) Department of Lands, Planning and Environment (DLPE). As such, this report will address the whole of the project area and will not be limited to that portion of the project area within respective State borders. The Commonwealth through Environment Australia (EA) has been involved in the assessment under cooperative arrangements with WA and NT.

In August 2000, the EPA provided advice and recommendations to the Minister for the Environment (EPA, 2000a) on the biodiversity implications of clearing 30,500 hectares (ha) of land for the Ord River Irrigation Area Stage 2 (M2 Supply Channel) development (hereafter referred to as the M2 Project). Accordingly, this report should be read in conjunction with Bulletin 988.

The EPA in Bulletin 988 concluded that, on the basis of information available to it, the clearing of the land for irrigated agriculture could be managed to meet the EPA's objectives related to biodiversity, subject to the conditions and commitments. The EPA was of the view that the proposal, as modified during the course of the assessment, achieved a number of important outcomes:

- it is unlikely that any species of flora or fauna will become extinct;
- the target of retention of at least 30% of each vegetation association/ community and each vegetation group is achieved for all but two vegetation associations/ communities;
- riparian zones around watercourses and wetlands have been excluded from the development;
- buffer areas will, in many cases, be a component of a much larger conservation system as a consequence of WA and NT Government conservation reserve initiatives; and
- where additional information on biota is required, this will be obtained and incorporated into the final project design prior to construction.

A number of appeals have been lodged with the Minister for the Environment and Heritage in relation to the EPA's advice in Bulletin 988. Given the assessment approach and the nature of issues being considered, the Minister is required to deal with those appeals as well as any appeals on this report at the same time. Consequently, appeals on Bulletin 988 have not yet been determined.

In view of the significant management implications for the M2 Project, the NT DLPE convened a one day workshop in Darwin on 3 October 2000 which was attended by representatives of WA and NT government agencies. Key issues discussed were:

- the management structure and desirability for a single entity having legal responsibility for key approvals;
- responsibilities of the co-proponents and government agencies and the need for these to be clearly defined;
- annual reporting and major triennial reporting with peer review;
- the inclusion of independent members on the management entity;

- the need for social impacts and Aboriginal issues to be completed;
- the buffer zone, its purpose and management, and responsibility for management;
- the need for hydrological information on the Keep River;
- the need for clarity and understanding of Commonwealth assessment involvement and possible conditions under the *Environmental Protection and Biodiversity Conservation Act 1999*;
- the need for the NT and WA Parliaments to pass enabling legislation identifying the WA *Environmental Protection Act 1986* as the key environmental instrument to apply to the whole of the project area, including the NT portion and the buffer;
- the application of the *Environmental Protection Act 1986* to, for example, a townsite within the Project Area but within the NT; and
- the Interim Water Allocation Plan (IWAP) for the Ord River.

The provision of water to the proposal is also being considered by the EPA. The Water and Rivers Commission (WRC) is currently undertaking a review of the basis for proposed allocations following the EPA's review of the WRC's Draft Interim Water Allocation Plan (DIWAP) for the Ord River in December 1999 (EPA, 1999). Once the review is completed, the EPA will provide advice on these allocations and the WRC will then finalise the IWAP.

It is the intention of the WA and NT Governments that environmental conditions issued under the *Environmental Protection Act 1986* apply to the whole of the Project Area. However, the environmental conditions cannot be set for the whole of the Project Area until enabling legislation is passed by the NT Parliament. In the meantime, any Statement of Approval issued under the *Environmental Protection Act 1986* can only apply to that portion of the Project Area located within WA.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors relevant to the issue of management. The environmental conditions and commitments related to management, to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other Advice by the EPA, Section 6 presents the EPA's conclusions and Section 7, the EPA's recommendations.

The summary of submissions and the co-proponent's response to submissions was provided as a separate document to the EPA's first report on biodiversity. This was included as a matter of information only and did not form part of the EPA's report and recommendations. Issues arising from the submissions and responses and which have been taken into account by the EPA appear in this report. Appendix 1 lists the references cited in this report while Appendix 2 contains the recommended conditions and co-proponents' commitments.

2. The proposal

The M2 Project is located near Kununurra within the Victoria-Bonaparte Biogeographic Region. The Project Area extends over approximately 76,000 ha of land comprising the Weaber, Keep River and Knox Creek Plains, and involves approximately equal areas within WA and the NT (see Figure 1).

The M2 Project as outlined in the Environmental Review and Management Programme (ERMP)/draft Environmental Impact Statement (EIS) (Kinhill, 2000) was modified by the co-proponents during the EPA's assessment of the project on biodiversity. These modifications were documented in EPA Bulletin 988 (EPA, 2000a). The modified Project Layout is shown in Figure 2 (Wesfarmers et al, 2000).

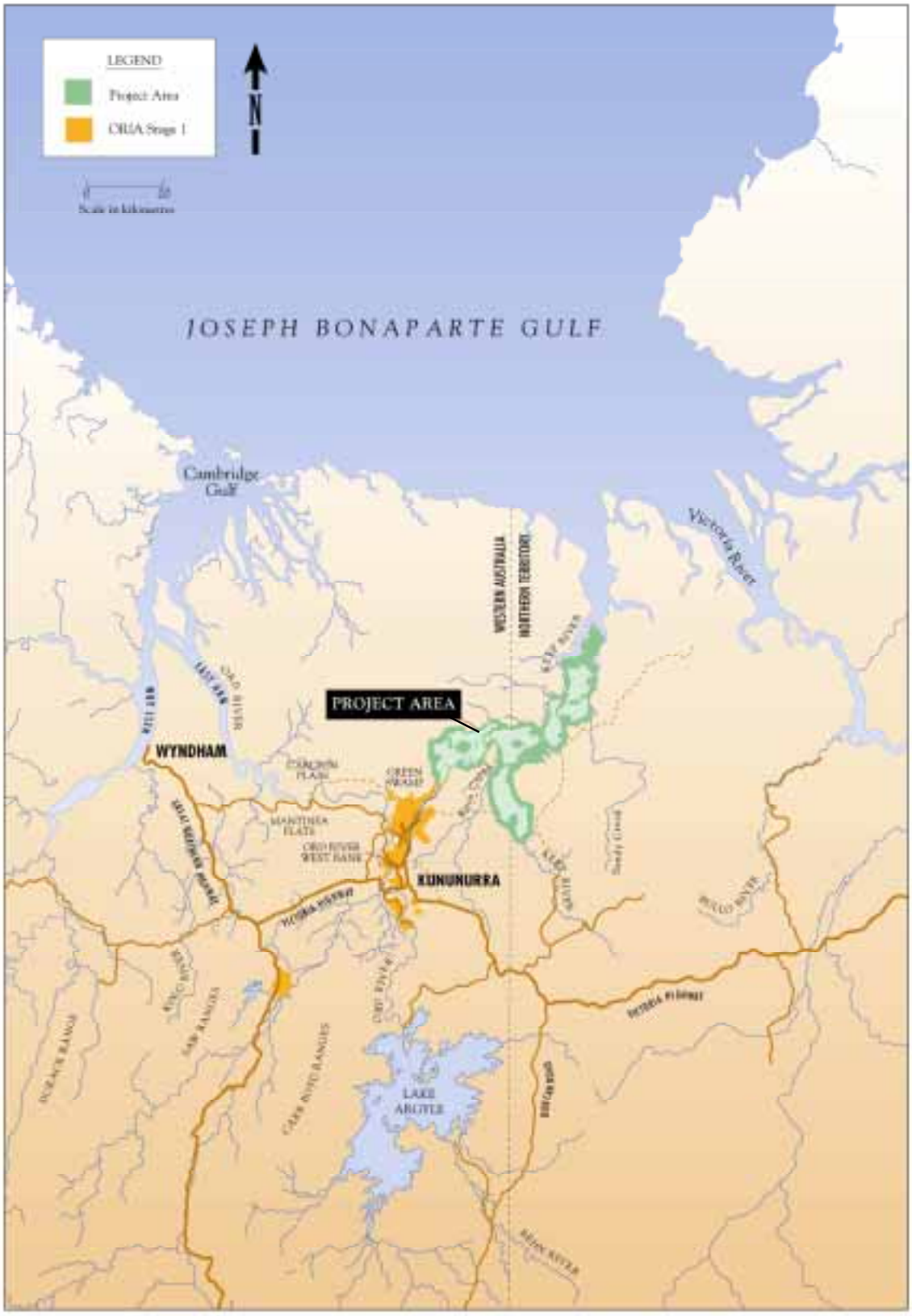

Figure 1. Overview of the Ord Region and Project Area (Kinhill Pty Ltd, 2000).

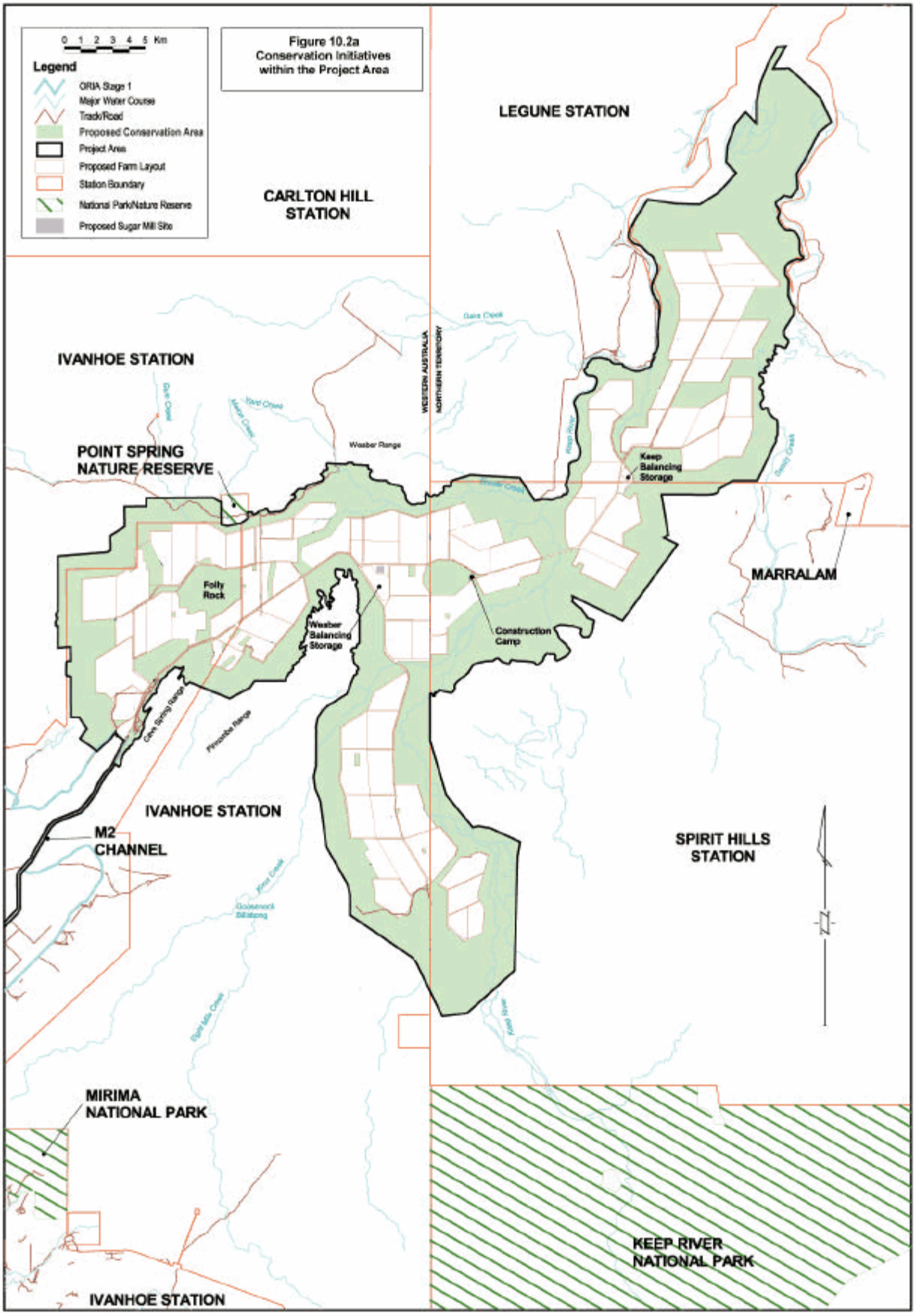

Figure 2: Project Layout (Wesfarmers et al, 2000)

The key components of the proposal include:

- development of 30,500 ha for irrigated agriculture;
- development of 3,000 ha for water supply and land protection infrastructure;
- establishment and management of 42,500 ha of land as a buffer for conservation purposes;
- construction of a raw sugar mill, with the capacity to produce approximately 400,000 tonnes per annum (tpa) of raw sugar and 160 000 tpa of molasses, near the centre of the M2 Area, in WA; and
- development of raw sugar and molasses storage and handling facilities at Wyndham.

The main characteristics of the proposal are summarised in Table 1 below.

Table 1: Summary of key proposal characteristics

Element	Description	Amount
Land within the Project Area	• Project area • Land managed as a buffer+ • Land for irrigable development • Infrastructure area	• 76,000 ha* • 42,500 ha* • 30,500 ha* • 3,000 ha*
Land outside the Project Area	• M2 Channel (Lake Kununurra to Project Area) • Wyndham Port Facilities	• 690 ha • 1 ha
Production	• Raw sugar • Molasses	• 400,000 tpa • 160,000 tpa
Infrastructure	• Irrigation channels • Annual water requirement • Drains • Flood protection levees • Balancing storage dams (operating volume) • Roads • Power lines	• 160 km* • 740 GL* • 153 km* • 142 km* • 5.6 GL • 161 km • 165 km
Wyndham Port	• Raw sugar store • Molasses store	• 180,000 t • 75,000 t

Key		
*	=	approximate
GL	=	Gigalitres
ha	=	hectares
km	=	kilometres
tpa	=	tonnes per annum
t	=	tonnes
+	=	for clarification, conservation reserve proposals by the WA and NT Governments are referred to as 'conservation areas' and the areas within the Project Area proposed by the proponent in the ERMP / draft EIS to be protected from development are referred to as 'buffer areas'

3. Relevant environmental factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The relevant environmental factors related to management of the proposal can be broadly grouped and assessed in relation to four significant environmental issues arising from the proposal. The relationship between the relevant environmental factors and environmental issues can be seen in Table 2.

Table 2: The relationship between the relevant environmental factors and environmental issues arising from the proposal.

Issue	Relevant Factor
Buffer Management	• Biodiversity
Environmental management	• Management structure • Environmental management programme • Mosquitoes and disease vectors • Chemicals • Particulates and dust • Greenhouse gas emissions
Hydrology	• Groundwater quality and quantity • Surface water quality and quantity
Social surroundings	• Recreation • Aboriginal heritage and culture

The environmental significance of the above issues of the proposal and their assessment are discussed in Sections 3.1 to 3.4 of this report. The description of each issue shows how it relates to the project. The assessment of each issue, combined with the consideration of the environmental factors relevant to it, is where the EPA considers if the proposal can be managed to meet its environmental objectives.

A summary of the EPA's assessment is presented in Table 5, following Section 3.4.

3.1 Buffer Management

Description

The M2 Project Area is located within the Victoria-Bonaparte Biogeographic Region and involves the substantial development of land on the Weaber, Keep River and Knox Creek Plains. In addressing biodiversity, the co-proponents in the ERMP / draft EIS set aside areas for protection from development. These areas include the southern Keep River Plain, Folly Rock, Spirit Hills Homestead, the Keep River and its riparian areas, and Milligan Lagoon.

For clarification, conservation reserve proposals by the WA and NT Governments are referred to as 'conservation areas' and the areas within the Project Area proposed by the co-proponents in the ERMP / draft EIS to be protected from development are referred to as 'buffer areas'.

In developing the project design the co-proponents incorporated corridors linking the various buffer areas within the Project Area and considered whether the land being set aside as buffer areas, would be viable in the long-term. The project was also designed so that the majority of the buffer areas were on the perimeter of the project, backing onto undeveloped land, to minimise edge effects.

In relation to buffer boundaries, the extent of the buffer area was given consideration and in many cases natural boundaries were used. In other areas a 1500m buffer area was adopted as this provided a reasonable width and tract of land for management of conservation and to ameroliate any chemical spray drift.

Along much of the project boundary, the buffer area separates irrigated farmland from proposed conservation reserves. The proposed reserve initiatives by the Department of Resources Development (DRD) and NT Office of Resources Development (NT ORD) will add 421,600 ha to the conservation estate with 309,800 ha being in the NT and 111,800 ha in WA (DRD et al, 2000).

These reserves have been proposed by the WA and NT Governments to complement future Ord Stage 2 developments in relation to the conservation of biodiversity in the region and are documented in Bulletin 988. The EPA noted that whilst some of the conservation initiatives are planned to proceed irrespective of the Ord Stage 2 development, most of the conservation initiatives would be contingent on the development of agricultural land as part of Ord Stage 2.

The EPA also notes that the five new conservation areas in the East Kimberley region in WA will be acquired from current pastoral leases and that it is the intention that these areas be held under the provisions of the *Conservation and Land Management Act 1984* (DRD et al, 2000).

Submissions

The EPA received 66 submissions on the project. Key issues relating to management of the buffer area focused on:

- tenure, ownership and management of the buffer area;
- the affect on the buffer areas from farm practices (eg pesticides and altered fire regimes);
- the impact of groundwater rise on the values of the buffer area in the long-term;
- the fact that the co-proponents have proposed to manage some 40,000 ha of land as a buffer area to offset the clearing of approximately 35,000 ha of land;
- the integrity of the buffers, their use for infrastructure developments, future uses, weed incursion and management arrangements;
- traditional owners being able to have access to the buffer zone;
- the survival of the buffer areas as biodiverse areas;
- alternative proposals for the management, size and configuration of the proposed buffer areas which may arise from the Aboriginal Socio-Economic Impact Assessment (ASEIA); and
- government agency involvement in the management of the buffer areas.

Assessment

The area considered for assessment is the Project Area and adjoining land.

Objective

The EPA's environmental objectives for the issue of buffer management are:

Issue	EPA Objectives
Buffer Management	• To maintain biological diversity meaning the different plants and animals and the ecosystems they form, at the levels of genetic diversity, species diversity and ecosystem diversity. • To ensure impacts from the operation of the irrigated farmlands are contained as far as practicable within the development area.

As part of its assessment on biodiversity, the EPA sought clarification on a number of issues including setbacks, viability of various buffer areas, and the hydrology of Milligan Lagoon, Keep River and Border Creek. As a consequence the co-proponents redesigned the Project Area. Modifications to the project, as documented in Bulletin 988 (EPA, 2000) and shown in Figures 3, 4 and 5 included:

- increasing the buffer area on the Knox Creek Plain to include additional riparian vegetation by reducing the size of farm units X41, X431, X432 and X441;
- re-configuring levees to the north of farm X41, to the east of E410, east of E46 and east of farm W64 to enable natural flooding to occur;
- redesigning levee HDX1 to permit surface water ingress to Milligan Lagoon from the south west;

- developing a drainage corridor along the northern boundary of farm X432 to enable surface water flow between Milligan Lagoon and the Keep River;
- re-designing farm units W36 and W65 to reduce flow velocities and potential erosion effects along Border Creek;
- a commitment that all riparian vegetation within the Project Area will be preserved and protected within the buffer areas; and
- increasing the buffer area from 41,000 ha to 42,500 ha.

The EPA recognised in Bulletin 988 that there will be large scale clearing of land and that there will be a substantial change to the environment within the Project Area. It also recognised that the buffer area will need to be managed well to ensure protection of its biodiversity values, including vegetation, the riparian zones and areas of significance such as Milligan Lagoon. Management of the buffer area becomes an important element of any consideration of the whole 76,000 ha Project Area.

The ERMP / draft EIS indicates that priorities for management of the buffer area are to:

- protect scheduled and other significant species, including those protected under international agreements;
- preserve site or habitat-specific areas;
- sustain biological diversity in terms of species richness criteria;
- conserve genetic resources; and
- control erosion.

The purpose of the buffer is essentially to retain representative associations and habitats of the Project Area within distinct conservation areas. Accordingly, the ERMP / draft EIS sought to conserve all rock outcrops and watercourses, including wetlands and billabongs within the buffer area and to maintain the effectiveness of these areas as fauna habitats by incorporating a system of linking corridors to adjacent areas of the surrounding Cockatoo Land System.

Clearly the protection of this range of environmental values within and surrounding the proposed irrigated farmland over the long-term will represent a substantial and ongoing commitment associated with the proposal. This will apply irrespective of the proponent or the crop(s) being cultivated. The ERMP / draft EIS suggests that sugar cane is a crop with relatively limited chemical inputs compared to other horticultural crops, but there is no assurance that sugar cane will be farmed in the long-term. On the other hand, sugar cane has major irrigation requirements and consequential implications to groundwater rise.

The major threats to the values of the buffer area have been identified in the ERMP / draft EIS. These include groundwater rise, erosion, weeds, fire and chemicals. The extent to which these require management will vary across the Project Area. Some portions of the buffer, such as Folly Rock, will be protected from some of the threats by their intrinsic character. Other portions of the buffer such as the linking corridors or isolated areas surrounded by developed farmland will be subject to greater numbers and level of threat.

In an endeavour to protect 30% of vegetation communities/ associations, the co-proponents set aside an area of vegetation association ET4, located to the west of the Cockatoo Land System on farm W511 from development (see Figure 3). ET4 has a total area of 16ha and is the only occurrence of this vegetation association/ community in the Project Area. Whilst its protection is supported, the EPA expressed concern in Bulletin 988 in relation to the long-term viability and sustainability of this small area. The EPA also recognises that this area will require a higher degree of management. In view of the potential difficulty in protecting this area in the long term, the EPA has recommended that the co-proponents determine whether ET4 is present within the proposed reserves.

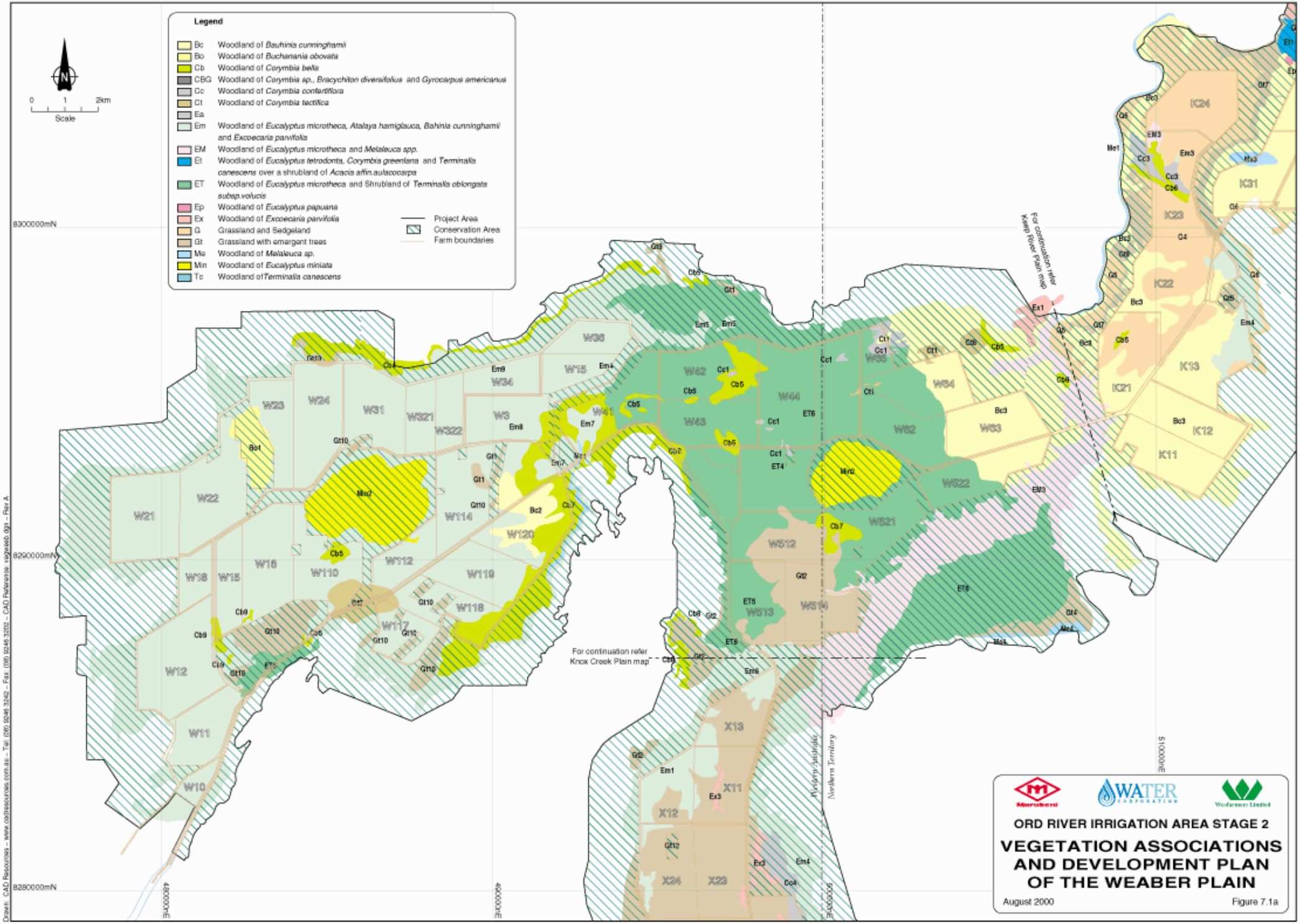

Figure 3: Vegetation Association and Development Plan of the Weaber Plain (wesfarmers et al, 2000)

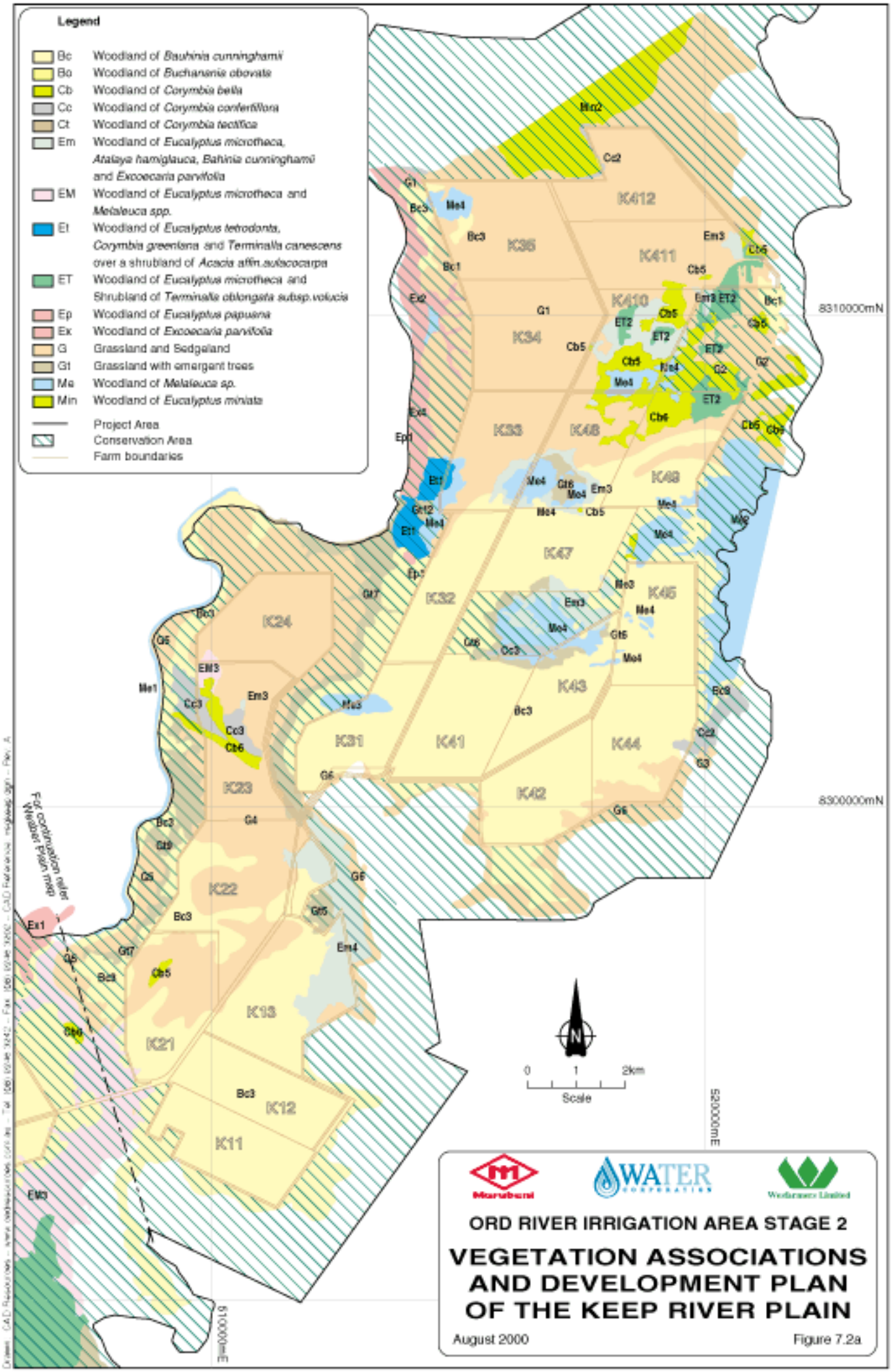

Figure 4: Vegetation Associations and Development of the Keep River Plain (Wesfarmers et al, 2000)

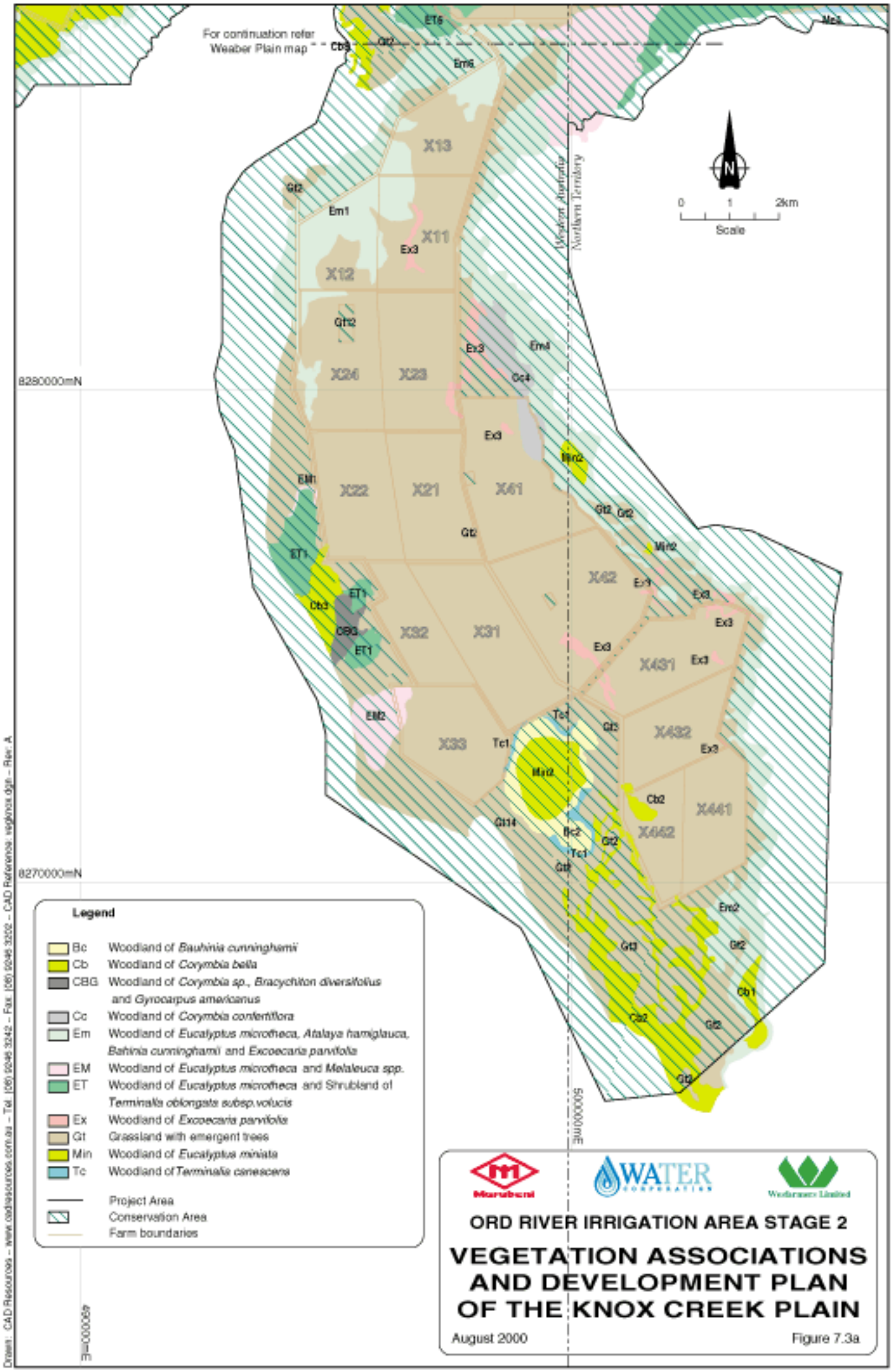

Figure 5: Vegetation Associations and Development Plan of the Knox Creek Plain (Wesfarmers et al, 2000)

The EPA supported the modifications to the project, as listed above, however it recognised in Bulletin 988 that the issue of buffer ownership and management had yet to be resolved. The ERMP / draft EIS indicated that the buffer areas would be managed by an Environmental Management Entity (EME), on behalf of the co-proponents.

The importance of buffer ownership/ tenure and management was highlighted at the Management Workshop in Darwin. Relevant outcomes arising from workshop discussions included:

- the buffer should be an asset of the co-proponents to ensure appropriate responsibility for management of the area;
- the role and purpose of the buffer area needs to be clearly defined;
- the objectives and priorities for buffer management need to be identified;
- the Buffer Management Plan should link in with the Keep River National Park Management Plan, which abuts the buffer, to ensure consistent management practices across both areas; and
- the NT Parks and Wildlife Commission would be prepared to undertake the responsibilities of managing the buffer area under a contractual arrangement.

In considering the outcomes from the Workshop, the EPA believes that there should be a direct link between management responsibility, control and ownership of the buffer area and therefore considers that it would be appropriate for the co-proponents to own, control and be responsible for ensuring proper management of the buffer.

The EPA is aware that the matter of ownership and control of the buffer area has yet to be resolved between the WA and NT Governments and the co-proponents. This needs to occur prior to development commencing and detailed design and planning being completed.

In Bulletin 988, the EPA recommended that a Buffer Management Plan be prepared and implemented by the co-proponents to address:

1. tenure of the buffer;
2. documentation of the environmental values of the buffer;
3. methods to manage human and vehicular access to environmentally sensitive portions of the buffer area;
4. methods to minimise the impacts of construction activities;
5. rehabilitation of disturbed portions of the buffer area; and
6. responsibilities for the maintenance of the buffer area.

In accordance with the outcomes of the Management Workshop, the EPA considers that this recommended condition should be amended to ensure that the plan also addresses:

- the role and purpose of the buffer;
- management objectives for the buffer;
- priorities for management; and
- consistency of management practices between adjoining conservation areas, including the Keep River National Park, and the buffer area.

There is the potential for management of the developed farmland to require actions which may be inconsistent with protection of the environmental values in the buffer area. Given the importance of the buffer area in relation to biodiversity values, the EPA expects that protection of buffer area values should take priority where there is any inconsistency. The Buffer Management Plan should outline how this would be applied.

The EPA notes that the co-proponents have made a number of commitments relating to buffer area management including:

- redesigning farm units to manage all undeveloped land in the Project Area for conservation;
- redesigning farms to ensure adequate conservation of vegetation associations;
- establishment of permanent monitoring sites for flora and fauna and biodiversity in the buffer areas, along ecological corridors and selected sites in the Project Area; and
- the preparation and implementation of an EMP made up of a series of sub-plans to guide environmental management over the Project Area, including the buffer areas.

The EPA notes the advice of the NT Parks and Wildlife Commission that it would be prepared to undertake management of the buffer on behalf of the co-proponents. This arrangement would clearly deliver complementary management with the Keep River National Park and also for the proposed conservation areas in WA. As mentioned previously, management arrangements for the buffer area have yet to be agreed.

In relation to the five newly proposed conservation reserve areas in the East Kimberley, and based on advice received from DRD, the EPA notes that WA intends to offer the Miriuwung and Gajerrong people joint management of these areas through membership of a Park Council where they will be given effective participation in the development and implementation of management and operation plans. The Miriuwung and Gajerrong people would also have the opportunity to nominate areas within the parks that are of cultural or heritage importance for special protection under section 62 of the *Conservation and Land Management Act 1984*. Management plans for these areas would be prepared with the advice of the relevant Miriuwung and Gajerrong people and the above will be offered as part of a Community and Economic Development Package to be negotiated with the Miriuwung and Gajerrong people.

Summary

Having particular regard to:

(a) the outcomes of the Management Workshop;
(b) the co-proponents' commitments; and
(c) Recommended Environmental Conditions 8 (Buffer Management Plan), 9 (Flora and Fauna Protection Plan) and 11 (Final Project Design);

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objectives, and recognises that such management will need to be of a very high quality and with substantial commitment through the long-term.

3.2 Environmental Management

Description

Under the issue of environmental management, the following environmental factors are addressed: management structure; environmental management programme; mosquitoes and disease vectors; chemical application; particulates and dust, and greenhouses gas emissions.

Submissions

Concerns expressed in submissions in relation to management structure, the Environmental Management Plan (EMP), mosquitoes and disease vectors, dust and particulates, chemicals and greenhouse gases are summarised in the Table 3.

Assessment

The area considered for assessment of management is the Project Area which encompasses the irrigable land, buffer area, water and infrastructure development and the sugar mill, as well as transport to and the port facilities at Wyndham.

Table 3: Points raised in submissions in relation to environmental management

Issue	Points raised in Submissions
Management structure	• The EME has no previous experience in management of environmental issues including the buffer areas. • The EME does not have the ability to protect conservation assets as the EME "would be wholly owned by the industry participants" and would manage the areas "on behalf of the industry participants". • The EME does not promote a shared responsibility for environmental management and does not allow for objectivity and impartiality. • The constitution of the EME will change as new shareholders are included. • The model of self-regulation is inappropriate as it does not assure compliance nor meeting commitments. • The model of self regulation eliminates the Native Title Holders from the exercise of their spiritual duties to care for their lands under their traditional law and custom. • The environmental management structure is not transparent, ie as land owners are the sole members of the EME there is no external accountability or review proposed. • An independent person, community representatives and a representative of the Miriuwung and Gajerrong people should be on the Board of Directors of the EME. • The ability of the EME to implement the EMP would be limited as the individual asset owners will have responsibility for compliance. • Reporting of the EME needs to be a public document. • There is a need to have an enforcement mechanism if individuals do not follow agreed practices. • An independent body should be established with legislative powers to set limits of acceptable changes in water quality, environmental health, review the monitoring programme, and impose penalties for non-compliance.
EMP	• Information provided on the sugar mill is superficial. • The results of the monitoring and revisions of the EMP should be subject to independent review. • Aboriginal and local resident stakeholders have been excluded in the development of the EMPs. • The EMPs are limited to compliance with legislative requirements rather than setting a framework to establish long-term actions to mitigate or control potential risks, and aiming for implementation of best practice environmental management. • The outline EMP provides a good general coverage of the major issues.
Mosquitoes	• The ERMP / draft EIS lacks a clear proposal for adult mosquito monitoring and control measures for the project area.
Dust and particulates	• What dust reduction measures will be employed when the wind direction is such that residences are downwind of the construction area? • The burning of cane has a detrimental effect on the environment. • The sugar mill will require a works approval and/or licence under Part V of the *Environmental Protection Act*, 1986.
Chemicals	• There is a need for careful management and control of the use of herbicides and pesticides within the Project Area. • Pesticide use for sugar cane is expected to be low. • There will be a risk to aquatic ecosystems as a result of chemical applications to farmland. • Endosulphan should be prevented from entering adjacent watercourses. • The buffer width should be increased between the northern boundary of the Weaber Plain and Border Creek to provide additional protection to watercourses. • The buffer area will be affected by chemical spray drift.
Greenhouse gas emissions	• The ERMP fails to adequately address the source of greenhouse emissions resulting from the additional burning of bagasse produced as a result of the sugar mill. • The existing sugar mill has difficulties in relation to its present bagasse load. • Will burnt bagasse be recycled? • Tree crops should be planted to reduce greenhouse gas emissions. • The reasons given by the co-proponents in terms of why cane on the Ord will be burnt are unsatisfactory in view of greenhouse emissions and impact on air quality. • The case for rejection of green harvesting and trash blanketing of sugar cane crops is not well made. • The claim that the project will store carbon from the atmosphere through the farming of sugar is false.

Objectives

The EPA's environmental objectives for the environmental factors related to the issue of environmental management are:

Factor	EPA Objectives
Management structure	• The management of the proposal should be transparent, accountable, and credible, and responsibility for ensuring compliance with environmental conditions and commitments should be clear.
Environmental Management Programme	• To ensure effective and transparent environmental management during project design and operation.
Mosquitoes and disease vectors	• Mosquito numbers on-site and off-site should not adversely affect the health, welfare and amenity of future residents. • Ensure the breeding of mosquitoes is controlled to the satisfaction of the relevant public health agencies without adversely affecting flora and other fauna
Chemicals	• Ensure that chemicals used in the Project Area do not adversely impact health, welfare and amenity of surrounding land users and the environment by meeting statutory requirements and acceptable standards.
Greenhouse gas emissions	• To minimise greenhouse gas emissions in absolute terms for the project and reduce emissions per unit product as low as reasonably practicable. • To mitigate greenhouse gases emissions in accordance with the Framework Convention on Climate Change 1992, and in accordance with established Commonwealth and State policies.
Particulates and dust	• Ensure that the dust levels generated by the proposal do not adversely affect welfare and amenity of surrounding land users or cause health problems by meeting statutory requirements and acceptable standards.

Management structure

The management structure for the Project Area, as documented in the ERMP/ draft EIS, proposed that an Environmental Management Entity (EME) be established to undertake the operational aspects of ongoing environmental management in relation to the proposed development on behalf of the industry participants. The proposed entity would be owned by the project participants and would provide environmental management services to the project owners.

Key features of the proposed EME include:

- the EME being wholly owned by the industry participants, including all three core industry participants (ie farmland owners, sugar mill owners and irrigation and drainage infrastructure owners);
- the EME managing environmental issues within the entire Project Area, on behalf of the industry participants;
- the EME being responsible for ongoing monitoring, analysis, and reporting on behalf of industry within the proposed development, however legal responsibility for environmental compliance would rest with the individual asset owners;
- the EME being the focal point for community input in relation to environmental issues in relation to the proposed development;
- the EME being resourced by the industry participants within the proposed development; and
- shareholder rights and obligations with respect to the EME being assigned to the asset, and to flow with any asset transfer.

The EPA notes that the EME, as proposed by the co-proponents in the ERMP/ draft EIS, is the key structure for environmental management. However, there is concern that the proposed EME would be an agent for the asset owners with no environmental responsibility for those assets. Further, this relation would be expected to become more complex with land ownership changes over time.

The preferred management structure arising as an outcome from the Management Workshop, is for a 'new' legal entity to be established with the EME becoming the service arm of that entity. This entity is envisaged to:

- collectively control all the assets on behalf of the owners;
- be legally responsible for the environmental management of the whole project; and
- hold the licences and environmental conditions for the sugar mill, farmers, buffer zone, and water infrastructure and development.

In addition to the above, workshop participants also considered that:

- the EME could undertake reporting to regulators on behalf of the new legal entity (as controller of the project assets);
- there should be independent members on the EME; and
- the EME needs to be transparent in its considerations and undertakings.

The EPA concurs with the outcomes arising from the workshop. The co-proponents have considered how this might be achieved but have identified potential legal and commercial impediments. While there may be difficulties with any structure, as alluded to in the ERMP/ draft EIS, it is important that commercial arrangements do not detract from the effective delivery of management obligations and ensures compliance. Management structures should be explored further to achieve an acceptable framework which provides clarity, transparency and responsibility for environmental management as well as meeting reasonable commercial expectations.

The EPA also considers it appropriate that the new legal entity should report to the regulators in terms of compliance with conditions and commitments, although it may wish the EME to undertake monitoring and drafting of reports on its behalf.

The EPA notes that the co-proponents have proposed a structure for environmental management and have identified impediments to it. However, due to the reasons outlined above, the EPA considers that the establishment of a new legal entity and management structure to achieve, ensure and report on compliance with conditions and commitments is appropriate.

The EPA advises that it is essential that the organisational arrangements for giving proper attention to environmental matters over the long-term be clearly established in the Environment Management System recommended in Condition 6.

It should also be noted that the compliance auditing of environmental conditions and commitments would be undertaken by the Department of Environmental Protection (DEP) and is a statutory requirement. This would also involve appropriate NT agencies.

Environmental Management Programme

As documented in the co-proponents ERMP/ draft EIS, the co-proponents have committed to preparing an Environmental Management Plan (EMP) prior to commencement of any works to monitor and manage any potential impact associated with the proposed development. The EMP would consider both construction and operation activities, and the monitoring of the implementation of the EMP would be the responsibility of the EME, on behalf of the industry participants.

Appendix O of the ERMP/ draft EIS outlines a draft EMP and the EPA notes that as part of this EMP, a number of sub-plans would be prepared, updated and implemented. These sub-plans are listed in Table 1, Appendix 2 and include: environmental education and training; legislation, policy and standards; records and information; Native Title; Cultural heritage; Aboriginal social impact; community issues; dust and particulates; mosquitoes and disease vectors; soil conservation, repair and restoration; soil chemical status; surface water resources; groundwater resources; fire; greenhouse gas emissions; native vegetation and fauna conservation; revegetation; weeds, plant pathogens and pest animals; and biodiversity and nature conservation.

The EMP will be fundamental in achieving best practice management across the whole of the Project Area and for the life of the project. The EPA notes that the sub-plans proposed by the co-proponents are not comprehensive and considers that additional plans are required.

The EPA supports the EMP commitment made by the co-proponents but considers that it needs to be placed in a framework established through an environmental condition for an . Environmental Management Programme (Recommended Condition 7). It is envisaged that the Environmental Management Programme would act as umbrella and encompass the co-proponents' expanded commitments for an EMP, comprising a series of sub-plans as outlined in Table 1, Appendix 2, and additional plans as set out in the Recommended Environmental Conditions 7, 8, 9, 10.

The EPA considers that the EMP should specify:

- environmental management measures, criteria and standards to be used to measure performance;
- remedial action to be undertaken;
- arrangements to ensure appropriate monitoring and minimal duplicate reporting;
- annual reporting of monitoring results to relevant agencies;
- annual reports to be publicly available;
- triennial reporting of monitoring results, interpretation of the results, remedial action and management implications; and
- triennial reporting to be peer reviewed and publicly available.

In addition to the environmental management sub-plans committed to by the co-proponents (Table 1, Appendix 2), the EPA considers that four additional plans should be prepared and implemented as part of Recommended Environmental Condition 7. These plans are for:

- the Sugar Mill and associated activities;
- sodic soil management;
- chemical management; and
- infrastructure maintenance.

With regard to the sodic soil management, it is considered that this plan should include a constrained soils map to indicate where problem areas are likely to appear, and where management may need to be directed, particularly during the first decade following development.

A key consideration is the need for environmental management to be resourced and implemented throughout the life of this proposal, during which time the ownership and crops may change substantially.

One of the matters considered at the management workshop was the requirement for some form of financial performance guarantee being provided by the co-proponents. The intention of this was primarily to provide assurance of funds to meet management obligations as set out under any environmental conditions set by the Minister for the Environment and Heritage or environmental commitment made by the co-proponents.

This proposal will be subject to an Agreement Act and an Ord River Development Area (ORDA) Act. The ORDA Act will continue beyond the grant of freehold of the land. The WA and NT Governments should consider whether there is a requirement for provision of a performance guarantee in which case the ORDA Act may be the appropriate avenue for it. This is discussed further in Section 5 under Other Advice.

The EPA holds strongly to the view that the development and implementation of the Environmental Management Programme covering the co-proponents' commitments and plans identified in Recommended Environmental Condition 7 is essential to the management of a range of environmental factors. Recommended Environmental Conditions 8, 9 and 10 also include plans and are based on the recommendations from Bulletin 988. These plans would form part of the co-proponents total Environmental Management Programme.

Mosquitoes and disease vectors

Mosquitoes present serious health risks to humans by acting as transmitters or vectors of pathogenic arboviruses. They are known to be carriers of a number of diseases in WA including Ross River virus, Barmah Forest virus and Australian encephalitis.

The EPA notes that the ERMP/ draft EIS (Kinhill, 2000) indicates that:

- flavivirus, which causes Murray Valley encephalitis, and the alphavirus, which causes Ross River virus, are enzootic (always present) in the east Kimberley;
- the mosquito *Culex annulirostris*, which is the predominant species of mosquito found in the Ord River, is an important vector of both the Murray Valley encephalitis virus and the Ross River virus;
- the mosquito *Culex annulirostris* breeds in fresh water; and
- the Barmah forest virus has also been recorded in the Ord River area.

The EPA also notes that numbers of mosquitoes vary widely from year to year and that the highest numbers correspond to years with heavy wet season rainfall. Further, it is acknowledged that the damming of the Ord River and the development of ORIA Stage 1 provides additional mosquito-breeding habitats.

Management commitments proposed by the co-proponents (Kinhill, 2000 and Wesfarmers et al, 2000) to reduce the risk of increased infection with arboviruses include:

1. Designing and operating the Project so as to reduce the potential for increased mosquito-breeding activity. This would be achieved by:

    - designing irrigation channels to ensure the swift flow of water, and eliminate areas of permanent still water;
    - implementation of Supervisory, Control and Data Acquisition technology in relation to the delivery of irrigation water, which would maintain water levels in irrigation channels over a narrow operating range – thereby avoiding periodic wetting of channel banks and the consequential formation of breeding habitat for mosquitoes;
    - regular maintenance of irrigation channels and regulating storages so as to remove weeds that may be conducive of mosquito breeding; and
    - operation of irrigation tailwater return systems so that the tailwater storage dams are normally empty.

2. Implementing education programmes for the Project's construction and operational workforce on measures that could be taken to reduce their personal risk of infection. This programme would include:

    - background information on the sentinel chicken programmes run in WA and NT and interpretation of the information made public from these programmes;

- information on measures that can be undertaken to reduce the incidence of mosquito bites, including the wearing of appropriate clothing, the use of insect repellents and reducing outdoor activities at early morning and at dusk when mosquito activity is at its highest; and
- an awareness programme that would enable employees to identify potential mosquito-breeding areas within the Project Area and to bring these to the attention of management so that remedial measures could be investigated.

3. Extending the existing monitoring programmes, as a component of the EMP, to cover the Project Area. This programme would involve:

    - sampling immediately after the first wet season rains to investigate the activity of viruses in the region;
    - monitoring mosquito fauna and virus carrying rates in different years and at different times of the year;
    - surveys of a range of mosquito and vertebrate host habitats;
    - surveys of breeding patterns and density of vertebrate hosts, and monitoring infection rates of these hosts with viruses; and
    - conducting surveys of mosquito larvae in newly constructed irrigation areas.

The EPA recognises that while it is not possible to eliminate all mosquitoes, it is important to take measures to reduce the risk of people being bitten by infected mosquitoes (EPA, 2000b).

The Arbovirus Surveillance Laboratory at the University of Western Australia (UWA) has been monitoring mosquito populations in the Kimberley region since 1972. The management of mosquito-borne vectors has been prepared by the co-proponents in conjunction with representatives from the Aborvirus Surveillance and Research Laboratory of UWA (Wesfarmers et al, 2000).

The EPA acknowledges that this project may compound the problem of mosquito-borne disease given the introduction of extra people to the area.

The EPA notes that the co-proponents have committed to prepare a mosquito and disease vectors sub-plan as part of the EMP.

The EPA considers that this factor is capable of being managed in accordance with the co-proponents commitments and Recommended Environmental Condition 7.

Particulates and dust

Ambient levels of dust in the Project Area are likely to be highly seasonal, with low levels during the wet season, increasing during the dry season as the cover of native vegetation becomes substantially less and wind strength increases (Kinhill, 2000).

In relation to the proposal, the EPA notes that:

- most of the construction works associated with the Project will be undertaken at least 30km from residential areas in and around Kununurra;
- in the first year of construction, works associated with the development of the M2 Channel would be required within 300m of Kununurra residences;
- localised sources of dust would result from vehicle movement on unsealed roads and stock movements;
- raw sugar and molasses would be transported from the mill to the port of Wyndham during the processing season via the existing sealed Kununurra-Wyndham Road;
- approximately 30 vehicle movements per day are anticipated for product transport from the Project Area to Wyndham;

- the main product storage facilities would be developed adjacent to the Wyndham wharf requiring reclamation of a portion of unvegetated mud flat; and
- a conveyor system would be developed to move raw sugar from the storage shed to the existing shiploader and a pressurised pipe would take molasses from the storage tank to the wharf.

The co-proponents have made commitments to:

- implement a dust monitoring programme as part of the EMP;
- minimise the effects of airborne dust on water quality in receiving waters;
- restrict construction activities to daylight hours; and
- notify local residents as to the nature and predicted duration of the activities.

The EPA understands that complaints associated with smoke and cane ash fallout have been made during cane harvesting from ORIA Stage 1. It is recognised that the Project Area is more distant and that the co-proponents in their ERMP/ draft EIS indicate that smoke and cane ash would be dispersed away from population areas for most of the harvesting period. However the construction camp is proposed to be used in the long term and may become a townsite. As a consequence the issue of ash and smoke from cane fires will need to be managed. Cane burning is also a greenhouse issue and is discussed further below.

With regard to atmospheric emissions from the sugar mill, the co-proponents have advised that these would be passed through a scrubber in order to reduce particulate emissions to levels within national guideline standards. The sugar mill will be the subject of a Works Approval and Licence under Part V of the *Environmental Protection Act 1986*.

The EPA notes that the co-proponents have committed to prepare a dust and particulates sub-plan as part of the EMP and that this plan will be prepared and implemented during construction and operation of the project.

The EPA considers that dust and particulate management for the Project Area, including Wyndham, should be a requirement of an Environmental Management Programme and form a component of Recommended Ministerial Condition 7. This is largely because:

- dust will need to be managed during construction;
- there will be a need for management of particulates during any cane burning; and
- although the development may be remote there will be a construction camp/ workers camp in the middle of the development.

Based on the above, the EPA considers that particulates and dust are capable of being managed in accordance with the co-proponents' commitments, Recommended Environmental Condition 7, and licence conditions imposed on the sugar mill.

Chemicals

The EPA notes that the 1500m buffer surrounding the farm units has a dual function for conservation and to act as a chemical application buffer.

To minimise the potential for spray drift, the co-proponents have made a commitment to incorporate into the EMP regimes of chemical and fertiliser usage, in terms of type, timing and method of application. These restrictions would include (Kinhill, 2000):

- pesticide application in accordance with the annual spray calendar prepared for the ORIA;
- the use only of chemicals that are approved by the Governments of WA and the NT;
- the successful completion of training for farm staff required to spray chemicals;

- commercial spray operators being required to be fully accredited under a national standard;
- a ban on the use of endosulphan during the wet season (November to March) and at other times when the crop areas have free-standing water in either the furrows or tail drains system;
- application of any endosulphan to comply with NRA review recommendations;
- interim restrictions would require each application of endosulphan to receive prior approval from the EME, as well as monitoring of farm drains, tailwater return systems and drainage flows
- the minimisation of the use of aerial spraying, by using tractor-drawn boom sprays wherever possible;
- utilising technology that results in relatively large spray droplets being released close to the ground; and
- ongoing monitoring and reporting of the use of herbicides and pesticides.

The EPA also notes that chemical and fertiliser regimes will be covered in some detail in the sub-plans for soil chemical status, surface water resources and groundwater resources, as outlined in Appendix O of the ERMP/ draft EIS (Kinhill, 2000). These sub-plans would incorporate:

- the adoption of best management practices;
- data bases to document the application of chemicals;
- monitoring of any release into the surrounding environment, for example the buffer; and
- identification of management practices to minimise impacts resulting from contamination.

Given the importance of managing chemicals to avoid impacts to the environment, the EPA considers that it would be preferable for chemicals management to be brought together under one plan to facilitate clarity of management obligations and practices. It is also clear that, as the co-proponents have recognised, chemicals management may also need to be incorporated into the sub-plans as proposed.

This plan should incorporate a chemical pathway analysis to provide an understanding of the fate of chemicals applied within the Project Area and their residues.

Through the use of the on-farm water management system, the risk of transporting chemicals from the Project Area in surface water to adjacent areas should be reduced. The ERMP/ draft EIS also suggests that the low chemical requirements for sugarcane cultivation, combined with the prevalence of heavy soils, suggest that contamination of groundwater in the Project Area by agricultural chemicals is unlikely.

It must be recognised that a small portion of the initial farm land may have crops other than sugar cane and that, in the long-term, all of the farmland may be used to grow other crops. As a consequence, it is essential that management of chemical practices is prescribed to cover such an eventuality.

Based on the above, the EPA considers that chemical application is capable of being managed in accordance with the co-proponents' commitments and Recommended Environmental Condition 7.

Greenhouse gas emissions

The ERMP / draft EIS indicates that the proposed development will cause a significant amount of carbon dioxide to be emitted but, as a whole, will result in a net decrease in Australian greenhouse gas emissions. The reduction, whilst not significant on a global scale, would be consistent with commitments made by the Commonwealth Government under the Kyoto Protocol in 1997 (Kinhill, 2000).

The co-proponents in the ERMP/ draft EIS indicate that the minimum carbon stored in the Project Area would increase following development of 35,000 ha of land, from about 19,500 tonnes to about 670,000 tonnes (CO_2 equivalent carbon) at full development. Most of the increase would be from the growth of sugarcane (including roots, trash and tops) during the dry season following progressive harvesting of the crop. The estimate includes the effects of burning of the sugarcane prior to harvest, and includes the carbon content in the raw sugar and molasses that would be in storage at the end of the dry season.

The co-proponents further estimate that the proposed development would result in a net reduction of the level of carbon dioxide (a greenhouse gas) in the atmosphere, through the storage of carbon dioxide as carbon within the sugarcane once the Project has reached full production. The estimate indicates that the magnitude of the reduction on an ongoing basis would be approximately 160,000 tonnes per annum of carbon dioxide equivalent carbon. The co-proponents have estimated greenhouse gas balance during project operations, and this is shown in Table 4. It should be noted, however, that Table 4 does not consider the effects of project establishment such as land clearing. The ERMP/ draft EIS estimates that 19,500 tonnes of stored carbon would be lost as a result of clearing.

The EPA notes that concern was expressed in submissions in relation to the burning of cane instead of green harvesting. The co-proponents indicate that the main reason for cane burning as the preferred method of cane harvesting is that the additional trash generated during harvesting would interfere with flood irrigation of the cane fields (Kinhill, 2000). In addition, the co-proponents also point out that whilst over 60% of Queensland cane-growers used green-harvesting techniques in 1997, cane farmers in the Burdekin district of Queensland, which has similar cane yields and irrigation systems, less than 5% of the crop was harvested using green cane techniques.

Table 4: Estimated greenhouse gas balance during project operations (Kinhill, 2000)

Source/sink	Description	Greenhouse gases as carbon dioxide equivalent carbon* (t/a)			
		Carbon dioxide	**Nitrous oxide**	**Methane**	**Total**
Farmland	Destocking (removal of cattle)**			-300	-300
	Biological processes in crop and soil	128,000	40,800		169,600
	Crop burning	173,200	102,200	6,600	282,000
	Crop growth	-1,193,400			-1,193,400
	Assimilation of organic carbon in soils	-32,000			-32,000
Sugar mill	Bagasse and fuel oil	603,700			603,700
Machinery	On-farm (cultivation)	2,400			2,400
	Harvest	2,500			2,500
	Cane transport	1,000			1,000
	Sugar and molasses transport	1,600			1,600
Total		**-312,200**	**143,000**	**6,300**	**-162,900**

* Using global warming potential of carbon dioxide = 1; nitrous oxide = 310, methane =21.

** Shown as methane but actually a mixture of all gases, with global warming potential used by the data source for this item of carbon dioxide =1,; nitrous oxide = 270; methane =11

Note: Negative values indicate sinks

In their response to submissions the co-proponents also indicate that given the vigorous growth of sugarcane in the Ord Region and in many parts of Queensland and the implications of trash on irrigation practices, the burning of cane prior to harvest is essential.

Processing of sugar cane to produce raw sugar would utilise the bagasse by-product as the primary source of fuel. This will generate an estimated 604,000 tonnes per annum of carbon dioxide.

Based on the above, the EPA considers it important that a Greenhouse Gas Emissions Management Plan be prepared and implemented as part of the EMP, to ensure that greenhouse gas emissions from the project are adequately addressed. This management plan should include:

- calculation of the greenhouse gas emissions associated with the proposal, as indicated in "Minimising Greenhouse Gas Emissions, Guidance for the Assessment of Environmental Factors, No. 12" published by the EPA;
- specific measures to minimise the total net greenhouse gas emissions and/or the greenhouse gas emissions per unit of product associated with the proposal;
- monitoring of greenhouse gas emissions;
- estimation of the greenhouse gas efficiency of the project (per unit of product and/or other agreed performance indicators) and comparison with the efficiencies of other comparable projects producing a similar product;
- an analysis of the extent to which the proposal meets the requirements of the National Greenhouse Strategy;
- demonstrate the target of 25% reduction of greenhouse gas emissions from 1990 baselines consistent with the 1997 Kyoto Protocol; and
- a target set by the co-proponent for the reduction of total net greenhouse gas emissions and/or greenhouse gas emissions per unit of product over time, and annual reporting of progress made in achieving this target.

The EPA also considers it appropriate that the management plan for greenhouse gas emissions investigate green harvesting as an alternative to cane burning.

The EPA considers that greenhouse gas emissions as an environmental factor will be given proper attention through the preparation and implementation of a Greenhouse Gas Emissions Management Plan as part of Recommended Condition 7.

Summary

Having particular regard to:

(a) the co-proponents' commitments;
(b) the establishment of an acceptable environmental management structure to achieve, ensure and report on compliance with environmental conditions and commitments through a clear operational statement in the EMS developed in accordance with Recommended Environmental Condition 6;
(c) the preparation and implementation of an Environmental Management Programme in accordance with Recommended Condition 7, which includes plans for mosquitoes and disease vectors, particulates and dust, chemicals management, greenhouse gas emissions, the Sugar Mill and associated activities, and sodic soil management;
(d) the preparation of management plans in accordance with Recommended Environmental Conditions 8 and 9, as part of the Environmental Management Programme; and
(e) the preparation and implementation of a Final Project Design, in accordance with Recommended Environmental Condition 11,

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objectives.

3.3 Hydrology

Description

The source of irrigation water to the Project Area is through the release of water from Lake Argyle, flowing via the Ord River and Lake Kununurra. The distribution of water from Lake Kununurra to the Project Area would be via a purpose built M2 Channel.

The Project Area will be contained within the lower reaches of the Keep River and Sandy Creek catchments which discharge into the Joseph Bonaparte Gulf (Kinhill, 2000, Figure 5.1). No drainage flowing from the Project Area will re-enter the Ord River. Thus there will be a transfer of water from the Ord River to the Keep River catchment as a result of the project.

Development of the Weaber, Knox and Keep River Plains for irrigated agriculture will result in seasonal changes to the hydrological cycles leading to increased water infiltration (accession) to underlying aquifers and a consequent rise in groundwater levels.

The proposal outlined in the ERMP/ draft EIS only requires the application of irrigation water to the farmland during the dry period. All irrigation water applied to the farmland would be contained on-farm through a combination of:

- use by the crop and evapotranspiration;
- accession through the soil profile to groundwater; and
- return to irrigation supply through tailwater management systems.

Irrigation would not be required during the wet. It is during this period that there may be a requirement for storm water discharge from the development area into the waterways within the buffer area.

The hydrology of the lower reaches of the Keep River will be affected by the exclusion of flood waters from much of the Keep, Knox and Weaber Plains by flood protection levees, and by land and drainage modification within the Project Area. All farms in the Project Area will be developed with irrigation tailwater management systems.

As indicated in the ERMP/ draft EIS (Kinhill, 2000, Appendix I, Attachment A), existing groundwater quality within the Project Area varies with location:

- groundwater of the Weaber Plain has a salinity range of 70mg/L to 2,600mg/L total dissolved solids (TDS);
- the salinity of groundwater of the Knox Creek Plain is generally around 1,000mg/L but can range from 60mg/L to 20,800mg/L TDS; and
- the groundwater salinity beneath the Keep River Plain varies between 100mg/L to 51,000mg/L TDS.

The quality of the irrigation water diverted from Lake Kununurra has a salinity level of approximately 160mg/L TDS. Although this water is of very good quality, ground water accession management has incorporated the need to flush any salt build up through the soil profile.

The catchments of the Keep River and Sandy Creek are relatively undeveloped, having been used for pastoral purposes.

Submissions

Key issues raised in submissions focused on:

- contaminants within the groundwater;

- discharge of groundwater into Border Creek and the Keep River;
- rising groundwater and salinity;
- environmental risks associated with elevated salinities on watercourses and related riparian ecosystems;
- lack of water quality baseline data for the Knox Creek Plain;
- the inability to design an effective monitoring programme, given the lack of baseline information available for water quality;
- management of groundwater levels and quality;
- water use and water disposal eg drainage and pumping are seen to be the primary management concerns;
- sustainability of irrigation in the long-term given the significant management requirement;
- the impact of Ord Stage 2 on water quality in the Keep River and downstream reaches in relation to nutrients, pesticides, herbicides etc;
- the example of the adverse impact of Ord Stage 1 on water quality within the Ord River;
- management of groundwater within the buffer area, especially zones 3 and 4;
- prevention of endosulphan to surface waters due to wet season thunderstorms;
- limited water quality data are available for the Keep River (particularly in relation to nutrients);
- the impact on ecosystems downstream from increased erosion rates and suspended solids in run-off during the monsoon;
- the effect of discharge water from groundwater dewatering bores into the receiving waters of the Keep River and Sandy Creek;
- adequacy of design criteria for drainage and flood protection under high flow conditions such as the February 2000 flow event eg setbacks, scouring protection, height and location of levees;
- the EMP needs to include an early warning system for problems and a plan of action if it occurs. For example, if monitoring shows that groundwater is significantly contaminated with pesticides and nutrients and that this is damaging the environment – what action would need to be taken to rectify the situation.

Assessment

The area considered for assessment of this issue is the Keep River and Sandy Creek catchments and the Joseph Bonaparte Gulf.

Objectives

The EPA's environmental objectives for the environmental factors related to the issue of hydrology are:

Factor	EPA Objectives
Surface water quality and quantity	• Maintain or improve the quality of surface water to ensure that existing and potential uses, including ecosystem maintenance, are protected. • Maintain surface water so that existing and potential uses, including ecosystem maintenance are protected.
Groundwater quality and quantity	• Maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance, are protected. • Maintain groundwater so that existing and potential uses, including ecosystem maintenance are protected.

The development of land for irrigated agriculture will lead to the intentional overwatering of the soils and progressive rising of the groundwater table. At some point, rising watertables will reach the root zone of vegetation and may reach riparian areas leading to discharge unless there is intervention in the form of cessation of irrigation or other active management such as deep

drains or pumping. The need for active management is recognised and proposed by the co-proponents.

As mentioned above, some portions of the development area contain highly saline groundwater and this will require early management (Kinhill, 2000, Appendix I, Attachment A).

The EPA notes that proposed methods for management of accessions to groundwater from irrigation is through a combination of design and active control. Methods for management of accessions include the implementation of best practice construction standards for irrigation infrastructure such as:

- the construction of irrigation channels with a clay lining to ensure the rate of infiltration is less than 2mm/day;
- locating the balancing storage dams on sites where the dominant surface soils are Aquitane clay; and
- designing drainage channels that are broad in width and shallow in depth to contain the channel within natural surface clays.

Other aspects of the groundwater management strategy proposed by the co-proponents will involve:

- the direct control of groundwater levels by the long term use of dewatering bores and, to a lesser extent, field drains;
- the discharge of extracted groundwater, collected by a network of buried pipelines, to the estuarine (tidal) sections of the Keep River and Sandy Creek; and
- a comprehensive monitoring programme for groundwater quality.

In relation to this management strategy, key outcomes noted by the EPA arising from the Management Workshop included:

- the estuarine dynamics of the Keep River are largely unknown and hence a hydrodynamic study should be undertaken prior to final design. If the study indicates there may be a problem (eg. minimal flushing) then changes should be incorporated into the design to correct it;
- arrangements for long-term maintenance of the levee bank system, in terms of legislation and how they will be managed, will need to be determined;
- monitoring requirements will need to be restructured and details in relation to criteria, actions to be taken, etc will need to be negotiated as part of the EMP process; and
- monitoring should encompass the buffer area.

The EPA notes that it is intended that the NT DLPE would issue a discharge drainage licence to the co-proponents under the *Northern Territory Water Act*, and that this licence will stipulate monitoring and reporting requirements.

With regard to environmental management of hydrology within the buffer areas, the EPA considers that this should have a priority over farm hydrology, particularly where buffer management objectives are likely to be compromised. Accordingly this issue should be addressed as part of the EMP.

The co-proponents have made a commitment to prepare and implement a groundwater resources sub-plan to be implemented during the operational phase of the development. The EPA considers that this plan should:

- be a requirement of any approval given;
- be prepared prior to any ground disturbing activities;
- be operational during the life of the project; and

- form part of the EMP under the umbrella of the Environmental Management Programme.

In terms of surface water, the EPA is aware that water quality issues may arise from construction activities; farm operations, including possible movement of farm chemicals beyond farm boundaries; stormwater runoff; weed control in the irrigation channels; sugar mill effluents, and groundwater disposal.

To address these issues the co-proponents (Kinhill, 2000) have indicated that the environmental measures they intend to undertake and the commitments they have made (see Appendix 2) are to:

- develop a tailwater return system on all farms. The tailwater return systems would be designed in such a way as to also perform the function of first-flush stormwater collection systems, with the collected stormwater also being returned on-farm for use as irrigation water. Implementation of the tailwater system would also maximise retention of sediments on farm and reduce irrigation water runoff from the farms into the receiving aquatic environment;
- control soil erosion in the Project Area using a combination of management strategies including: controlling drainage by providing levee banks to prevent floodwaters entering the developed area; providing buffer zones on both sides of watercourses to allow riparian vegetation to continue to stabilise soils in these areas; and sizing and designing receiving drains to accommodate anticipated flow regimes;
- monitoring of erosion along all watercourses, including constructed drains would be undertaken and remedial measures would be taken on an as-needed basis;
- provide buffers between farms and water courses;
- adopt the AGWEST recommendations for on-farm management of endosulphan;
- undertake a comprehensive monitoring programme for the Keep River and Sandy Creek to include sampling for suspended solids, total dissolved salts, nutrients, insecticides, herbicides, turbidity, heavy metals, chlorophyll, dissolved oxygen, erosion and sedimentation and biological impacts;
- implement regimes of chemical and usage in terms of type, timing and method of application in accordance with the EMP; and
- ensure that the quality of any water runoff from the Project Area is within national guideline values (in accordance with ANZECC guidelines) for the maintenance of aquatic ecosystems;
- apply pesticides in accordance with the annual spray calendar prepared for ORIA Stage 1;
- ban the use of endosulphan during the wet season (November –March) and at other times when the crop areas have free-standing water in either the furrows or tail drains; and
- control aquatic weeds in irrigation channels and balancing storage dams by a combination of mechanical weed removal and periodic dosing with acrolein and with treated irrigation water being retained on farm.

The exclusion of river flows across the Keep, Knox and Weaber Plains by flood levees will also lead to increased flow velocities along watercourses. The co-proponents have identified portions of Border Creek where this may lead to erosion problems, and have relocated farm boundaries to address this. In addition, a commitment has been given to further review the setbacks along watercourses during final design to alleviate erosion problems.

With regard to surface water, the EPA notes that the co-proponents have made a commitment to prepare and implement a surface water resources sub-plan as part of the EMP to be implemented during construction phase of the proposal. The EPA considers that the surface water EMP should:

- be a requirement of any approval given;
- be prepared prior to any ground disturbing activities;
- be operational during the life of the project; and
- form part of the EMP under the umbrella of the Environmental Management Programme.

Based on the above, and outcomes arising from the Management Workshop, the EPA considers that:

(a) the co-proponents should prepare and make publicly available a Hydrodynamic Survey Plan for the Keep River, Border Creek and Sandy Creek, as part of the Environmental Management Programme, prior to intended discharge of harvested groundwater or drainage from the project development area. This plan should include:

- surveys of the flushing characteristics of the Keep River;
- surveys of the flushing characteristics of Sandy Creek;
- surveys of the flow characteristics of Border Creek; and
- hydrodynamic investigations of the estuarine portion of the Keep River;

and be implemented 18 months prior to intended discharge from the project, in accordance with Recommended Environmental Condition 10;

(b) flood levee management (in terms of ongoing maintenance) should become part of the EMP to be addressed as part of the Environmental Management Programme, in accordance with Recommended Environmental Condition 7; and

(c) surface water and groundwater should form part of the EMP under the umbrella of the Environmental Management Programme (Recommended Environmental Condition 7).

Summary

Having particular regard to the:

(a) the co-proponents' commitments; and
(b) Recommended Environmental Conditions 7 and 10,

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objectives for this issue.

3.4 Social surroundings

Description

The Project Area and land encompassing the Keep River catchment is of traditional and cultural significance to the Miriuwung and Gajerrong people, and is used for recreation purposes by residents and visitors.

The Project Area is subject to native title and land rights claims in WA and the NT (Kinhill, 2000, Figure 12.3). In November 1998, the Federal Court of Australia determined that the Miriuwung and Gajerrong people hold a range of native title rights to a portion of their traditional land covering approximately 7900 km^2, and included part of the township of Kununurra, Lake Argyle and Lake Kununurra, part of the Ord River Irrigation Area (including approximately 100km^2 of the Project Area) and the Argyle Diamond Mine.

This decision was appealed to the Full Court which upheld the trial judge's findings of fact in relation to the connection of the present Miriuwung and Gajerrong community with the land claimed, and their connection with the Aboriginal people in occupation of the claim area at the time of sovereignty.

Aspects of the Full Court's decision are currently being heard before the High Court.

Submissions

In summary, the key issues raised in submissions focused on:

- the impact of Stage 2 on ecotourism and recreational fisheries;
- access to the land for recreation;
- Stage 2 increasing the need for better sporting and recreational facilities;
- the superficial treatment of Aboriginal issues within the ERMP / draft EIS;
- the ERMP/ draft EIS failing to include indigenous interests;
- the need for the completion of the ASEIA as a pre-requisite for the assessment of the project and its consideration for approval;
- the ERMP/ draft EIS containing little information on socio-economic impacts of the project on Aboriginal people;
- the fact that there have been virtually no archaeological surveys of the WA portion of the project;
- the adverse affect on the cultural heritage values of the development area and adverse impact on the Miriuwung and Gajerrong people;
- the importance of the Keep River to the Native Title holders in religious and spiritual terms;
- the management of cultural heritage within the Project Area; and
- the importance of an Indigenous Land Use Agreement (ILUA) between the Miriuwung and Gajerrong people and the co-proponents.

Assessment

The area considered for assessment of this factor is the Project Area and adjoining land.

Objectives

The EPA's objectives for the environmental factors related to the issue of social surroundings are:

Factor	EPA Objectives
Recreation	• Maintain or enhance recreational usage of the Project Area, consistent with plans developed by planning agencies.
Aboriginal heritage and culture	• Ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.

Recreation

The Keep River plays an important recreational role for Aboriginal and non-Aboriginal people. The Keep River is a popular destination for anglers, although access is limited at times due to the weather and pastoral activities. Given the importance of the Keep River for recreational and lifestyle purposes, the maintenance of access to the waterways is an important social impact issue. This is particularly true for the local Aboriginal community for whom access to the riverbanks and the water is of socio-cultural importance (Kinhill Pty Ltd, 2000).

The EPA notes that the co-proponents have indicated in the ERMP / draft EIS that:

- access to locations on the Keep River within the buffer area would remain open with designated recreation sites for fishing and picnicking;
- access to the remainder of the buffer areas would be restricted to control erosion and weeds as well as to protect the regeneration of flora and fauna habitats; and
- recreational areas would be managed by the Environmental Management Entity.

The EPA notes that recreational visitation in and adjacent to the Project Area is currently focused on activities such as fishing and accessible locations including the lower Keep River and Point

Springs Nature Reserve, and that access to these localities would be maintained and improved. This will lead to requirements for increased management of visitor sites.

Measures to maintain the recreational values within the Project Area are detailed in the draft outline of the EMP (Appendix O of the ERMP / draft EIS). The EPA notes that as part of this EMP, the co-proponents would establish a Recreation and Tourism Management Plan as a sub-plan to the Community Issues Management Plan to minimise disruptions to traffic, recreation and tourism and, where practicable, to allow for enhanced recreation and tourism of the Project Area.

Based on the above, the EPA considers that recreation can be managed in accordance with the co-proponents' commitments.

Aboriginal heritage and culture

In order to address Aboriginal culture and heritage, the EPA has considered information obtained through ethnographic and archaeological surveys and other descriptions of Aboriginal values and use of the land.

(i) Ethnographic and archaeological surveys

In relation to the proposed Project Area and footprint of irrigable land, the EPA notes that:

- there has been no comprehensive ethnographic or archaeological assessment of the WA portion of the Project Area, encompassing the Weaber Plain and the Knox Creek Plain; and
- site-specific assessments have been undertaken by the Aboriginal Areas Protection Authority (AAPA) and the Heritage Conservation Branch of the DLPE (Gregory and Sutton, 1997) for the NT portion of the proposed footprint of the irrigable land contained within the Keep River Plain and Knox Creek Plain.

With regard to the ethnographic assessment (sacred site survey), undertaken by the AAPA in 1997, the EPA understands that this assessment led to a conditional authority being issued under the *Northern Territory Aboriginal Sacred Sites Act 1989*. The EPA, however, is also aware that the scope of this certificate is being questioned as it is uncertain whether the approval relates to whole development of the portion of the Project Area in the NT or whether it relates only to the establishment of a perimeter trace. This is currently being clarified.

In addition, the EPA notes that an Aboriginal Heritage Works Clearance Programme over the Project Area associated with major engineering works, by the Miriuwung and Gajerrong people, enabled a geotechnical investigation programme to be completed in 1998. Details of this report however have yet to be released.

The EPA notes that based on the work undertaken by Gregory and Sutton in 1997 the co-proponents:

- developed a predictive model to assess the archaeological site distribution within the WA portion of the Project Area; and
- made ethnographic site distribution predictions for the WA portion of the Project Area.

The predictive model and known archaeological and ethnographic sites were then analysed, in conjunction with the preliminary project design layout, and the project design was modified to ensure that known and predicted archaeological and ethnographic sites would be avoided (Kinhill, 2000).

Notwithstanding this, the EPA is also aware that an issue has been raised by Aboriginal people in relation to an area on the "east side of the Keep River", between the Keep River and Sandy

Creek, and that although this issue has yet to be resolved, the NLC/KLC are working with the AAPA to ensure that all heritage protection concerns are appropriately addressed.

The co-proponents have made a commitment to undertake an archaeological and ethnographic assessment of the Project Area before construction to ensure protection of cultural heritage sites. The EPA expects that this archaeological and ethnographic assessment will be undertaken, covering the whole Project Area, and include the proposed black-soil farmlands, the portion of the M2 channel linking the Kununurra Diversion Dam with the Project Area, as well as potential borrow pits for construction materials and communication sites.

In addition, the EPA also notes that the co-proponents have committed to develop and implement a Cultural Heritage Management Plan (CHMP) to the satisfaction of the Miriuwung and Gajerrong people and that the findings of the combined cultural heritage assessments will define how the cultural heritage values within the Project Area will be protected and managed for the life of the Project.

The EPA expects that the CHMP will be consistent with and incorporate the views of the Miriuwung and Gajerrong people in respect to the protection of sites and areas of cultural significance and that the CHMP will detail and provide measures for mitigating any potential negative effect brought about by changes to the biological and physical environment of the black soil plains on the traditional cultural associations of the Miriuwung and Gajerrong people.

The EPA notes that the KLC/NLC consider that the management of cultural heritage should be the sole responsibility of Miriuwung and Gajerrong people in accordance with traditional laws, and with the assistance of their representative agencies. The EPA believes that this issue should be resolved between the co-proponents and the Miriuwung and Gajerrong people.

(ii) Other Aboriginal values and use of the land

As documented in Bulletin 988, the EPA acknowledges that it has received little information related to specific Aboriginal values and use of land. Work that has been undertaken by the co-proponents and others with regard to Aboriginal values and social issues relating to the Ord Stage 2 developments include:

- a population planning study by Naralup and Associates in 1996;
- a social impact assessment by Beckwith and Associates in 1997 based on the Naralup population model;
- a series of consultations with the Miriuwung and Gajerrong people conducted by AACM International Pty Ltd in 1997. This report is not specific to heritage and native title issues. The AACM report found that the Aboriginal community regards Ord Stage 2 as an opportunity for them to participate in the regional economy of the area and would welcome the development if they can participate in it. Heritage and cultural concerns highlighted in the report were general in nature and were principally related to the impact of development on the riverside and plains landscape units. They included the possibility of reduced access for hunting, fishing and bush tucker activities; the impact of increased access by non-Aboriginal community and the impact of potential pollutants on the riverside and plains areas;
- an ongoing consultation programme with the Miriuwung and Gajerrong people, conducted by the co-proponents, which commenced in mid 1998; and
- the Kununurra-Wyndham Area Development Strategy (WAPC, 1999).

To ensure that there was the opportunity for consideration of relevant Aboriginal issues by the public and assessors in a timely manner, the EPA's guidelines stated that information from a study of the social, cultural and economic impact of developments related to this project on the Miriuwung and Gajerrong people (the ASEIA) and other reports should be referred to in the ERMP / draft EIS. The EPA's guidelines also stated that this information and any additional

relevant information should be published prior to the EPA and NT DLPE reporting to their respective Ministers.

Unfortunately, the EPA notes that the ASEIA remains to be undertaken and that the terms of reference for the ASEIA have yet to be negotiated and agreed between the co-proponents and the Aboriginal Representative Bodies. In the best case scenario, it is considered unlikely that an ASEIA would be completed prior to mid 2001.

The ERMP/ draft EIS provides insufficient information about the cultural significance and use of the terrestrial vegetation and habitats of the area to indigenous people.

The KLC/ NLC in their submission acknowledged that much information concerning the impact of the project on the interests of the Miriuwung and Gajerrong people and their preferred strategies for involvement in the project will be derived from the ASEIA. Whilst not wishing to pre-empt the outcomes of the ASEIA process, the KLC/ NLC indicated that some of the impacts on Aboriginal people that are anticipated from the project if it proceeds are:

- impacts of the construction process including the presence of a large construction workforce;
- loss of access to traditional lands for cultural and recreational purposes;
- loss of the integrity of the cultural landscape disrupted by the broadacre clearing of black soil plains;
- damage to sites of significance;
- social disempowerment and marginalisation through the establishment of an externally imposed management regime on traditional lands; and
- loss of biodiversity on traditional lands and impacts on food species.

The EPA has endeavoured to gather together reasonably available material to enable it to understand and identify the extent to which the aesthetic, cultural, economic and social surroundings of the Miriuwung and Gajerrong population directly affect or are affected by the physical and biological surroundings in the proposal area.

As indicated in Bulletin 988, the EPA met several times with representatives of the KLC/ NLC and Miriuwung and Gajerrong people during the assessment of this proposal to gain an understanding of what was important to them in terms of values, traditional use of the project area, perception of landscape and attitudes to the project. The Miriuwung and Gajerrong people expressed the view in these discussions that:

- the M2 project will significantly change the country and this will affect the Miriuwung and Gajerrong people;
- for the M2 project to proceed, developers and government must consider and understand the significance and attachment of the land to the Miriuwung and Gajerrong people;
- the development must not affect sacred sites and ongoing traditional or cultural practices that are linked to the land;
- Ord Stage 2 will have similar affects to that of Ord Stage 1 in terms of reduced water quality, weed infestation, loss of access etc;
- environmental problems created by Ord Stage 1 must be dealt with before Ord Stage 2 can go ahead;
- the M2 project will have a bad effect on the Keep River;
- the Keep River is important for hunting and fishing;
- the Ord Stage 2 development will affect bush tucker resources, through clearing of land and the use of chemicals;
- more people in the area will push the Miriuwung and Gajerrong people out even further, and will prevent them from using their country the way they always have; and
- the development may cause problems for the Aboriginal people and their culture that have not been considered.

In terms of Aboriginal connection to the land and use of the land, the EPA notes the following relevant information.

Source	Information
KLC/ NLC Submission (2000)	• Miriuwung and Gajerrong people believe that it is in their traditional lands where their languages belong (Lee 1998, 68) and that their language reflects the cultural knowledge that Miriuwung and Gajerrong people have of their country. • Miriuwung and Gajerrong people "subscribe to a belief in a metaphysical concept known as the Dreaming or *ngarankani*. This concept is also a thesis which explains Miriuwung society and its place in the universe. The Dreaming defines the relationships between the claimants and the physical and non-physical environment." (Barber and Palmer, 1996: 14). Barber and Palmer explain that "the term *ngarankani* is best understood as both an historical time and a contemporary spiritual actuality. It is used to refer to places in the countryside which were created by the ancestral beings, to identify the beings themselves or more generally to identify the spirituality of the creative period manifest in people, places or things today."(Barber and Palmer 1996:14) • Miriuwung and Gajerrong people believe that the ancestral beings of the Black headed python, the Dingo and the Old Man all travelled from the mouth of the Ord River across these plains to the Keep River. The travels of these heroic ancestors are detailed by way of place names in the narrative of ceremonial songs. The black soil plains are named within these songs and are therefore significant to the *ngarankani*. These songs are also important for various ceremonies that are conducted in relation to the land the subject of the songs and subject to the activities of the *ngarankani*. The relationship between the black soil plains, the Miriuwung and Gajerrong people, and the dreamings which created them and the ceremonies is inextricably inter related. • Miriuwung and Gajerrong country is criss-crossed by pathways or Dreaming tracks that the ancestral beings created in their journeys across the land during the ancestral epoch or Dreaming. Miriuwung and Gajerrong people refer to this period as the 'Ngarranggarni'. Sites of cultural significance occur which include mythological sites, where Miriuwung and Gajerrong people attest that the ancestral beings conducted specific activities in the Dreaming. These sites are manifested in the form of geographic features and their associated vegetation including hills, waterholes, river systems and rock outcrops. • Specific cultural restrictions apply to access to certain sites. The travels and activities of the ancestral beings are recalled in song and ceremonies that continue to be practiced today by Miriuwung and Gajerrong people. Other places of cultural heritage significance reflect the prehistoric and contemporary use of the land by Miriuwung and Gajerrong people. Such places include middens, fish traps, stone arrangements, hearths, grinding hollows, paintings, engravings, burials, artefact scatters, stone quarries, ochre quarries and scarred trees, either singly, or in combination.
Gregory and Sutton (1997)	• As nomadic fishing, hunting and gathering people, occupation of the Keep River and Knox Creek Plains would not have been restricted to the low lying areas of the Ivanhoe land system. The diversity, availability and abundance of stone, water, floral and faunal resources would therefore vary across the landscape and that this would be on a seasonal basis. The land use strategies employed by hunter-gatherers in this type of environment must therefore cope with both spatial and temporal variation in the resource base. A least risk land use strategy in the region is likely to have been based on resource scheduling and movement between land use zones, rather than a reliance on the resources from a single zone. • In the coastal zone, few species have been exploited for food by Aboriginal people apart from *Brachychiton diversifolius* and *Buchanania obvota*. In the lowland zone, which exhibits extensive black soil plains, broken occasionally by residual outcrops of rock species reported to have been consumed by Aboriginal people include *Brachychiton paradoxum*, *Buchania obovota*, *Commenlina ensifolia*, *Pandanus* sp., *Planchonia careya*, and *Persoonia falcata*. The swamps and lagoons of the lowlands provide suitable habitats for freshwater aquatic species such as fish, mussels and turtles, in addition to a number of terrestrial species such as magpie geese and ducks. The open plains support a range of fauna including echidnas, bandicoots, possums and wallabies.

Lee (1998)	• The introduction of cattle by pastoral enterprises deprived Aboriginal people of their usual sources of sustenance. The cattle ate out indigenous food, drove away native fauna, took over water holes, degraded the land and made it difficult for Aboriginal people to follow their nomadic way of life. • Members of the Miriuwung and Gajerrong community retain substantial knowledge of the location and use of bush foods and bush medicines. The skill and knowledge required in the gathering and preparing of these medicines and foods is strong evidence of the maintenance of physical connection with the claim area and of oral transmission of knowledge across generations by the Miriuwung and Gajerrong people since settlement. The practice of hunting and fishing is motivated by the desire for sustenance and to maintain a connection with the and with their ancestors. There was evidence of specialised knowledge of the methods for hunting certain animals such as the echidna and the goanna, and the proper or customary way to prepare and cook them. There is also evidence of contemporary observance of certain food taboos and restrictions, indicative of ongoing totemic relationships. • As the ecology of the claim area, and the nature of the occupation of it by the Miriuwung and Gajerrong people, has changed since settlement, their opportunity to engage in traditionally based activities on the land has been restricted. However, against the historical background, namely the manner in which people were brought into the stations in the early years of settlement, the changes brought about by the pastoral industry and by the Ord River irrigation scheme, the drift from the pastoral stations into the town of Kununurra in the late 1960's and 1970's, the story presented by the evidence remains that of a people who have sought to maintain their connection with land in a practical sense. First, through the use of "holiday time" while working on the stations and thereafter by seeking to establish outstations on traditional country to give them the opportunity and authority to continue traditional links. • There is an acceptance of obligations to care for country and to protect sites of spiritual and ancestral significance. Community members know their land by place names that have been passed on by members of the Miriuwung and Gajerrong communities making connection with the land of particular significance to them. • The Miriuwung and Gajerrong community has maintained a connection with the ancestral communities which held the native title at sovereignty and has maintained connection with the land to which that native title applies.

The EPA also notes that it has been argued and accepted through the Federal Court that the Miriuwung and Gajerrong people have maintained connection and use of the land for spiritual purposes (ie dreaming), sacred sites, hunting and gathering and medicinal purposes.

As advised in Bulletin 988, the EPA considers it important that the Miriuwung and Gajerrong people be given the opportunity by government to properly explain the significance to their people of the land in the Project Area and that they be given such an opportunity before a decision is made by the WA and NT Governments as to whether the project may be implemented is taken. The EPA considers that it is very important that the Miriuwung and Gajerrong peoples concerns and views are heard, and that the results of the ASEIA and other related studies are considered by the co-proponents and government at the earliest opportunity.

Based on information available to it, the EPA considers that the Ord Stage 2 proposal, through development of the black soil plains for irrigable agriculture, is likely to result in:

- loss of access to traditional lands for cultural purposes;
- loss of the integrity of the cultural landscape;
- possible damage to sites of significance; and
- loss of biodiversity on traditional lands, bush tucker habitats and food species.

However, the EPA is unable to quantify these impacts based on information presently available.

The EPA notes that the following commitments have been made by the co-proponents, to:

- undertake archaeological and ethnographic assessments of the Project Area;
- develop and implement a Cultural Heritage Management Plan to the satisfaction of the Miriuwung and Gajerrong people;
- complete an ASEIA study before construction; and
- use best endeavours to resolve native title issues by way of a negotiated settlement, preferably an ILUA.

The EPA considers that it has taken all reasonable steps to obtain information in relation to Aboriginal values and use of the land as they pertain to the definition of environment under the *Environmental Protection Act 1986*.

The EPA, however, can only provide advice to the Minister for the Environment and Heritage on Aboriginal values and issues if that advice is available to it. The EPA acknowledges that it would have preferred to consider the implications of the proposal on Aboriginal values in more detail but has been constrained by the limited available information.

The EPA considers that information on Aboriginal values may become available through future negotiations with Aboriginal people, and that this information should be incorporated into the detailed planning and design of the proposal.

Summary

Having particular regard to:

(a) the co-proponents' commitments, particularly Commitment 8 which relates to the completion of an ASEIA before construction, to the satisfaction of the Miriuwung and Gajerrong people, and Commitments 4, 5 and 6 which relate to further work on cultural heritage;
(b) Recommended Environmental Condition 11, regarding the Final Project Design; and
(c) the information available to the EPA in relation to Aboriginal values, but noting that this is limited,

it is the EPA's opinion that, the proposal is capable of being managed to meet the EPA's environmental objectives.

4. Conditions and commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Proponent's commitments

As the EPA is assessing this proposal in two parts, some of the commitments relate to biodiversity and some commitments relate to detailed management. The co-proponents' commitments as set out in the ERMP/ draft EIS and subsequently modified, are shown in Appendix 2.

4.2 Recommended conditions

It is the intention of the WA and NT Governments that environmental conditions issued under the *Environmental Protection Act 1986* be applied to the whole of the Project Area. The environmental conditions, however, cannot be set for the whole of the Project Area until enabling legislation is passed by the NT Parliament. In the meantime, any Statement of Approval issued under the *Environmental Protection Act 1986* can only apply to that portion of the Project Area located within WA.

Having considered the co-proponents' commitments and information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the proposal by Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains is approved for implementation. These conditions are presented in Appendix 2. Several of these conditions, specifically conditions 8, 9, 11 and 14 have previously been recommended by the EPA in Bulletin 988 and are included in this report with minor adjustments for completeness. It should be noted that condition 14 is a procedure involving the WA and NT governments and is not subject to co-proponent compliance. Matters addressed in the conditions include the following:

(a) that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 2;

(b) that the proponent be required to establish a legal entity and environmental management structure to ensure compliance with environmental conditions and commitments;

(c) that the proponent be required to prepare, make publicly available and implement an Environmental Management Programme that includes environmental management plans as listed in Table 1, Appendix 2, as well as environmental management plans for:

- chemicals management;
- the Sugar Mill and associated activities;
- sodic soil management; and
- infrastructure maintenance (including flood levee location and management);

(d) that the proponent be required to prepare, make publicly available and implement a Buffer Management Plan;

(e) that the proponent be required to prepare, make publicly available and implement a Flora and Fauna Protection Plan, prior to the preparation of the Final Project Design Layout. This plan requires the proponent to:

- undertake additional surveys of terrestrial fauna including frogs, bats and reptiles;
- undertake additional surveys of aquatic fauna within the Keep River (including estuarine fauna);
- protect vegetation associations/ communities G1, G4, EM8, EM9, Gt2 and ET4 within proposed reserves adjacent to the Project Area; and
- identify and protect subterranean fauna.

Table 5: Summary of Relevant Environmental Factors/ Issues in Relation to Management

Issues	EPA Objective	Government Agency and Public Comments	Co-proponents' commitments and environmental management measures	EPA Assessment
BIOPHYSICAL				
Biodiversity management issues: • management of riparian zones; • management of hydrological function; • buffer area management; and • buffer area ownership.	To maintain biological diversity meaning the different plants and animals and the ecosystems they form, at the levels of genetic diversity, species diversity and ecosystem diversity.	Biodiversity was considered in EPA Bulletin 988 (EPA, 2000a). In relation to biodiversity management issues, submissions focussed on: • tenure of the buffer area; • ownership and management of the buffer area; • CALM is prepared to be on an advisory management committee; • effect on buffer area from rising groundwater and farm practices. (eg pesticides); • impact of groundwater rise on the values of the buffer area in the long-term; and • traditional owners being able to have access to the area around the project area, which was denied to them by the Stage 1 system. The DEP notes that at the management workshop held in Darwin on 3 October 2000, the Parks and Wildlife Commission of the NT indicated that they would be prepared to manage the buffer for a fee.	Environmental management commitments include: • redesigning farm units to ensure conservation of all riparian vegetation, adequate setback of the developed areas from natural watercourses, minimal hydrological impact on Milligan Lagoon watercourses, and adequate surface water flows between Milligan Lagoon and the Keep River watercourses; • buffer area management; • preparation and implementation of an EMP, consisting of a range of sub-plans to guide environmental management over the Project Area; • establishment of permanent monitoring sites for flora and fauna . and biodiversity in the buffer areas, along ecological corridors and selected sites in the Project Area. Monitoring would be undertaken on a regular basis; • all undeveloped land in the Project Area would be managed for conservation; and • completion of an additional biological survey of the Keep River in the vicinity of the Project Area.	As a result of proposal modifications (as documented in Bulletin 988), the EPA notes that the area to be managed as buffer has increased from 41 000 ha to 42,500 ha. This increase allows for all riparian vegetation to be incorporated within the buffer area, and Milligan Lagoon to be protected. Having particular regard to: • Recommended Environmental Conditions 8, 9 and 11; and • the co-proponents' commitments, it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objectives, and recognises that such management will need to be of a very high quality and with substantial commitment through the long-term.
Mosquitoes and disease vectors	(i) Mosquito numbers on-site and off-site should not adversely affect the health, welfare and amenity of future residents. (ii) Ensure the breeding of mosquitoes is controlled to the	Submissions focused on the lack of a clear proposal for adult mosquito monitoring and control measures for the project area..	Environmental management commitments include: • designing and operating the Project so as to reduce the potential for increased mosquito breeding activity; • implementing education programmes for the Projects construction and operational workforce on measures that could be taken to reduce their personal risk of infection; and • extending the existing monitoring	Having particular regard to: • the co-proponents' commitments; and • Recommended Environmental Condition 7, it is the EPA's opinion that the proposal is capable of being managed

Issues	EPA Objective	Government Agency and Public Comments	Co-proponents' commitments and environmental management measures	EPA Assessment
	satisfaction of the relevant public health agencies without adversely affecting other flora and fauna.		programmes to cover the Project Area.	to meet the EPA's objectives.
POLLUTION				
Particulates and dust	Ensure that the dust levels generated by the proposal do not adversely affect welfare and amenity of surrounding land users or cause health problems by meeting statutory requirements and acceptable standards.	Submissions focussed on: • dust reduction measures to be employed when the wind direction is such that residences are downwind of the construction area; • emissions from the burning of cane; and • the requirement for a works approval and/or licence for the sugar mill under Part V of the Environmental Protection Act, 1986.	Environmental management commitments include: • establish a dust monitoring programme as part of the EMP; • restrict construction works to daylight hours for all activities within 500m of an existing residence; • advise all occupiers of residences within 1km of construction activities of the nature and predicted duration of the activities to be undertaken when construction is within 300m of residences; • pass boiler emissions through a scrubber to achieve a maximum particulate discharge of 32kg/h; and • managing the burning of cleared vegetation to occur at times when prevailing winds would direct smoke and ash away from residential areas.	Having particular regard to: • the co-proponents' commitments; • Recommended Environmental Condition 7; and • Licence conditions that can be imposed on the sugar mill, it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objectives.

Chemicals	Ensure that chemicals used in the Project Area do not adversely impact health, welfare and amenity of surrounding land users and the environment by meeting statutory requirements and acceptable standards	Submissions focussed on:
		• the need for careful management and control of the use of herbicides and pesticides management within the Project Area;
		• pesticide usage for sugar cane being low;
		• risk to aquatic ecosystems given approximately 3000ha of land will be for smallholdings for horticulture;
		• prevention of endosulphan into adjacent watercourses;
		• increasing the buffer width between the northern boundary of the Weaber Plain and Border Creek to
			Environmental management commitments include:
			• Minimising spray drift by:
			  • the application of chemicals by tractor-drawn boom-sprays wherever possible;
			  • avoidance of unsuitable weather conditions such as surface temperature inversions and unstable conditions during aerial spraying whenever possible;
			  • utilisation of a larger droplet size settings for spray equipment during aerial spraying;
			• the application of aerial spraying when ground or crop conditions prevent tractor access. The timing and manner of application would be carefully chosen to minimise spray drift;
			• the application of chemical and fertiliser
				Having particular regard to:
				• the co-proponents' commitments
				• Recommended Environmental Condition 7;
				• the increased area of land to be utilised as buffer (ie 42,500ha instead of 41,000ha),
				it is the EPA's opinion that environmental management is capable of being managed to meet the EPA's environmental objectives.

Issues	EPA Objective	Government Agency and Public Comments	Co-proponents' commitments and environmental management measures	EPA Assessment
		provide additional protection to watercourses; and • the effect of chemical sprays on the conservation areas that may act as buffers.	applications as part of the EMP; • applications of pesticides being in accordance with the annual spray calendar prepared for the ORIA Stage 1, NRA recommendations and National Standards, • only chemicals approved for use by the WA and NT Governments would be used; • compulsory training for all farm staff who would be required to handle and spray chemicals; • banning the use of endosulphan in the wet season and at other times when crop areas have free standing water in furrows or drains; and • ongoing monitoring and reporting of the use of herbicides and pesticides.	
Greenhouse gas emissions	(i) To minimise greenhouse gas emissions for the project and reduce emissions per unit product as low as reasonably practicable. (ii) To mitigate greenhouse gases emissions in accordance with the Framework Convention on Climate Change 1992, and in accordance with established Commonwealth and State policies.	Submissions focused on: • difficulties the existing sugar mill has in relation to its present bagasse load; • recycling of bagasse; • greenhouse emissions from the additional burning of bagasse (603,700 t/a C); • green harvesting instead of burning cane (282,000 t/a C equivalent); • planting of tree crops to reduce greenhouse gas; and • stored carbon and current emission levels.	Environmental management measures include: • utilising the bagasse bi-product as the primary source of fuel during the processing of sugar cane; • returning residual ash from the burning of bagasse to the farms; and • a commitment to include greenhouse gas emissions as a sub-plan to the EMP (March 2001).	Having particular regard to: • Recommended Environmental Condition 7; and • the co-proponents' commitments, it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objectives.
Groundwater quality and quantity	(i) Maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected.	Submissions focused on: • contaminants within the groundwater; • discharge of groundwater into Border Creek and the Keep River; • rising groundwater and salinity; • environmental risks associated with	Environmental management commitments include: • controlling groundwater levels via the utilisation of bores and subsoil drains. • a comprehensive monitoring programme for groundwater levels and quality would be implemented and the collected data used to modify management practices as necessary; and	Having particular regard to: • Recommended Environmental Conditions 7 and 10; and • the NT issuing a drainage discharge to the co-proponents that will stipulate monitoring and reporting requirements for surface

Issues	EPA Objective	Government Agency and Public Comments	Co-proponents' commitments and environmental management measures	EPA Assessment
	(ii) Maintain groundwater so that existing and potential uses, including ecosystem maintenance are protected.	elevated salinities on watercourses and related riparian ecosystems; • lack of water quality baseline data for the Knox Creek Plain; • management of groundwater levels and quality; • effects of climate change have not been factored into hydrologic and groundwater modelling; • water use and water disposal eg drainage and pumping are seen to be the primary management concerns; and • sustainability of irrigation in the long-term given the significant management requirement.	• monitoring of groundwater quality would be a component of the EMP; • data collected from the groundwater monitoring programme would be used to continually update the groundwater model and to optimise the extent and timing of installation of the groundwater management system; • the quality of groundwater adjacent to watercourses would be monitored; and • groundwater would be tested on a regular basis for all chemicals used in the Project Area to ensure compliance with national drinking water quality guidelines. Environmental management measures as detailed in the ERMP/ EIS include: • engineering design standards complying with current best practice for all irrigation channels and regulating storage's intended to convey or store water for prolonged periods; and • utilising crop watering strategies that maximise the water uptake by crops and minimise the water loss to groundwater.	water, it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's objectives.
Surface water quality and quantity	(i) Maintain or improve the quality of surface water to ensure that existing and potential uses, including ecosystem maintenance are protected. (ii) Maintain surface water so that existing and potential uses, including ecosystem maintenance are protected	Submissions focused on: • the impact of Ord Stage 2 on water quality in the Keep River and downstream reaches in relation to nutrients, pesticides, herbicides etc; • the adverse impact of Ord Stage 1 on water quality within the Ord River; • prevention of endosulphan to surface waters due to wet season thunderstorms; • limited water quality data is available for the Keep River (particularly in relation to nutrients); • the impact on ecosystems downstream from increased erosion rates and suspended solids in run-off	Environmental management commitments include: • all farm units within the Project Area would be developed with tailwater return systems; • regimes of chemical and fertiliser usage, in terms of type, timing and method of application in accordance with the EMP; • pesticide application in accordance with the annual spray calendar prepared for ORIA Stage 1; • banning the use of endosulphan during the wet season (November –March) and at other times when the crop areas have free-standing water in either the furrows or tail drains; and • controlling aquatic weeds in irrigation channels and balancing storage dams by a combination of mechanical weed removal and periodic dosing with acrolein;	Having particular regard to: • Recommended Environmental Conditions 7 and 10; • the NT issuing a drainage discharge to the co-proponents that will stipulate monitoring and reporting requirements for surface water; and • the co-proponents' commitments, it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's objectives.

Issues	EPA Objective	Government Agency and Public Comments	Co-proponents' commitments and environmental management measures	EPA Assessment
		during the monsoon; • the effect of discharge water from groundwater dewatering bores into the receiving waters of the Keep River and Sandy Creek; and • adequacy of design criteria for drainage and flood protection under high flow conditions, eg setbacks, scouring protection, height and location of levees.	Environmental management measures, as indicated in the ERMP / draft EIS include: • provision of buffers between farms and water courses; • the adoption of AGWEST recommendations for on-farm management of endosulphan; and • a comprehensive monitoring programme for the Keep River and Sandy Creek. The monitoring programme will include sampling for suspended solids, total dissolved salts, nutrients, insecticides, herbicides, turbidity, heavy metals, chlorophyll, dissolved oxygen, erosion and sedimentation and biological impacts.	
SOCIAL SURROUNDINGS				
Recreation	Maintain or enhance recreational usage of the project area, consistent with plans developed by planning agencies.	Submissions focused on: • the impact of Stage 2 on ecotourism and recreational fisheries; • access to the land for recreation, and • Stage 2 would increase the need for better sporting and recreational facilities.	Environmental management commitments include: • maintaining access to the Keep River within the conservation area, for recreational purposes as designated recreational sites; • restricting access to the remainder of the conservation area to control weeds and erosion • erection of signs throughout the Project Area to advise travellers that access to pastoral leases is restricted; and • the preparation of a community issues plan as part of the EMP.	Having particular regard to: • the co-proponents' commitments; and • Recommended Environmental Condition 7, it is the EPA's opinion that the project is capable of being managed to meet the EPA's objectives.
Aboriginal heritage and culture	Ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.	Submissions focused on: • the superficial treatment of Aboriginal issues; • the ASEIA needs to be completed prior to project approvals; • there have been virtually no archaeological surveys of the WA portion of the project; • only limited information on other uses of the land by Aboriginal people has been collected; and • EPA Guidelines on the project	Environmental management commitments are to: • establish and implement Cultural Heritage Protection Procedures; • develop and implement a cultural heritage management plan as part of the Environmental Management Plan to be administered by the Environmental Management Entity; • undertake archaeological and ethnographic assessments of the Project Area; • complete an ASEIA; • hold regular meetings with the Miriuwung and Gajerrong people; and	Having particular regard to: • the co-proponents' commitments, particularly Commitment 8 which relates to the completion of an ASEIA before construction, to the satisfaction of the Miriuwung and Gajerrong people, and Commitments 4, 5 and 6 which relate to further work on cultural heritage; • Recommended Environmental

Issues	EPA Objective	Government Agency and Public Comments	Co-proponents' commitments and environmental management measures	EPA Assessment
		indicate that the ASEIA should be available to the EPA to consider during the assessment process and prior to reporting. The DEP notes that: • the ASEIA is outstanding; • the issue of Native Title has yet to be resolved; and • if an ILUA is not possible, resolution will be reached, in accordance with the National Native Title Act.	• to use best endeavours to resolve native title issues by way of a negotiated settlement, preferably an Indigenous Land Use Agreement. Environmental management measures as outlined in the ERMP/ EIS include: • locate, record and protect known cultural heritage sites; • ensure that the Miriuwung and Gajerrong people have the opportunity to input into the management of cultural heritage sites; and • managing cultural heritage sites using appropriate techniques agreed with the endorsement of Miriuwung and Gajerrong people, and the State, Territory and Commonwealth heritage agencies.	Condition 11, regarding the Final Project Design; and • the information available to the EPA in relation to Aboriginal values, but noting that this is limited, it is the EPA's opinion that, the proposal is capable of being managed to meet the EPA's environmental objectives. .
OTHER				
Environmental Management Issues: • structure • EME • legal responsibilities of the asset owners	The management of the proposal should be transparent, accountable, and credible, and responsibility for ensuring compliance with environmental conditions and commitments should be clear	Submissions focussed on: • self-regulation by proponents to comply with environmental management commitments ie submissions do not believe that self regulation is an appropriate model as it does not assure compliance nor meeting commitments; • transparency of environmental management structure, ie as land owners are the sole members of the Environmental Management Entity (EME), there is no external accountability or review proposed; • an independent person being on the EME; and • community representatives and the Miriuwung and Gajerrong people should be represented on the EME. The DEP notes that the EME, as proposed by the co-proponents, is the key structure for Environmental Management. The current proposal for	Environmental Management commitment is to establish an Environmental Management Entity (EME). The key features of the EME (as detailed in the ERMP / draft EIS) are: • the EME would be wholly owned by the industry participants; • the EME would be responsible for aspects such as ongoing monitoring, analysis and reporting on behalf of the industry within the proposed development – but legal responsibility for environmental compliance would lie with the individual asset owners; • the EME would be the focal point for community input in relation to the Project environmental issues in relation to the proposed development; • the EME would be resourced by the industry participants within the proposed development; and • shareholder rights and obligations with respect to the EME would be assigned to any new asset	Having particular regard to: • Recommended Environmental Condition 6, and • the statutory compliance provisions of the *Environmental Protection Act 1986*, it is the EPA's opinion that al management can be achieved that the proposal is capable of being managed to meet the EPA's objectives. The EPA advises that it is essential that the organisational arrangements for giving proper attention to environmental matters over the long-term be clearly established in its Environmental Management System.

Issues	EPA Objective	Government Agency and Public Comments	Co-proponents' commitments and environmental management measures	EPA Assessment
		the EME is perceived to have some regulatory problems, as the EME is an agent for the asset owners and has no environmental responsibility for those assets.	owner in parallel with any future asset ownership transfer.	
Environmental Management Programme Issues: • Reporting • Sugar Mill • Soils	To ensure effective and transparent environmental management during project design and operation.	Points raised in submissions includes: • information provided on the sugar mill is superficial; • the requirement for a works approval and/or licence for the sugar mill; • results of monitoring and revisions of the EMP should be subject to independent review; • Aboriginal and local resident stakeholders have been excluded in the development of the EMPs; and • the EMPs are limited to compliance with legislative requirements rather than setting a framework to establish long term actions to mitigate or control potential risks and aiming for implementation of best practice environmental management.	Management commitments include: • the preparation of an EMP. The EMP will consist of a series of sub-plans that would be prepared, updated, approved and implemented on a progressive basis as required for the various stages of Project development; and • the EMP will contain provisions to review monitoring data to modify management measures as appropriate.	Having particular regard to: • Recommended Environmental Conditions 7, 8 and 9; and • the co-proponents' commitments, it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's objectives. The EPA considers that a performance guarantee should be provided by the co-proponents to ensure delivery of environmental commitments.

(f) that the proponent be required to prepare and make publicly available a Hydrodynamic Survey Plan for the Keep River, Border Creek and Sandy Creek, as part of the Environmental Management Programme, prior to intended discharge of harvested groundwater or drainage from the project development area. The plan shall be implemented at least 18 months prior to the intended discharge from the project, and include:

- surveys of the flushing characteristics of the Keep River;
- surveys of the flushing characteristics of Sandy Creek;
- surveys of the flow characteristics of Border Creek; and
- hydrodynamic investigations of the estuarine portion of the Keep River,

(g) that the proponent be required to prepare a Final Project Design Layout for the Project Area, following the completion of the buffer management plan and additional biological surveys, make that plan publicly available and implement that plan;

(h) that the proponent be required to prepare and implement a Decommissioning Plan; and

(i) that the proponent shall submit a Performance Review Report, every three years and annual reports on compliance and monitoring results.

5. Other Advice

Water Allocation

In parallel to the assessment of the M2 Project, the EPA is also considering water allocation planning for the Ord River and the provision of water to the M2 Project.

The WRC is currently undertaking a programme to review the basis for proposed allocations including environmental water provisions. Once the review of the water allocations is completed, the EPA will provide advice under S16(e) of the *Environmental Protection Act 1986* and the WRC will then finalise the Interim Water Allocation Plan (IWAP).

Following finalisation of the IWAP, the EPA will formally assess the water licence for the M2 Project.

Indigenous Land Use Agreement

The EPA notes that in relation to the Project Area the co-proponents have indicated that they would prefer to resolve all native title issues in relation to the Project Area by concluding an ILUA (a negotiated settlement), with the Miriuwung and Gajerrong people.

The EPA noted in Bulletin 988 that the co-proponents were seeking an ILUA, that this agreement is a fundamental component of the project, and that the co-proponents' position is that without an ILUA there will be no project.

With regard to this position, the EPA understands that the preferred approach by the co-proponents is to reach an agreement (ILUA) with the Miriuwung and Gajerrong people to facilitate development of the Project Area by addressing their concerns and providing opportunities for participation and other benefits. However, it is noted that the original commitment made by the co-proponents in the ERMP/ draft EIS to "resolve all Native Title issues by concluding an ILUA with the Miriuwung and Gajerrong people" has been amended to "best endeavours would be made to resolve native title issues by way of a negotiated settlement, preferably an ILUA". The EPA understands that the Northern and Kimberley Land Councils have advised that they are committed to future development proceeding pursuant to a negotiated settlement of Aboriginal rights and interests in land including the resolution of all heritage

matters to the satisfaction of the native title holders. However, it is further understood that the Land Councils have yet to agree to a timeframe in which to complete these negotiations.

Community and Economic Development Package

The EPA is aware that the State has entered into negotiations with the Miriuwung and Gajerrong people with respect to a Community and Economic Development Agreement (CEDA). This Agreement has yet to be agreed upon, however, it is understood that the Agreement will enable the Aboriginal community to be better placed to capture some of the benefits from the major developments proposed for the area as part of the resolution of the native title and heritage issues.

The EPA recognises additional population will affect existing communities positively and negatively and that these need to be addressed by relevant agencies.

Implications of Environmental Protection and Biodiversity Conservation Act 1999

The M2 Project and the M2 Water Licence will be required to be referred to Environment Australia (EA) under the EPBC Act.

The EPA is aware that under Section 87(4) of the EPBC Act there is a provision for the Commonwealth Minister to accredit a State's environmental impact assessment process on a case-by-case basis. However, accreditation under Section 87(4) can only apply if the State assessment "is to be" undertaken. As the State has almost completed its assessment of the M2 Project, the M2 Project is likely to be assessed by EA following referral of the proposal to EA by the co-proponents.

In relation to the M2 Water Licence, which will follow from the IWAP, there remains the opportunity for a Commonwealth accredited assessment as the Western Australian assessment has not yet commenced.

Ord River Irrigation Area Stage 1

The development of the Ord River Irrigation Scheme in the East Kimberley region of WA and the NT was originally planned to proceed in two stages. The Ord River Irrigation Area Stage 1 was completed in 1966, and involved the construction of the Kununurra Diversion Dam to form Lake Kununurra, as well as irrigation infrastructure and associated works, and the township of Kununurra (Kinhill, 2000).

It is the EPA's expectations that land and water management practices currently being used in Ord Stage 1 will improve to attain best practice. It is the EPA's understanding that this will be a key objective of the IWAP.

Performance Guarantee

The delivery of effective and appropriate design and management performance over the life of this project will be essential. Further, management requirements will develop and change over time. In view of the scale and location of the proposal, failure to provide this level of management can be expected to lead to unacceptable environmental impacts.

Apart from the establishment of a soundly based and responsive structure to provide the management and diligent overview by appropriate government agencies, the requirements for a financial surety to assure delivery of management has been suggested. The EPA believes that consideration should be given to this by the WA and NT Governments.

This proposal will be subject to an Agreement Act and the ORDA Act. As the ORDA Act will continue beyond the grant of freehold of the land, this Act may be an appropriate mechanism to require the provision of a performance guarantee.

Scope of application of Environmental Protection Act 1986 to the Project Area and other activities

It is the EPA's understanding that the ORDA Act will provide for aspects of the *Environmental Protection Act 1986,* especially environmental conditions, to apply to the NT portion of the Project Area. This is supported, however, the scope of this coverage needs to be considered where it may affect other activities. For example, the EPA is aware that the NT Government may wish to convert the construction camp to be used for workers into a designated townsite following construction of the M2 Project. As mentioned in section 3.2, the presence of a significant population within the Project Area will necessitate specific management to protect the residents.

6. Conclusions

The EPA has considered the environmental implications for management of the proposal by Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains.

The EPA has assessed this proposal on the basis of sugar cane being the predominant crop. However, it has also considered the long-term development as an irrigated horticulture proposal, without assuming any specific crops. Management will need to be flexible and offer sufficient assurance to cater for the full range of possible future demands.

The EPA notes that:

- the matter of ownership, control and management of the buffer area needs to be resolved, prior to the completion of detailed design and development commencing;
- there is a need for a management structure and a legal entity to achieve, ensure and report on compliance with conditions and commitments;
- the Environmental Management Programme that includes environmental management plans on a range of topics is fundamental in achieving best practice management across the whole of the Project Area (irrigated farmland and buffer area) for the life of the proposal;
- management will need to be of a very high quality and have substantial proponent commitment throughout the life of the development;
- development of the Weaber, Knox and Keep River Plains for irrigated agriculture will result in seasonal changes to the hydrological cycles leading to increased rate of water infiltration (accession) to underlying aquifers and a consequent rise in groundwater levels;
- the Aboriginal Socio-Economic Impact Assessment (ASEIA) is an outstanding issue and social impacts associated with the proposal have yet to be completed;
- it has been argued and accepted through the Federal Court that the Miriuwung and Gajerrong people have maintained connection and use of the land for spiritual purposes (ie dreaming), sacred sites, hunting and gathering and medicinal purposes;
- aspects of the operation and management of the project may affect Aboriginal heritage values which have been identified through the Native Title process;
- no comprehensive archaeological and ethnographic surveys have been undertaken for the Western Australian portion of the Project Area.

The EPA is satisfied that, on the basis of information available to it and subject to the conditions and commitments set out in Appendix 2 and summarised in Section 4, the development of the land and its use for irrigated agriculture is capable of being managed to meet the EPA's objectives related to management.

7. Recommendations

Recommendations

The EPA submits the following recommendations to the Minister for the Environment and Heritage:

1. That the Minister notes that this report is Part 2 – Management, and addresses the management component of the proposal by Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains.

2. That the Minister notes that a report on the proposal, Part 1- Biodiversity Implications, was submitted in August 2000 (EPA Bulletin 988).

3. That the Minister considers the report on the relevant environmental factors related to management as set out in Section 3 of this report.

4. That the Minister notes that the EPA has been constrained in its assessment of Aboriginal heritage and culture by the limited available information on Aboriginal values but further notes that the co-proponents have committed to further work on cultural heritage and also an Aboriginal Socio-Economic Impact Assessment to the satisfaction of the Miriuwung and Gajerrong people.

5. That the Minister notes that the EPA has concluded that development of the land and its use for irrigated agriculture:

   (a) is capable of being managed to meet the EPA's objectives related to the relevant factors of biodiversity, mosquitoes and disease vectors, particulates and dust, chemicals, greenhouse gas emissions, groundwater quality and quantity, surface water quality and quantity, recreation, management structure and environmental management plan, subject to the conditions and co-proponents' commitments set out in Appendix 2 and summarised in Section 4.
   (b) is, on the basis of current information and subject to the conditions and co-proponents' commitments set out in Appendix 2 and summarised in Section 4, capable of being managed for the relevant factor of Aboriginal heritage and culture (see also Recommendation 4).

6. That the Minister notes that the conditions and procedures recommended in Appendix 2 combine recommendations from Bulletin 988 and this report.

7. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report.

Appendix 1

References

AACM International Pty Ltd (1997) *Aboriginal Consultations Ord River Irrigation Scheme Stage II*, prepared for the Department of Resources Development, Perth, Western Australia.

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Appendix 2

Recommended Environmental Conditions and

Proponents' Consolidated Commitments

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

Ord River Irrigation Area Stage 2 (M2 Supply Channel), Kununurra

Proposal: The proposal is to develop an export-based raw sugar industry on the Weaber, Keep River and Knox Creek Plains, as documented in Schedule 1 of this Statement.

Proponent: Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and the Water Corporation of Western Australia

Proponent Address: Wesfarmers Limited, 11 Floor, "Wesfarmers House", 40 The Esplanade, PERTH WA 6000

Assessment Number: 1240

Reports of the Environmental Protection Authority: Bulletin 988 and 1016

The proposal to which the above reports of the Environmental Protection Authority relate may be implemented subject to the following environmental conditions and procedures:

1 Implementation

1-1 Subject to these conditions and procedures, the proponent shall implement the proposal as documented in schedule 1 of this statement.

1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is substantial, the co-proponents shall refer the matter to the Environmental Protection Authority.

1-3 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

2 Proponent Commitments

2-1 The proponent shall implement the consolidated environmental management commitments documented in schedule 2 of this statement.

2-2 The proponent shall implement subsequent environmental management commitments which the proponent makes as part of the fulfilment of conditions and procedures in this statement.

3 Proponent

3-1 The proponent for the time being nominated by the Minister for the Environment and Heritage under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment and Heritage has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person in respect of the proposal.

3-2 Any request for the exercise of that power of the Minister referred to in condition 3-1 shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the proposal in accordance with the conditions and procedures set out in the statement.

3-3 The proponent shall notify the Department of Environmental Protection of any change of proponent contact name and address within 30 days of such change.

4 Commencement

4-1 The proponent shall provide evidence to the Minister for the Environment and Heritage within five years of the date of this statement that the proposal has been substantially commenced.

4-2 Where the proposal has not been substantially commenced within five years of the date of this statement, the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment and Heritage will determine any question as to whether the proposal has been substantially commenced.

4-3 The proponent shall make application to the Minister for the Environment and Heritage for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement at least six months prior to the expiration of the five year period referred to in conditions 4-1 and 4-2.

4-4 Where the proponent demonstrate to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding five years for the substantial commencement of the proposal.

5 Compliance Auditing

5-1 The proponent shall submit periodic Compliance Reports, in accordance with an audit program prepared in consultation between the proponent and the Department of Environmental Protection.

5-2 Unless otherwise specified, the Chief Executive Officer of the Department of Environmental Protection is responsible for assessing compliance with the conditions, procedures and commitments contained in this statement and for issuing formal, written advice that the requirements have been met.

5-3 Where compliance with any condition, procedure or commitment is in dispute, the matter will be determined by the Minister for the Environment and Heritage.

6 Environmental Management System

6-1 In order to manage the environmental impacts of the project, and to fulfil the requirements of the conditions and procedure in this statement, prior to ground disturbing activities, the proponent shall demonstrate to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection and the Northern Territory Department of Lands Planning and Environment that there is in place an environmental management system which includes the following elements:

1 An environmental policy and corporate commitment to it;

2 Mechanisms and processes to ensure:

2.1 planning to meet environmental requirements;

2.2 implementation and operation of actions to meet environmental requirements;

2.3 measurement and evaluation of environmental performance;

3 Review and improvement of environmental outcomes; and

4 Nominate environmental management responsibilities.

6-2 The proponent shall implement the environmental management system referred to in condition 6-1.

7 Environmental Management Programme

7-1 Prior to commencement of ground-disturbing activities, the proponent shall prepare an Environmental Management Programme, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, Department of Conservation and Land Management, the Northern Territory Department of Lands Planning and Environment, the Northern Territory Parks and Wildlife Commission, the Waters and Rivers Commission, the Health Department of Western Australia and the Shire of Wyndham-East Kimberley.

The programme shall relate to the Project Area, activities associated with the proposal at Wyndham and along the transport link between the Project Area and Wyndham.

The programme shall include environmental management plans as listed in Table 1, Appendix 2, as well as environmental management plans for:

1 chemicals management;

2 the Sugar Mill and associated activities;

3 sodic soil management; and

4 infrastructure maintenance (including flood levee location and management).

The plans will specify:

- environmental management measures, criteria and standards to be used to measure performance;

- remedial action to be undertaken;
- performance monitoring requirements; and
- annual monitoring and reporting requirements;
- triennial monitoring and reporting requirements; and
- peer review requirements.

7-2 The proponent shall implement the Environmental Management Programme required by condition 7-1.

7-3 The proponent shall make the Environmental Management Programme required by condition 7-1 publicly available, to the requirements of the Environmental Protection Authority.

8 Buffer Management Plan

8-1 Prior to ground-disturbing activity, the proponent shall prepare a Buffer Management Plan, as part of the Environmental Management Programme, to protect the environmental values of the buffer, including the protection of watercourses, wetlands, native fauna and vegetation to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Conservation and Land Management, the Northern Territory Department of Lands Planning and Environment, and the Northern Territory Parks and Wildlife Commission.

This Plan shall address:

1 tenure of the buffer area;

2 the role and purpose of the buffer area;

3 management objectives and priorities for the buffer area;

4 management practices to apply to the buffer area;

5 management of chemicals within or potentially affecting the buffer;

6 the environmental values of the buffer area;

7 methods to control human and vehicular access to environmentally sensitive portions of the buffer area;

8 methods to minimise the impacts of construction activities;

9 rehabilitation of disturbed portions of the buffer area; and

10 responsibilities for the maintenance of the buffer area.

8-2 The proponent shall implement the Buffer Management Plan required by condition 8-1 as specified in that Plan.

8-3 The proponent shall make the Buffer Management Plan required by 8-1 publicly available, to the requirements of the Environmental Protection Authority.

9 Flora and Fauna Protection Plan

9-1 Prior to the preparation of the Final Project Design Layout, as required by condition 11, the proponent shall prepare a Flora and Fauna Protection Plan for the Project Area, as part of the Environmental Management Programme, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Conservation and Land Management, the Northern Territory Department of Lands, Planning and Environment, and the Northern Territory Parks and Wildlife Commission.

The objectives of this plan are:

- to conserve and protect listed species;
- to conserve and protect vegetation associations/ communities;
- conserve and protect aquatic fauna species; and
- conserve and protect subterranean fauna species.

This plan shall address:

1 additional surveys of terrestrial fauna, including frogs, bats and reptiles;

2 additional surveys of aquatic fauna within the Keep River system (including estuarine fauna);

3 the protection of vegetation associations/ communities G1, G4, Em8, Em9, Gt2 and ET4 within proposed reserves adjacent to the Project Area; and

4 the identification and protection of subterranean fauna.

9-2 Prior to the preparation of the Final Project Design Layout, as required by condition 11, the proponent shall implement the Flora and Fauna Protection Plan required by condition 9-1 as specified in that Plan.

9-3 The proponent shall make the Flora and Fauna Protection Plan required by condition 9-1 publicly available, to the requirements of the Environmental Protection Authority.

10 Hydrodynamic Survey Plan

10-1 The proponent shall prepare a Hydrodynamic Survey Plan for the Keep River, Border Creek and Sandy Creek, as part of the Environmental Management Programme, prior to intended discharge of harvested groundwater or drainage from the project development area, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Conservation and Land Management, the Northern Territory Department of Lands, Planning and Environment, the Northern Territory Parks and Wildlife Commission and the Water and Rivers Commission.

The objectives for this plan are:

- to determine the hydrodynamic, including flushing, characteristics of the Keep River and Sandy Creek;

- to determine the flow characteristics of Border Creek including under drainage discharge conditions; and

- to determine the estuarine dynamics of the Keep River.

The plan shall include:

1 surveys of the flushing characteristics of the Keep River;

2 surveys of the flushing characteristics of Sandy Creek;

3 surveys of the flow characteristics of Border Creek; and

4 hydrodynamic investigations of the estuarine portion of the Keep River.

10-2 The proponent shall implement the Hydrodynamic Survey Plan required by condition 10-1, at least 18 months prior to intended discharge from the project, as specified in that Plan.

10-3 The proponent shall make the Hydrodynamic Survey Plan required by condition 10-1 publicly available, to the requirements of the Environmental Protection Authority.

11 Final Project Design

11-1 Following completion of the requirements of conditions 8 and 9, and prior to ground-disturbing activities, the proponent shall prepare a Final Project Design Plan for the Project Area and related activities in Wyndham, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Conservation and Land Management, the Water and Rivers Commission, the Aboriginal Affairs Department, the Northern Territory Department of Lands, Planning and Environment, and the Northern Territory Parks and Wildlife Commission.

The objectives of the plan are:

- to ensure that listed flora and fauna species are protected; and

- to ensure that the Miriuwung and Gajerrong peoples' environmental values in the Project Area are documented and considered.

This plan shall address:

1 the outcomes of the plans/ surveys required by Conditions 8 and 9;

2 the outcomes from the Aboriginal Socio-Economic Impact Assessment and other related studies (Commitment 8); and

3 the boundaries of the buffer area.

11-2 The proponent shall implement the Final Project Design Plan required by condition 11-1 as specified in that Plan.

11-3 The proponent shall make the Final Project Design Plan required by condition 11-1 publicly available, to the requirements of the Environmental Protection Authority.

12 Decommissioning Plans

12-1 Prior to construction, the proponent shall prepare a Preliminary Decommissioning Plan which provides the framework to ensure that the site is left in a suitable condition, with no liability to the State or Northern Territory, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

The Preliminary Decommissioning Plan shall address:

1 the conceptual plans for the removal or if appropriate the retention of plant and infrastructure and conceptual plans for its / their removal or, if appropriate, retention;

2 conceptual rehabilitation plans for all disturbed areas and a process to agree on the end land use(s); and

3 management of noxious materials to avoid the creation of contaminated areas.

12-2 At least six months prior to the anticipated date of decommissioning, or at a time agreed with the Department of Environmental Protection, the proponent shall prepare a Final Decommissioning Plan designed to ensure that the site is left in a suitable condition, with no liability to the State or Northern Territory, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

The Final Decommissioning Plan shall address:

1 removal or, if appropriate, retention of plant and infrastructure;

2 rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s); and

3 identification of contaminated areas, including provision of evidence of notification to relevant statutory authorities.

12-3 The proponent shall implement the Final Decommissioning Plan required by condition 12-2 until such time as the Minister for the Environment and Heritage determines that decommissioning is complete.

12-4 The proponent shall make the Final Decommissioning Plan required by condition 12-2 publicly available, to the requirements of the Environmental Protection Authority.

13 Performance Review

13-1 Each three years following the commencement of construction, the proponent shall submit a Performance Review Report to the Department of Environmental Protection and the Northern Territory Department of Lands, Planning and Environment:

- to document the outcomes, beneficial or otherwise;
- to review the success of goals, objectives and targets; and
- to evaluate the environmental performance over the three years;

relevant to the following:

1 environmental objectives reported on in Environmental Protection Authority Bulletins 988 & 10**xx** and Northern Territory Department of Lands Planning and Environment Reports 34a and 34b;

2 proponent's consolidated environmental management commitments documented in schedule 2 of this statement and those arising from the fulfilment of conditions and procedures in this statement;

3 environmental management system environmental performance targets;

4 environmental management programs and plans; and/or

5 environmental performance indicators;

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection and the Northern Territory Department of Lands, Planning and Environment.

Note: The Environmental Protection Authority may recommend changes and actions to the Minister for the Environment and Heritage following consideration of the Performance Review Report.

Procedure

14 Regional Conservation Initiatives

14-1 The Government of Western Australia will create the following conservation reserves, within two years, as a priority:

- Livistona Range Conservation Area;
- Pincombe Range Conservation Area;
- Ninbing Range Conservation Area;
- Weaber Range Conservation Area; and
- Mt Zimmerman Conservation Area.

14-2 The Government of Northern Territory will create the following conservation reserves, within two years, as a priority:

- Spirit Hills as National Park; and
- Western Legune as National Park.

Note

1 The proponent is required to apply for a Works Approval and Licence for this Project under the provisions of Part V of the *Environmental Protection Act 1986.*

2 Procedure 14 is not subject to proponent compliance.

Schedule 1

The Proposal

The M2 project is located within the Victoria-Bonaparte Biogeographic Region. The Project Area extends over approximately 76,000 hectares (ha) of land comprising the Weaber, Keep River and Knox Creek Plains, and involves approximately equal areas within Western Australia (WA) and the Northern Territory (NT) (see Figure 1).

The M2 project involves (see Figure 2):

- development of 30,500 hectares (ha) for irrigated agriculture;
- development of 3,000 ha for water supply and land protection infrastructure;
- establishment and management of 42,500 ha of land as a buffer for conservation purposes;
- construction of a raw sugar mill, with the capacity to produce approximately 400,000 tonnes per annum (tpa) of raw sugar and 160 000 tpa of molasses, near the centre of the M2 Area, in Western Australia; and
- development of raw sugar and molasses storage and handling facilities at Wyndham.

Key Characteristics Table

Element	Description	Amount
Land within the Project Area	• Project area • Land managed as a buffer+ • Land for irrigable development • Infrastructure area	• 76,000 ha* • 42,500 ha* • 30,500 ha* • 3,000 ha*
Land outside the Project Area	• M2 Channel (Lake Kununurra to Project Area) • Wyndham Port Facilities	• 690 ha • 1 ha
Production	• Raw sugar • Molasses	• 400,000 tpa • 160,000 tpa
Infrastructure	• Irrigation channels • Annual water requirement • Drains • Flood protection levees • Balancing storage dams (operating volume) • Roads • Power lines	• 160 km* • 740 GL* • 153 km* • 142 km* • 5.6 GL • 161 km • 165 km
Wyndham Port	• Raw sugar store • Molasses store	• 180,000 t • 75,000 t

Key:

*	=	approximate
GL	=	Gigalitres
ha	=	hectares
km	=	kilometres
tpa	=	tonnes per annum
t	=	tonnes
+	=	for clarification, conservation reserve proposals by the WA and NT Governments are referred to as 'conservation areas' and the areas within the Project Area proposed by the proponent in the ERMP / draft EIS to be protected from development are referred to as 'buffer areas'

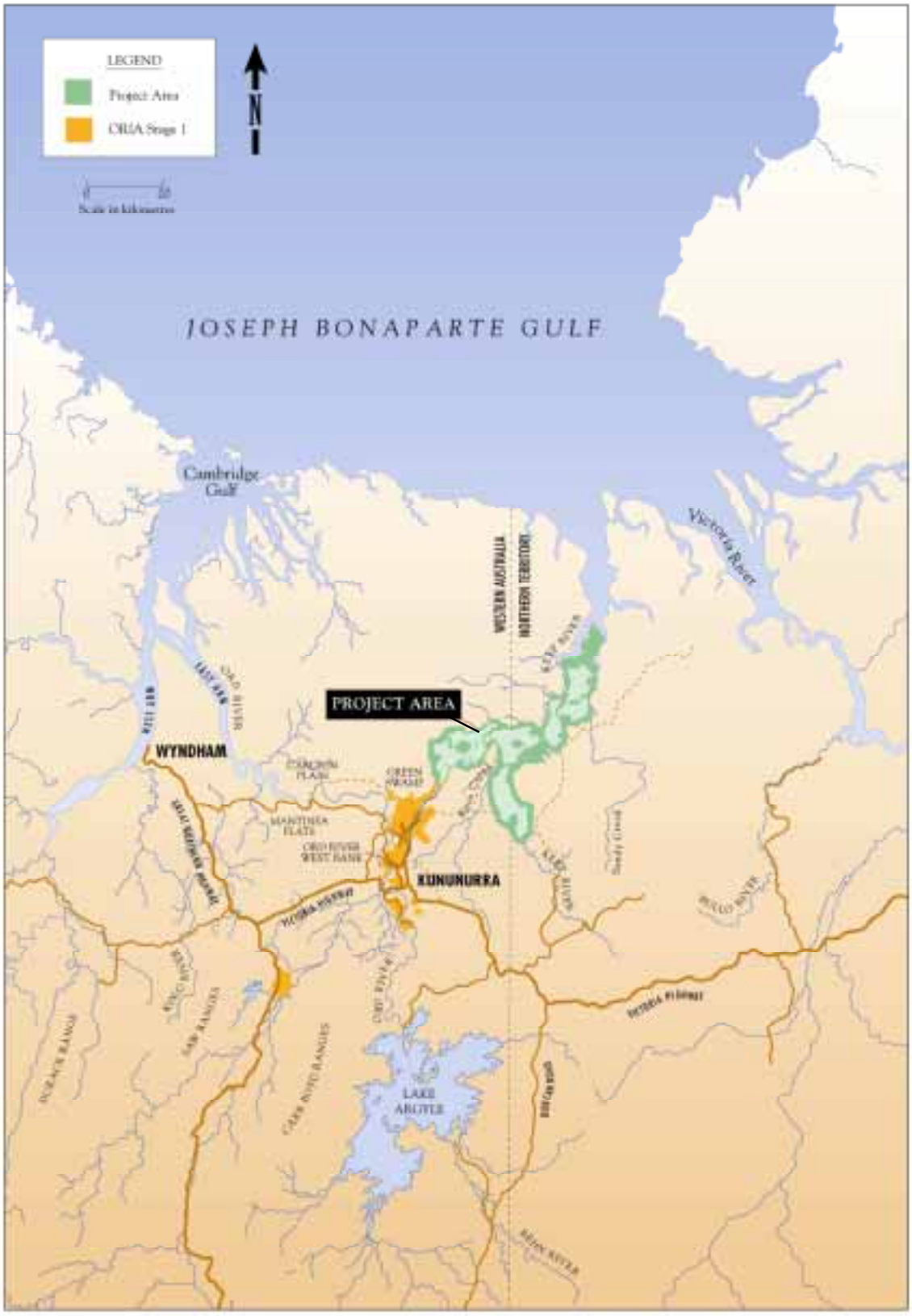

Figure 1. Overview of the Ord Region and Project Area (Kinhill Pty Ltd, 2000).

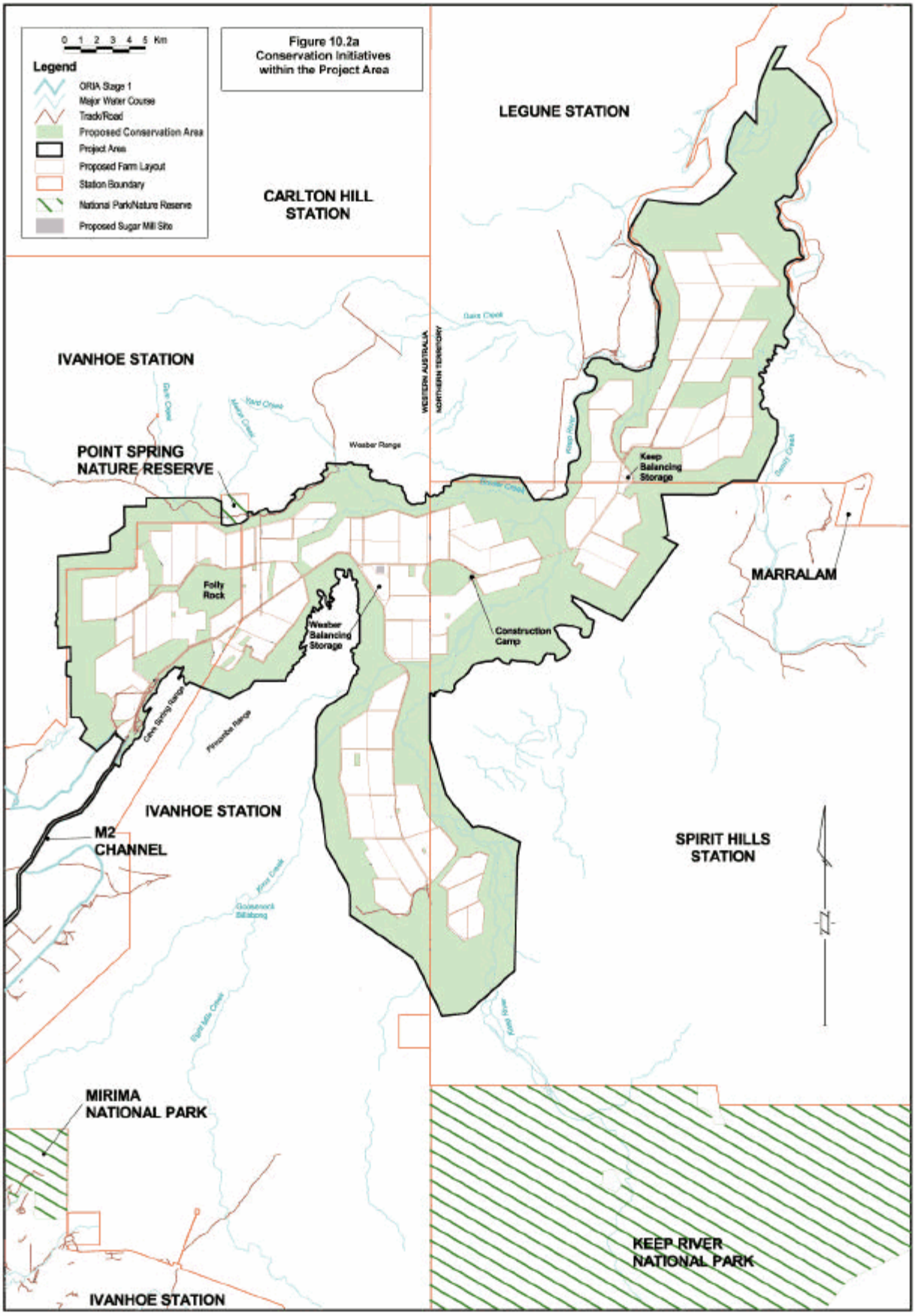

Figure 2: Project Layout (Wesfarmers et al, 2000)

Schedule 2

Wesfarmers Sugar Company Pty Ltd, Marubeni Corporation and Water Corporation of Western Australia

Environmental Management Commitments

March 2001

Summary of key commitments relating to environmental management (see footnote for glossary)

No.	Relevant ERMP/EIS Section	Commitment	Timing	Responsibility	Objective	Action	Further consultation	Compliance Criteria
	Environmental Management System							
1	Appendix O	An environmental management system (EMS) conforming to the requirements of the AS/NZ ISO 14000 series of standards would be developed for the project. The EMS would have the following key components: • organisational commitment; • environmental policy; • environmental aspects and impacts register; • regulatory and legal compliance register; • objectives and performance indicators; • environmental management program documentation (ie. EMP); • operational and emergency procedures; • responsibility and reporting structure; • training and awareness program; • environmental performance reviews, audits, monitoring and measurement.	Before construction, construction and operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Develop a framework for environmental management.	As committed.	DEP and DLPE.	Requirements of AS/NZ ISO 14000 series of standards.
2	3.2.4, Appendix O	An Environmental Management Plan (EMP) would be prepared for the Project. The EMP would consist of a series of sub-plans as indicated in Table 1. The sub-plans would be prepared, updated, approved and implemented in a progressive basis as required for the various stages of Project development in accordance with Table 1. The EMP will contain provisions to review monitoring data and to modify management measures as appropriate.	Before construction, construction and operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Provide management plan to guide environmental management.	As committed.	Public scoping of EMP in consultation with DEP and DLPE.	To satisfaction of DEP and DLPE
	Native Title							
3	12.5.8	Best endeavours would be made to resolve native title issues by way of a negotiated settlement, preferably an Indigenous Land Use Agreement.	Before construction.	Wesfarmers-Marubeni, the Water Corporation.	Ensure protection where possible of any Native Title rights.	As committed.	Aboriginal Representative Bodies, the Miriuwung and Gajerrong people and relevant Government agencies.	In accordance with the Native Title Act 1993.

	Cultural Heritage							
4	12.5.3	Archaeological and ethnographic assessments of the Project Area would be undertaken.	Before construction.	Wesfarmers-Marubeni and the Water Corporation	Ensure protection of cultural heritage sites.	As committed.	Aboriginal Representative Bodies, the Miriuwung and Gajerrong people, AAPA, the HCB and the AAD.	In accordance with the *Aboriginal Heritage Act 1972*, the *Northern Territory Sacred Sites Act 1995*, the *Heritage Conservation Act 1996*, and the *Aboriginal and Torres Strait Islander Protection Act 1984*.
5	12.5.3	Cultural Heritage Protection Procedures would be established and implemented.	Before construction, construction and operation.	Wesfarmers-Marubeni and the Water Corporation	Ensure protection of cultural heritage sites.	By providing the Procedures to all contractors.	Aboriginal Representative Bodies, the Miriuwung and Gajerrong people, AAPA, HCB and AAD.	To satisfaction of the Miriuwung and Gajerrong people, the AAPA, the HCB and the AAD.
6	12.5.3	A Cultural Heritage Management Plan would be developed and implemented.	Before construction, construction and operation.	Wesfarmers-Marubeni, the Water Corporation and Environmental Management Entity.	Ensure protection of cultural heritage sites.	By involving the Aboriginal Representative Bodies and Miriuwung and Gajerrong people.	Aboriginal Representative Bodies, the Miriuwung and Gajerrong people, AAPA, the HCB and the AAD.	To satisfaction of the Miriuwung and Gajerrong people, the AAPA, the HCB and the AAD.
	Aboriginal Social Impact							
7	12.3	Regular meetings would be held with Miriuwung and Gajerrong people.	Before construction, during construction and operation.	Wesfarmers-Marubeni, the Water Corporation and Environmental Management Entity.	Ensure people are informed about the Project and to provide a venue for feedback.	By regular meetings.	Aboriginal Representative Bodies and the Miriuwung and Gajerrong people.	To satisfaction of the Miriuwung and Gajerrong people, the EPA and DLPE.

8	12.6.2	An Aboriginal Socio-Economic Impact Assessment would be completed.	Before construction.	Wesfarmers-Marubeni and the Water Corporation	To ensure that the Miriuwung and Gajerrong view of the Project is understood and reflected in the final Project design.	By involving the Miriuwung and Gajerrong and Aboriginal representative Bodies.	Aboriginal Representative Bodies and the Miriuwung and Gajerrong people.	To satisfaction of the Miriuwung and Gajerrong people, the EPA and DLPE.
	Community Issues							
9	14.1.3	Management action would be taken in conjunction with the proposed development to reduce the risk of increased infection with arboviruses. These actions would concentrate upon the following activities: • designing and operating the Project so as to reduce the potential for increased mosquito-breeding activity; • implementing education programmes for the Project's construction and operational workforce on measures that could be taken to reduce their personal risk of infection; • extending the existing monitoring programmes to cover the Project Area.	Before construction, construction and operation.	Wesfarmers–Marubeni and the Water Corporation (to end of construction), Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation (thereafter).	Reduce risk of infection through lower mosquito numbers and public awareness.	As committed.	Health Departments (WA) and (NT).	–
10	13.3.2	Burning of cleared vegetation would be managed to occur at times when prevailing winds would direct smoke and ash away from residential areas.	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Avoid nuisance from smoke and ash fallout.	By including requirements into construction contracts and monitor.	CALM and PWCNT.	–
11	13.6	Construction activities would be restricted to daylight hours for all activities within 500 m of an existing residence. All occupiers of residences within 1 km of construction activities would be advised of the nature and duration of the activities planned, and well in advance of construction commencing.	Construction.	Wesfarmers-Marubeni and the Water Corporation.	Avoid nuisance to existing residents.	By incorporating requirements into construction contracts and monitoring.	Occupiers of residences within 1 km of construction works.	Noise abatement regulations.

12	13.2	A dust monitoring programme would be established as part of the EMP and administered throughout the construction and operational phases of the Project, using dust deposit gauges that comply with *AS 3580.10.1—1991*. Periodic dust monitoring would also be undertaken using portable monitors.	Construction and Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Provide data for management.	As committed.	DEP and DLPE.	–
13	11.5.1	Signs would be erected at strategic locations throughout the Project Area to advise travellers that access to pastoral leases is restricted.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Avoid unwanted visitors to pastoral leases.	By erection of signs.	Local pastoralists.	–
	Soil conservation, Repair and restoration							
14	3.10	Borrow pits would be selected in accordance with Aboriginal cultural and heritage considerations of the land and operated as far as practicable with a view to minimising erosion, damage to surrounding vegetation and visual impact. Once construction is completed, areas no longer required would be rehabilitated by a combination of contouring, slope stabilisation, topsoil spreading and seeding.	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Achieve appropriate rehabilitation.	By including requirement in construction contracts and monitoring.	Miriuwung and Gajerrong people, CALM, PWCNT and the Shire of Wyndham — East Kimberley.	To satisfaction of CALM and PWCNT.
15	4.5.2, 10.5.2	Soil erosion in the Project Area would be controlled by a combination of the following management strategies: • staging vegetation clearance so that areas are cleared only as required; • controlling drainage by providing levee banks to prevent floodwaters entering the developed area; • grading of land on farms so as to minimise stormwater runoff velocities; • sizing and designing receiving drains to accommodate anticipated flow regimes;	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Minimise soil erosion.	By including rehabilitation requirements and plans in construction contracts and monitoring.	Commissioner of Soil and Land Conservation (WA) and DLPE.	To satisfaction of Commissioner of Soil and Land Conservation (WA) and DLPE.

		• providing buffer zones on both sides of watercourses to allow riparian vegetation to continue to stabilise soils in these areas; • rehabilitating disturbed areas as soon as possible following disturbance during construction; • formulating and implementing appropriate rehabilitation plans and programmes including topsoil stripping and stockpiling, land preparation, and reseeding with local native species to facilitate regeneration of disturbed areas.						
16	10.5.6	Rehabilitation of any sites disturbed during development would be undertaken progressively using topsoil and seed species collected from the Project Area. Monitoring of the success of rehabilitation would be undertaken.	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Effective rehabilitation of disturbed sites.	By including requirements in construction contracts and monitoring.	Miriuwung Gajerrong people, CALM and PWCNT	To satisfaction of Miriuwung Gajerrong people, CALM and PWCNT.
17	10.5.7	A seed collection programme would be undertaken before vegetation is cleared. Only seeds of plant species endemic to the Project Area would be used in revegetation projects.	Construction.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Effective rehabilitation of disturbed sites.	Seed collection and use in rehabilitation projects.	Miriuwung Gajerrong people, CALM and PWCNT.	To satisfaction of Miriuwung Gajerrong people, CALM and PWCNT.
	Soil Chemical Status							
18	4.5.4	Long-term monitoring would be undertaken to ascertain any changes to surface and subsoil salinity and soil chemical status, including sodicity.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni and independent farmers.	Avoid significant increases in subsoil salinity and sodicity levels.	Monitor sodium adsorption ratio, ESP, and electrical conductivity levels. Advise farmers of optimal watering strategies.	AGWEST.	Target sub-soil ESP of 15.

	Surface Water Resources							
19	5.3.1, 5.4.1	Complete further analysis of predicted water velocity regime and stability of soils along the lower 20km of Border Creek	Before construction	Wesfarmers Marubeni and the Water Corporation	To ensure erosion effects in and around Border Creek are not significant	By implementing appropriate design	WRC and DLPE	To satisfaction of WRC and DLPE
20	5.4.1	Appropriate erosion protection measures such as stone pitching and bridge abutments would be developed in localised areas of high water velocity and implemented.	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Minimise erosion of watercourses.	By implementing protective measures at watercourse crossings.	–	To satisfaction of Commissioner of Soil and Land Conservation (WA) and DLPE.
21	5.5.1	Sedimentation effects by would be managed by: • wherever practicable, restricting ground-disturbing operations to the dry season; • restricting ground-disturbing operations to the minimum area required to facilitate construction; • collecting and storing for future use any topsoil from areas to be disturbed; • installing and maintaining temporary sediment traps downstream of any areas to be disturbed; • progressive clearing, developing and rehabilitating, wherever possible using locally won topsoil, of any areas that are no longer going to be disturbed.	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Minimise sediment load to receiving waters.	By incorporating requirements into construction contracts and monitoring.	Commissioner of Soil and Land Conservation (WA) and DLPE.	To satisfaction of Commissioner of Soil, Land Conservation (WA) and DLPE.
22	3.3.2, 4.5.3	All farms in the Project Area would be developed with irrigation tailwater management systems. The volume of tailwater dams in these systems would be optimised during detailed design with the objective being to minimise discharges of irrigation tailwater during the dry season. As a minimum, the tailwater dam capacity would be sufficient to provide first-flush stormwater retention capacity of 12 mm of rainfall runoff for sugarcane farms, and 25 mm of rainfall runoff from other farms. Farm maintenance would include regular desilting of these drains and return of the collected material to the cropped area.	Construction and Operation.	Wesfarmers–Marubeni and independent farmers.	Minimise water pollution.	By constructing, operating and maintaining the tailwater return system.	–	Quality (suspended solids) of drainage waters to be in natural range of Keep River.

23	3.4.2, 5.6.1	Regimes of chemical and fertiliser usage, in terms of type, timing and method of application would be incorporated into the EMP to be developed for the Project Area. These restrictions would as a minimum include: • pesticide application in accordance with the annual spray calendar prepared for the ORIA; • the use only of chemicals that are approved by the Governments of Western Australia and the Northern Territory; • the successful completion of training for farm staff required to spray chemicals; • commercial spray operators being required to be fully accredited under a national standards system; • a ban on the use of endosulphan during the wet season (November to March) and at other times when the crop areas have free-standing water in either the furrows or tail drains; • application of any endosulphan to comply with NRA review recommendations. • interim restrictions would require each application of endosulphan to receive prior approval from the Environmental Management Entity, as well as monitoring of farm drains, tailwater return systems and drainage flows.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Minimise use of pesticides. Manage endosulphan levels in receiving waters to below guideline levels.	By incorporating into EMP and implementing.	AGWEST.	NRA recommendations and National Standards.
24	5.4.1	Monitoring of erosion along all watercourses, including constructed drains, would be undertaken and remedial measures would be undertaken on an as-needed basis.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Minimise erosion of water courses.	By monitoring and implementing remedial measures as needed.		

25	5.1005.1	Fertilisers or chemicals would not be applied to cropped areas when the first-flush basin capacity is not available.	Operation.	Wesfarmers–Marubeni and independent farmers.	Minimise water pollution.	Only apply fertilisers and pesticides when first flush basin capacity available.		Nutrients within natural range for receiving waters. Pesticides within national guidelines to maintain aquatic ecosystems in receiving waters.
26	5.5.2	Effects of any spray drift would be minimised by: • minimisation of the use of aerial spraying, by using tractor-based spraying to the maximum extent possible; • avoidance of unsuitable weather conditions such as surface temperature inversions and unstable conditions during aerial spraying whenever possible; • utilisation of a larger droplet size settings for spray equipment during aerial spraying;	Operation.	Wesfarmers–Marubeni and independent farmers.	Minimise pesticide levels in receiving waters.	By incorporating requirements into EMP and implementing.	AGWEST.	National guideline values for pesticides for maintenance of aquatic ecosystems.
27	5.5.2	Effects of airborne dust on water quality in receiving waters would be minimised by: • provision of dedicated on-farm access tracks that would not have agricultural chemicals applied directly to them; • wherever possible, adoption of 'minimum tillage' farming practices.	Operation.	Wesfarmers–Marubeni and independent farmers.	Minimise spread of pesticides by minimising dust.	As committed.	AGWEST.	National guideline values for pesticides for maintenance of aquatic ecosystems.

28	5.5.4	Aquatic weeds in the irrigation channels and balancing storage dams would be controlled by a combination of mechanical weed removal and periodic dosing with a chemical such as acrolein. Chemical dosing would be in accordance with best-practice procedures as outlined below: • emptying the channel, locking offtakes, erecting warning signage and notifying farmers prior to injection of the chemical; • releasing a known flow of water to obtain a water depth of approximately 0.5 m into the channel and releasing the chemical from a controllable release point to maintain an initial concentration (15 ppm in the case of acrolein); • releasing a marker dye to denote the chemical front; • shutting flow to the channel and holding the chemical in the channel for a minimum of forty-eight hours before diluting by release of additional water and use of the water for irrigation; • monitoring the watercourses downstream of the Project Area for acrolein and if detected, review the above procedure in conjunction with the Water and Rivers Commission and the DLPE.	Operation.	Water Corporation.	Manage chemical use and minimise discharges to receiving waters.	By incorporating requirements into EMP and implementing.	WRC and DLPE.	National guideline values for maintenance of aquatic ecosystems.
29	14.2.4	Rapid assessment of the placement deposit patterns in the field following spray operations would be implemented by the proposed Environmental Management Entity to monitor spraying operations within the Project Area.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Provide data for management.	By incorporating requirements into EMP and implementing.	DEP and DLPE.	–
	Groundwater Resources							
30	2.4.2	Engineering design standards for all irrigation channels and regulating storage's intended to convey or store water for prolonged periods would be adopted to restrict seepage to a maximum of 2mm/d.	Before construction.	Water Corporation.	Minimise accessions.	By implementing appropriate design, material selection and construction method and monitor.	–	Maximum seepage rate of 2 mm/d.

31	3.5.2	Incorporate wider, shallower drains than were built in ORIA Stage 1. Where deeper drains are required, the excavated surface of the drain would be compacted to minimise seepage.	Construction.	Water Corporation.	Minimise groundwater accessions.	By implementing design and construction standards and monitoring.	–	–
32	6.5.5	Groundwater delineation drilling across the interpreted position of the palaeochannel aquifers would be implemented in order to define the position of aquifers beneath the irrigation area. An extensive network of groundwater monitoring bores would be installed within and adjacent to the irrigation area prior to the commencement of irrigation. This network would include bore transects aligned perpendicular to the Keep River and Sandy Creek to acquire additional data in relation to the river–groundwater interactions, as well as the establishment of monitoring bores adjacent to Milligan Lagoon. Groundwater samples would be collected during the delineation drilling to quantify the vertical and horizontal water quality distribution.	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Confirm parameters adopted for groundwater modelling.	Conduct further groundwater monitoring.	WRC and DLPE.	To satisfaction of WRC and DLPE.
33	2.4.2	Groundwater levels would be controlled via the utilisation of bores and subsoil drains if necessary.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Minimise impacts on proposed land use.	By use of bores and subsoil drains.	WRC and DLPE.	–
34	2.4.2	A comprehensive monitoring programme for groundwater levels and quality, and use of the collected data to modify management practices would be practiced.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Monitor groundwater levels.	By regular monitoring of observation wells.	WRC and DLPE.	WRC and DLPE.

35	6.5.5	Test dewatering bores would be installed to confirm aquifer yields and the response of the aquifers to pumping. The data collected from the groundwater monitoring programme would be used to continually update the groundwater model and to optimise the extent and timing of installation of the groundwater management system.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Optimise groundwater management.	Install and operate test bores.	WRC and DLPE.	To satisfaction of WRC and DLPE.
36	14.2.4	Groundwater would be tested on a regular basis for all chemicals used in the Project Area to ensure compliance with national drinking water quality guidelines.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Ensure safe drinking water supplies.	As committed.	WRC and DLPE.	National guidelines for drinking water.
37	6.5.5	The quality of groundwater adjacent to watercourses would be monitored. The groundwater pumping strategy would include provision for the capture of additional groundwater adjacent to the watercourses if considered necessary.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Maintain health of riparian vegetation.	Monitor groundwater adjacent to watercourse and implement control measures of needed.	WRC and DLPE.	To satisfaction of WRC and DLPE.
	Fire							
38	10.5.2	A fire control strategy and plan would be developed for the farms and for the proposed conservation areas. This would include monitoring areas to determine the need for burning.	Before construction.	Wesfarmers–Marubeni and the Water Corporation.	Develop appropriate fire management practices	Be developing a fire control strategy and plan and including it in the EMP.	CALM and PWCNT.	To satisfaction of CALM and PWCNT.

	Native Vegetation and Fauna Conservation							
39	10.5.2	To limit any potential for over clearing, all areas designated for construction works would be clearly marked on development maps and on the ground prior to commencement of works.	Before construction.	Wesfarmers–Marubeni and the Water Corporation.	Limit any potential for over clearing and improve environmental awareness.	As committed.	–	–
40	10.5.1	Permanent monitoring sites for flora, fauna and biodiversity would be established in conservation areas, along ecological corridors and in selected sites in the Project Area. Monitoring would be undertaken on a regular basis with the monitoring parameters clearly defined following consultation with the staff of CALM and the Parks and Wildlife Commission of the Northern Territory.	Before construction and operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Monitor flora, fauna and biodiversity.	By incorporating requirements into the EMP and implementing.	CALM and PWCNT.	To satisfaction of CALM and PWCNT
41	3.10	In areas where reserve widths are significantly greater than those required for construction, only the sections necessary for construction and future maintenance purposes would be cleared.	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Avoid excessive clearing.	By including requirement in construction contracts and monitoring.	–	–
	Weeds, Plant pathogens and pest animals							
42	10.5.3	All construction machinery would be cleaned of soil and other organic debris prior to being transported to the Project Area. If borrow is required, it would be obtained from surveyed weed-free sites.	Construction.	Wesfarmers–Marubeni and the Water Corporation.	Minimise potential for introduction of weeds to Project Area.	As committed.	AGWEST, Department of Primary Industries and Fisheries, CALM and PWCNT.	To satisfaction of AGWEST and Department of Primary Industries and Fisheries
43	10.5.5	People would be discouraged from taking dogs and cats into the conservation areas.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Minimise potential for feral pests.	By erection of signs.	–	–

44	11.4.4	Access to the Keep River within the Conservation Area, for recreational purposes, would remain open at designated recreation sites. Access to the remainder of the conservation area would be restricted.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Control erosion and weeds.	By providing designated recreation sites and control access.	Miriuwung Gajerrong people and local recreation groups.	To satisfaction of Miriuwung Gajerrong people and local recreation groups.
	Biodiversity and Nature Conservation							
45	10.2.2	All undeveloped land in the Project Area would be managed for conservation.	Before construction, construction and operation	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Management of a world-class broad-scale agricultural development, with integral conservation areas, in accordance with Australia's ESD and biodiversity policies.	Establish conservation areas and manage in accordance with the EMP.	CALM and PWCNT	-
46	10.3.5	Redesign Farms W511, W65, K31, X442, W36, W41, X41, X431, X432, X441, W11, W12, W14, W110, K41 and the M2N irrigation channel	Before construction	Wesfarmers Marubeni and the Water Corporation	To ensure adequate conservation of vegetation associations ET4, Ct1, Me3, Cc1, Gt3, Em8, Em7, Gt2, ET5, Ct2, Cb9, Bc3, Gt6 and Gt8.	By implementing appropriate design	-	To the satisfaction of the DEP

47	2.4.2, 10.3.5	Reconfigure the design of the Keep River balancing storage	Before construction	Water Corporation	To ensure adequate conservation of vegetation association Gt5	By implementing appropriate design	-	-
48	10.3.5	Confirm the location of vegetation associations G1 and G4 outside of the Project Area	Before construction	Wesfarmers Marubeni and the Water Corporation	To ensure adequate conservation of vegetation associations G1 and G4	By implementing appropriate survey work	-	-
49	10.3.5	Redesign Farms W11, W12, W14, W36 and the M2N irrigation channel; and confirm the location of vegetation association Em9 outside of the Project Area	Before construction	Wesfarmers Marubeni and the Water Corporation	To ensure adequate conservation of vegetation association Em9	By implementing appropriate design and survey work	-	-
50	5.5.2, 10.3.3	Redesign boundaries to Farms X41, X431, X432, and X441	Before construction	Wesfarmers Marubeni and the Water Corporation	To ensure conservation of all riparian vegetation, and adequate setback of the developed area from natural watercourses	By implementing appropriate design	-	-
51	10.3	Redesign flood protection levees east of Farm X23, east of Farm W64, and east of conservation areas E46 and E410	Before construction	Wesfarmers Marubeni and the Water Corporation	To ensure the inundation of the conservation areas by natural flooding, and associated drainage	By implementing appropriate design	-	-

52	5.3.1, 6.5.3	Redesign flood protection HDX1 and design a drainage corridor through Farm X432	Before construction	Water Corporation	To ensure minimal hydrological impact on Milligan Lagoon	By implementing appropriate design	WRC and DLPE	To satisfaction of WRC and DLPE
53	9	Complete an additional biological survey of the Keep River in the vicinity of the Project Area	Before construction	Wesfarmers Marubeni and the Water Corporation	To confirm current predictive models, and provide additional baseline data for inclusion in the EMP	By implementing survey work	DEP, DLPE, NT Dept. of Fisheries	To the satisfaction of DEP, DLPE, and NT Dept. of Fisheries
54	10.5.2	All contractors and consultants would be required to participate in a formal environmental and cultural heritage induction programme on the importance of the natural and social environment.	Construction	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Improve environmental awareness	Incorporate into site induction.	–	–
	Other							
55	16.4.2	An entity would be established to shoulder the operational aspects of ongoing environmental management in relation to the proposed development on behalf of the industry participants. The proposed entity, or Environmental Management Entity (EME), would be owned by the industry participants, and would provide environmental management services to the owners. The EME would be formed prior to the commencement of any development works associated with the proposed development.	Before construction.	Wesfarmers–Marubeni and the Water Corporation.	Establish an entity to provide environmental services to the owners.	As committed.	–	–
56	3.7.3	Emissions from the boiler would be passed through a scrubber to achieve a maximum particulate discharge of 32 kg/h from the 40 m high chimney. Bagasse firing would be a complete combustion process with excess oxygen available at all times.	Operation.	Wesfarmers–Marubeni.	Avoid air and water pollution.	By implementing design and construction standards and monitoring.	DEP.	National standards for emissions from stationary sources.

57	16.6	The results and interpretation of the monitoring implemented by the EME would be reported on an annual basis on behalf of the industry participants. The annual report would detail actual environmental performance against the environmental performance targets detailed in the EMP, and would be made readily available to the industry participants. The annual report would also be made available to relevant government agencies and possibly other organisations and community interest groups.	Operation.	Environmental Management Entity on behalf of Wesfarmers–Marubeni, independent farmers and the Water Corporation.	Provide ready identification of compliance by the industry with the EMP.	Prepare annual reports and make available to industry participants and relevant government agencies.	EPA, and DLPE.	–

Glossary

AAD	Aboriginal Affairs Department (WA)
AAPA	Aboriginal Areas Protection Authority (NT)
AGWEST	Agriculture Western Australia
CALM	Department of Conservation and Land Management (WA)
DEP	Department of Environmental Protection (WA)
DLPE	Department of Lands, Planning and Environment (NT)
EPA	Environmental Protection Authority (WA)
HCB	Heritage Conservation Branch of the DLPE (NT)
PWCNT	Parks and Wildlife Commission Northern Territory
WRC	Water and Rivers Commission (WA)

Table 1 Scope of EMP (as outlined in Appendix O of ERMP/draft EIS) and timing of sub-plans

EMP Sub-plan	Timing of implementation		
	Before Construction (design)	Construction	Operation
Environmental education and training		√	√
Legislation, policy and standards	√	√	√
Records and information	√	√	√
Native title	√	√	√
Cultural Heritage	√	√	√
Aboriginal social impact	√	√	√
Community issues		√	√
Dust and particulates		√	√
Mosquito and disease vectors *	√	√	√
Soil conservation, repair and restoration		√	
Soil chemical status			√
Surface water resources		√	
Groundwater resources			√
Fire			√
Greenhouse gas emissions*			√
Native vegetation and fauna conservation	√	√	√
Revegetation		√	√
Weeds, plant pathogens and pest animals		√	√
Biodiversity and nature conservation	√	√	√

* *Additional to sub-plans in Appendix 0 of the ERMP/draft EIS.*