Irrigated agricultural proposals

Report and recommendations of the
Environmental Protection Authority

Environmental Protection Authority
Bulletin 462
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Irrigated agricultural proposals in the Swan Coastal Plain catchment of the Peel-Harvey Estuary

Report and recommendations of the Environmental Protection Authority

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The proposals

The Environmental Protection Authority has received two proposals (summarised in Schedule 1), each of which involves an application for a well licence to pursue irrigated agriculture within the Peel-Harvey coastal plain catchment.

Schedule 1. Summary of proponents, property locations, proposed landuse and type of irrigation and the area of each property subject to irrigation.

Proposal Number	Proponent	Property location	Proposed landuse	Area subject to irrigation (hectares)
1	Mr P Sevelj	Lot 12 Corio Rd, Pinjarra	Flood irrigated pasture	12
2	Mr R. Parkey	Lot 48 Boreswamp Rd, Coolup	Drip irrigated horticulture	12

Proposal number 1 involves the flood irrigation of commonly grown pasture species (clover and perennial grasses) on an area of riverine clays adjacent to the North Dandalup River. Between 10 to 15 kg of phosphorus would be applied each year, with two thirds applied in autumn and one third applied in spring. Irrigation would occur mainly during the summer months.

Proposal number 2 involves the drip irrigation of summer vegetable crops (mainly pumpkins, rockmelons, watermelons) on an area of loamy clay soils from November to March. Irrigation would be managed by evaporation replacement using drippers under plastic mulch to minimise water use. Fertilisation would occur in the irrigation water daily over a two week period. After this two week period, no more nutrients would be applied to the crop. Nutrients applied annually would amount to 5 kg of nitrogen and 15 kg of phosphorus per hectare, which includes nutrients applied in basal dressings at other times of the year.

Assessment of the proposals

The Authority has assessed the proposals on the basis of:

- the information provided in the well licence applications;
- discussions with the proponents;
- the Authority's knowledge of current irrigated agricultural practice and its environmental effects;
- a recently published position statement and report and recommendations on new conventional sprinkler irrigated agricultural proposals in the Swan Coastal Plain catchment of the Peel-Harvey Estuary (EPA, 1990);
- the Authority's knowledge of the current status of the Peel-Harvey estuarine system and associated catchments; and
- in the context of the Ministerial Conditions for the Peel Inlet-Harvey Estuary Management Strategy (Stage 2).

During the assessment the Authority consulted with the Water Authority of W A, the Department of Agriculture and the proponents. No public comment on the proposals was received during the public review period.

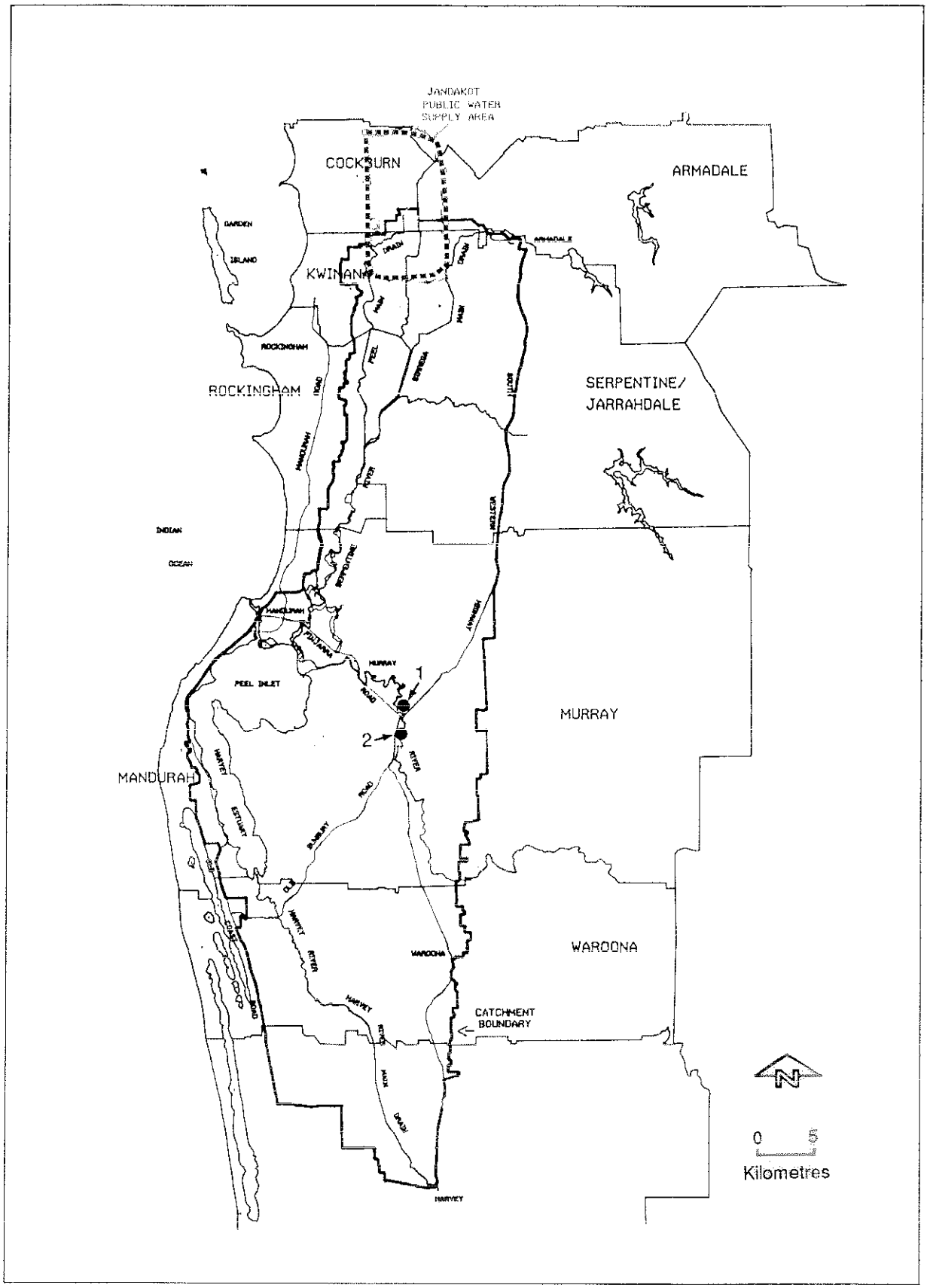

Figure 1: Location of proposals within the Peel-Harvey coastal plain catchment administrative boundary

The Existing environment

The Peel-Harvey estuarine system shows signs of severe eutrophication (nutrient enrichment), which results in excessive algal growth that greatly reduces its recreational, environmental, social and economic value. The cause of the eutrophication is an inflow of nutrients (mainly phosphorus and nitrogen) from the coastal plain catchment into the estuary. The nutrient inflow is currently far above the estuary's ability to cope — hence the huge production of algae.

The primary source of the nutrients is agricultural runoff from the sandy soils of the catchment which have been extensively cleared and drained. The sandy soils of the coastal plain are naturally infertile and require inputs of nutrients to be productive. The sandy soils, however, have little capacity to retain nutrients that are applied and a large proportion of that which is applied is lost through leaching and runoff.

The sandy soils have little capacity to retain moisture during summer and have to be irrigated frequently to maintain plant growth (eg. horticulture and irrigated pasture). Often the soils are waterlogged during winter which enhances nutrient loss through runoff.

The problems that exist in the estuarine system today are largely the result of relatively small applications of nutrients, for example 10-15kg of phosphorus per hectare per year for passive agricultural activities such as annual pasture growth for stock grazing. These are known as diffuse sources of nutrients, however, point sources (sources concentrated at one small location) also contribute to the problems in the estuarine system. Point sources include intensive animal industries, stock holding yards and horticultural developments.

The Ministerial conditions and their implications

Ministerial Conditions were set on 3 January 1989 under Section 45 of the Environmental Protection Act for the Peel-Harvey Stage 2 Environmental Review and Management Programme. These conditions imposed constraints on developments in the catchment with the objective of reducing the flow of nutrients into the estuary to about half their present level.

The Stage 2 proposal by the Ministers for Transport, Agriculture and Waterways sought to improve flushing of the estuary by constructing the Dawesville Channel and to reduce the flow of nutrients by controlling developments in the catchment. The proposal included a commitment to a moratorium on further clearing and drainage in the catchment. In approving the proposal, the Minister for Environment set the condition that the moratorium should continue "until the Minister for Environment is satisfied that these activities would be environmentally acceptable."

The implementation of this Condition requires that a proposal which involves some additional clearing and/or drainage may be approved provided that the proponent can demonstrate that the proposal incorporates sufficient ameliorative measures to ensure that the overall impact is consistent with the objective of reducing nutrient inflows to the estuarine system by about half.

Condition 2 specifies interim target levels for the quantity of phosphorus flowing into the estuary. In operational terms these targets mean that on average phosphorus losses to the estuary should not exceed 0.375kg of phosphorus per hectare per year. Conditions 3 and 4 require the proponents to prepare an Environmental Protection Policy and a Catchment Management Plan designed to meet the targets in Condition 2. These documents are currently in preparation.

Further, Condition 9 states that, for the present, decisions on developments which may release phosphorus or nitrogen to the environment in the Peel-Harvey Estuary area and coastal plain catchment should be conservative. The condition makes specific reference to new and expansion of existing intensive horticultural and intensive animal industries.

Under the Environmental Protection Act these Ministerial Conditions have the force of law, and are legally binding on the proponents.

Environmental impacts

The Authority has given consideration to the basic nature of irrigated agricultural practices on the coastal plain as it currently exists and the potential for ameliorating its environmental impacts. In this regard the Authority is aware that:

- nutrient application rates for irrigated crops are generally much higher than those for non irrigated crops (EPA, 1990);
- Western Australian Department of Agriculture surveys have revealed nutrient applications far in excess of recommended rates and that vegetable crops only use a small proportion of the nutrient that is applied (EPA, 1990);
- recent research by the Western Australian Department of Agriculture has indicated that the potential for enviromental impact from nutrients may be reduced by changing the irrigation method. By changing from sprinkler to trickle irrigation, water application could be reduced by 56% and nitrogen application could be reduced by 80% for the same yield (tonnes per hectare) of rockmelons (McPharlin, 1990 cites Luke and Calder, 1990);
- the existing severe algal problems in the estuary have been caused by average phosphorus applications of the order of 10-15kg per hectare annually;
- the Environmental Protection Authority has received a number of complaints from landholders with grossly polluted groundwater. In most cases the contamination has been linked to nutrient intensive activities in the vicinity;
- recent local research on market gardens (Sharma, 1990) has indicated that significant proportions of applied phosphorus (70%) and of applied nitrogen (44%) were leached below the crop root zone;
- owners of existing broadacre agricultural holdings have, by and large, accepted the recommended constraints by making a significant reduction in the rates of phosphorus fertilisers applied to their properties. The approval of new horticultural proposals involving large applications of nutrients to the soil raises concerns of equity with existing catchment landholders whose fertiliser application rates are being constrained;
- irrigation of crops on the sandy soils of the Peel-Harvey coastal plain catchment to which large quantities of phosphorus are applied can cause the nutrient leaching problem to occur more quickly (EPA, 1990); and,
- drainage waters from irrigated clay and loam soils have been shown to have much lower phosphorus concentrations, however the water yield or runoff from these soil types is much higher. As a result the total discharge of phosphorus from irrigated clay soils can be significant due to the total water yield (Technical working Group, 1990). This could be a result of higher applications of nutrients or insufficient management of irrigation tailwaters.

Conclusions and recommendations

The Authority has assessed the proposals on the basis of the information provided in the well licence applications, discussions with the proponents, its knowledge of current irrigated agricultural practice and, in the context of the Ministerial Conditions.

Procedures are in place to establish an Environmental Protection Policy (EPP) to help manage impacts from existing conventional irrigated agricultural activities in the Peel-Harvey catchment. It is recognised that there may be further development proposals from landowners in the catchment who are not yet operating and that these proponents need to be treated fairly, whilst achieving environmental objectives.

Recommendations for Proposal 1

Recommendation 1.1: The Environmental Protection Authority concludes that nutrients and irrigation could be managed adequately at Lot 12 Corio Rd, Pinjarra and recommends that the proposal is environmentally acceptable. The Environmental Protection Authority therefore recommends that this proposal may proceed and that a well licence be issued.

Recommendation 1.2: The Environmental Protection Authority recommends that flood irrigation be restricted to the riverine and clay soils and that a Western Australian Department of Agriculture approved irrigation system and fertilizer regime be used, to the satisfaction of the Environmental Protection Authority. Furthermore, the Environmental Protection Authority recommends that the loss of irrigation tailwaters should be minimised and that fertilization be in accordance with Western Australian Department of Agriculture recommendations arising from annual soil testing and to the satisfaction of the Environmental Protection Authority

Recommendation 1.3: The Environmental Protection Authority recommends that the proponent plant trees along drainage lines to the satisfaction of the Environmental Protection Authority. The trees species to be used should be selected by the Western Australian Department of Agriculture.

Recommendations for Proposal 2

Recommendation 2.1: The Environmental Protection Authority concludes that nutrients and irrigation could be managed adequately at Lot 48 Boreswamp Rd, Coolup and recommends that the proposal is environmentally acceptable. The Environmental Protection Authority therefore recommends that this proposal may proceed and that a well licence be issued.

Recommendation 2.2: The Environmental Protection Authority recommends that horticultural activities on Lot 48 Boreswamp Rd, Coolup, be restricted to the loamy clay soils and that the use of fertilisers be in accordance with Western Australian Department of Agriculture recommendations arising from annual soil testing of the property. In addition, the irrigation regime must be to the satisfaction of the Environmental Protection Authority.

Recommendation 2.3: The Environmental Protection Authority recommends that the proponent plant trees along drainage lines to the satisfaction of the Environmental Protection Authority. The trees species to be used should be selected by the Western Australian Department of Agriculture.

The Authority believes that any approval for either of the proposals based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further considerations of the proposal should occur only following a new referral to the Authority.

The Authority's experience is that it is common for details of a proposal to alter as it is established or implemented. In many cases alterations are not environmentally significant or have a positive effect on the environmental performance of the project. The Authority believes that such non-substantial changes, and especially those which improve environmental performance and protection, should be provided for.

References

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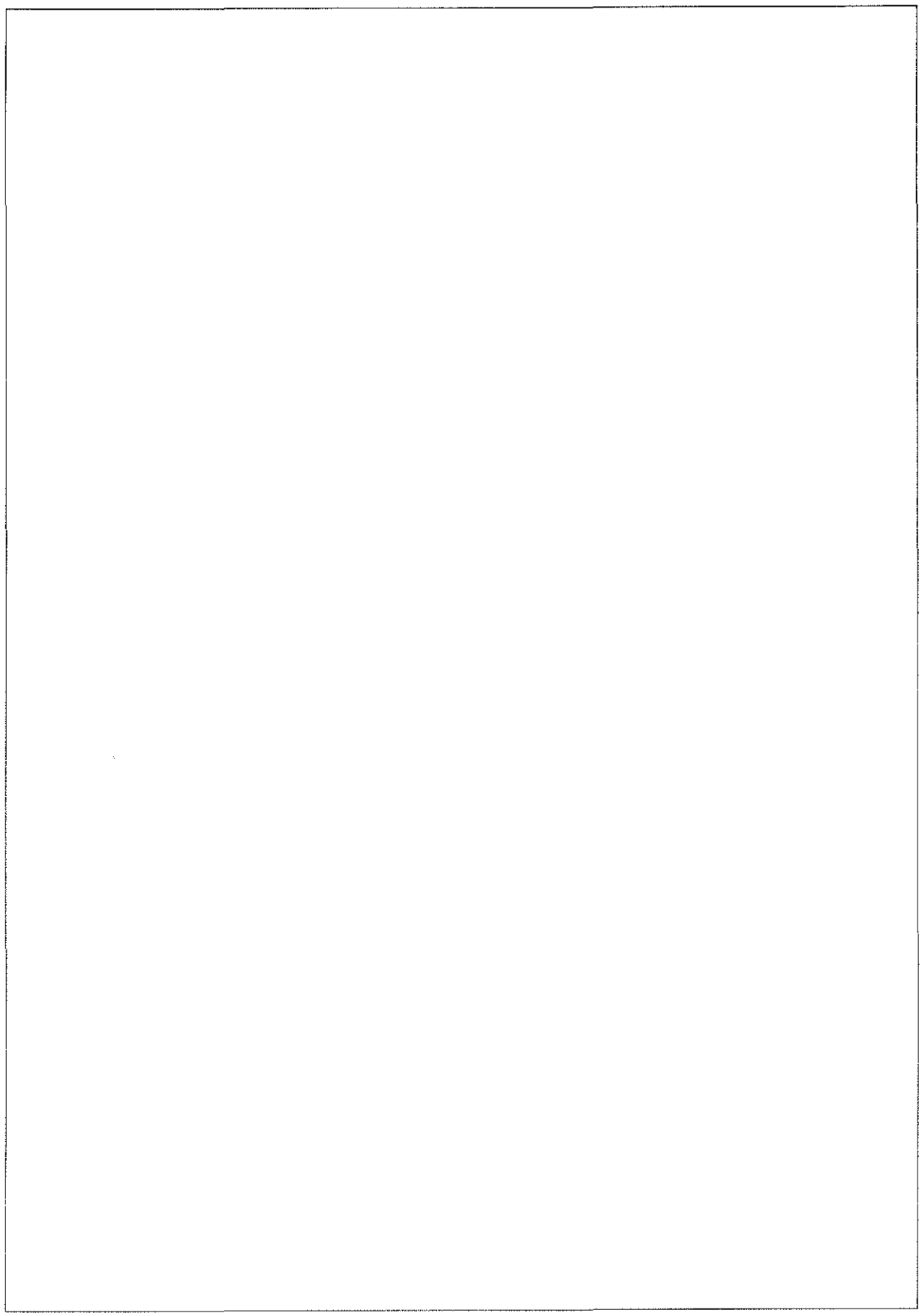

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The Ministerial Conditions and their implications

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EPA Publication/Production requests

General production details

To be completed by officers when requesting drafting, stationary, overheads/slides, publications etc

Officer Vaughan Cox Date 6/4/90.

Branch _____ Telephone _____

Subject Irrigated Ag. Proposals (8,41) in Peel Harvey.

Nature of request

- ☐ Desktop publishing
- ☐ Drafting/illustration (maps, figures)
- ☐ Editing
- ☐ Printing (reprints, copying etc)
- ☐ Design/layout (brochures etc)
- ☐ Other _____

Estimated number _____ Date required _____ Chart number _____

Approval (to be completed before handing to Communications Branch)

Manager _____ Director _____ Chairman _____

Assessment report check list

To be completed by officers before final draft report is presented to Communications Branch

- ☐ Strategy to EPA
- ☐ Proponent nominated
- ☐ Project title consistent
- ☐ DMAs aware of likely recommendations
- ☐ I and M consulted on recommendations
- ☐ Consolidated commitments list
- ☐ Works approval needed
- ☐ Pollution Control consulted
- ☐ Standard conditions needed
- ☐ Graphics requests to Communications Branch
- ☐ Appendices complete
- ☐ Standard distribution letters prepared
- ☐ Distribution to Evaluation secretary
- ☑ EPA delegates release

Final draft approved by:

_____ Manager

_____ Director

_____ Chairman

- ☐ Release strategy
- ☐ Chairman's comments incorporated
- ☐ Final report to Communications Branch
- ☐ Proof copy to Minister/30 copies for release

Communications Branch only

Job number _____ File/s _____ SPD requisition _____

Number of copies _____ Total cost _____ Unit cost _____

Date in _____ Date out _____ Time involved _____

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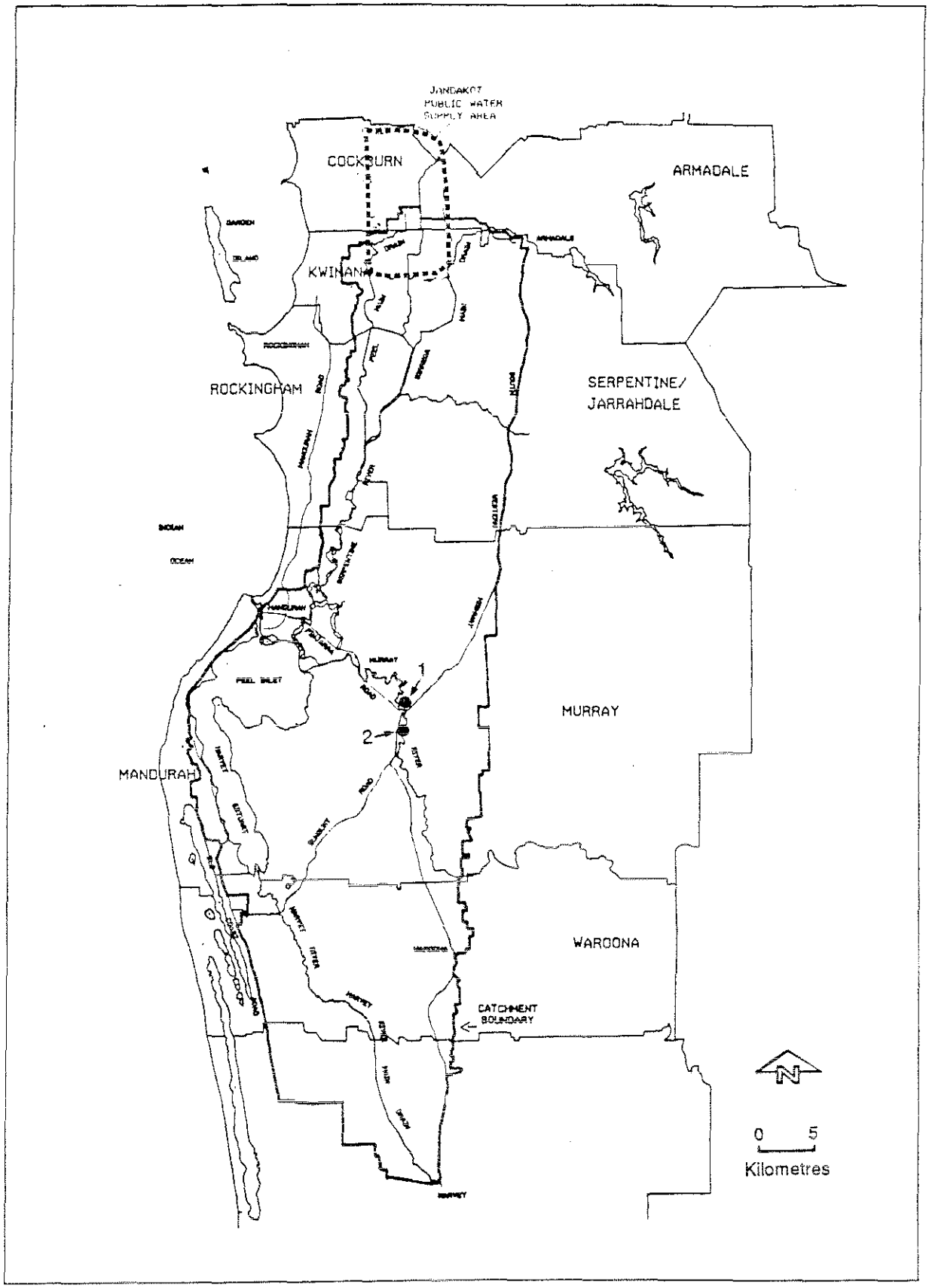

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Further, Condition 9 states that, for the present, decisions on developments which may release phosphorus or nitrogen to the environment in the Peel-Harvey Estuary area and coastal plain catchment should be conservative. The condition makes specific reference to new and expansion of existing intensive horticultural and intensive animal industries.

Under the Environmental Protection Act these Ministerial Conditions have the force of law, and are legally binding on the proponents.

Environmental impacts

The Authority has given consideration to the basic nature of irrigated agricultural practices on the coastal plain as it currently exists and the potential for ameliorating its environmental impacts. In this regard the Authority is aware that:

- nutrient application rates for irrigated crops are generally much higher than those for non irrigated crops (EPA, 1990);
- Western Australian Department of Agriculture surveys have revealed nutrient applications far in excess of recommended rates and that vegetable crops only use a small proportion of the nutrient that is applied (EPA, 1990);
- recent research by the Western Australian Department of Agriculture has indicated that the potential for enviromental impact from nutrients may be reduced by changing the irrigation method. By changing from sprinkler to trickle irrigation, water application could be reduced by 56% and nitrogen application could be reduced by 80% for the same yield (tonnes per hectare) of rockmelons (McPharlin, 1990 cites Luke and Calder, 1990);
- the existing severe algal problems in the estuary have been caused by average phosphorus applications of the order of 10-15kg per hectare annually;
- the Environmental Protection Authority has received a number of complaints from landholders with grossly polluted groundwater. In most cases the contamination has been linked to nutrient intensive activities in the vicinity;
- recent local research on market gardens (Sharma, 1990) has indicated that significant proportions of applied phosphorus (70%) and of applied nitrogen (44%) were leached below the crop root zone;
- owners of existing broadacre agricultural holdings have, by and large, accepted the recommended constraints by making a significant reduction in the rates of phosphorus fertilisers applied to their properties. The approval of new horticultural proposals involving large applications of nutrients to the soil raises concerns of equity with existing catchment landholders whose fertiliser application rates are being constrained;
- irrigation of crops on the sandy soils of the Peel-Harvey coastal plain catchment to which large quantities of phosphorus are applied can cause the nutrient leaching problem to occur more quickly (EPA, 1990); and,
- drainage waters from irrigated clay and loam soils have been shown to have much lower phosphorus concentrations, however the water yield or runoff from these soil types is much higher. As a result the total discharge of phosphorus from irrigated clay soils can be significant due to the total water yield (Technical working Group, 1990). This could be a result of higher applications of nutrients or insufficient management of irrigation tailwaters.

Conclusions and recommendations

The Authority has assessed the proposals on the basis of the information provided in the well licence applications, discussions with the proponents, its knowledge of current irrigated agricultural practice and, in the context of the Ministerial Conditions.

Procedures are in place to establish an Environmental Protection Policy (EPP) to help manage impacts from existing conventional irrigated agricultural activities in the Peel-Harvey catchment. It is recognised that there may be further development proposals from landowners in the catchment who are not yet operating and that these proponents need to be treated fairly, whilst achieving environmental objectives.

Recommendations for Proposal 1

Recommendation 1.1: The Environmental Protection Authority concludes that nutrients and irrigation could be managed adequately at Lot 12 Corio Rd, Pinjarra and recommends that the proposal is environmentally acceptable. The Environmental Protection Authority therefore recommends that this proposal may proceed and that a well licence be issued.

Recommendation 1.2: The Environmental Protection Authority recommends that flood irrigation be restricted to the riverine and clay soils and that a Western Australian Department of Agriculture approved irrigation system and fertilizer regime be used, to the satisfaction of the Environmental Protection Authority. Furthermore, the Environmental Protection Authority recommends that the loss of irrigation tailwaters should be minimised and that fertilization be in accordance with Western Australian Department of Agriculture recommendations arising from annual soil testing and to the satisfaction of the Environmental Protection Authority

Recommendation 1.3: The Environmental Protection Authority recommends that the proponent plant trees along drainage lines to the satisfaction of the Environmental Protection Authority. The trees species to be used should be selected by the Western Australian Department of Agriculture.

Recommendations for Proposal 2

Recommendation 2.1: The Environmental Protection Authority concludes that nutrients and irrigation could be managed adequately at Lot 48 Boreswamp Rd, Coolup and recommends that the proposal is environmentally acceptable. The Environmental Protection Authority therefore recommends that this proposal may proceed and that a well licence be issued.

Recommendation 2.2: The Environmental Protection Authority recommends that horticultural activities on Lot 48 Boreswamp Rd, Coolup, be restricted to the loamy clay soils and that the use of fertilisers be in accordance with Western Australian Department of Agriculture recommendations arising from annual soil testing of the property. In addition, the irrigation regime must be to the satisfaction of the Environmental Protection Authority.

Recommendation 2.3: The Environmental Protection Authority recommends that the proponent plant trees along drainage lines to the satisfaction of the Environmental Protection Authority. The trees species to be used should be selected by the Western Australian Department of Agriculture.

The Authority believes that any approval for either of the proposals based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further considerations of the proposal should occur only following a new referral to the Authority.

The Authority's experience is that it is common for details of a proposal to alter as it is established or implemented. In many cases alterations are not environmentally significant or have a positive effect on the environmental performance of the project. The Authority believes that such non-substantial changes, and especially those which improve environmental performance and protection, should be provided for.

References

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Recommendations for Proposal 2

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Irrigated agricultural proposals

Report and recommendations of the Environmental Protection Authority

Environmental Protection Authority
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The proposals

The Environmental Protection Authority has received two proposals (summarised in Schedule 1), each of which involves an application for a well licence to pursue irrigated agriculture within the Peel-Harvey coastal plain catchment.

Schedule 1. Summary of proponents, property locations, proposed landuse and type of irrigation and the area of each property subject to irrigation.

Proposal Number	Proponent	Property location	Proposed landuse	Area subject to irrigation (hectares)
1	Mr P Sevelj	Lot 12 Corio Rd, Pinjarra	Flood irrigated pasture	12
2	Mr R. Parkey	Lot 48 Boreswamp Rd, Coolup	Drip irrigated horticulture	12

Proposal number 1 involves the flood irrigation of commonly grown pasture species (clover and perennial grasses) on an area of riverine clays adjacent to the North Dandalup River. Between 10 to 15 kg of phosphorus would be applied each year, with two thirds applied in autumn and one third applied in spring. Irrigation would occur mainly during the summer months.

Proposal number 2 involves the drip irrigation of summer vegetable crops (mainly pumpkins, rockmelons, watermelons) on an area of loamy clay soils from November to March. Irrigation would be managed by evaporation replacement using drippers under plastic mulch to minimise water use. Fertilisation would occur in the irrigation water daily over a two week period. After this two week period, no more nutrients would be applied to the crop. Nutrients applied annually would amount to 5 kg of nitrogen and 15 kg of phosphorus per hectare, which includes nutrients applied in basal dressings at other times of the year.

Assessment of the proposals

The Authority has assessed the proposals on the basis of:

- the information provided in the well licence applications;
- discussions with the proponents;
- the Authority's knowledge of current irrigated agricultural practice and its environmental effects;
- a recently published position statement and report and recommendations on new conventional sprinkler irrigated agricultural proposals in the Swan Coastal Plain catchment of the Peel-Harvey Estuary (EPA, 1990);
- the Authority's knowledge of the current status of the Peel-Harvey estuarine system and associated catchments; and
- in the context of the Ministerial Conditions for the Peel Inlet-Harvey Estuary Management Strategy (Stage 2).

During the assessment the Authority consulted with the Water Authority of W A, the Department of Agriculture and the proponents. No public comment on the proposals was received during the public review period.

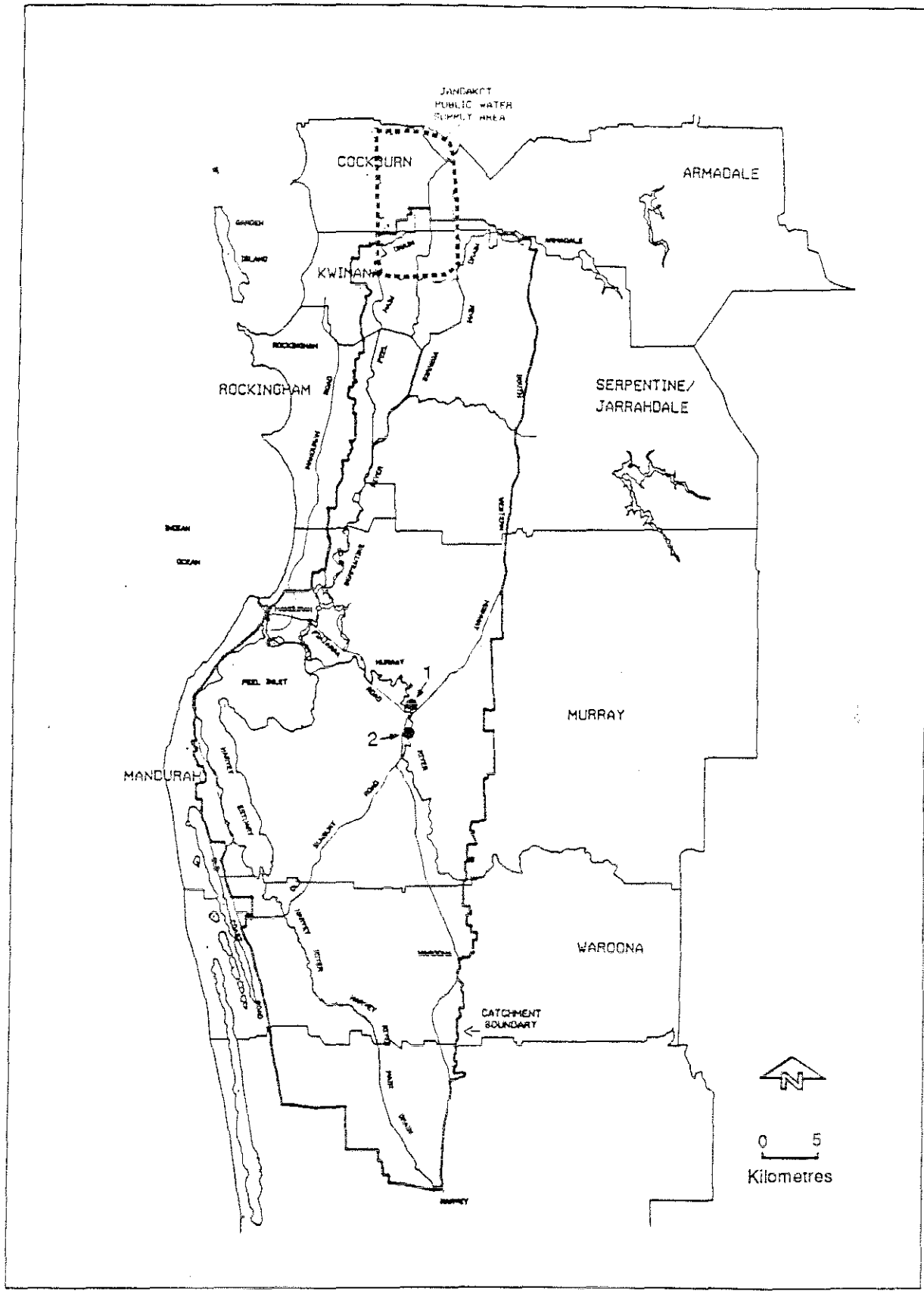

Figure 1: Location of proposals within the Peel-Harvey coastal plain catchment administrative boundary

The Existing environment

The Peel-Harvey estuarine system shows signs of severe eutrophication (nutrient enrichment), which results in excessive algal growth that greatly reduces its recreational, environmental, social and economic value. The cause of the eutrophication is an inflow of nutrients (mainly phosphorus and nitrogen) from the coastal plain catchment into the estuary. The nutrient inflow is currently far above the estuary's ability to cope — hence the huge production of algae.

The primary source of the nutrients is agricultural runoff from the sandy soils of the catchment which have been extensively cleared and drained. The sandy soils of the coastal plain are naturally infertile and require inputs of nutrients to be productive. The sandy soils, however, have little capacity to retain nutrients that are applied and a large proportion of that which is applied is lost through leaching and runoff.

The sandy soils have little capacity to retain moisture during summer and have to be irrigated frequently to maintain plant growth (eg. horticulture and irrigated pasture). Often the soils are waterlogged during winter which enhances nutrient loss through runoff.

The problems that exist in the estuarine system today are largely the result of relatively small applications of nutrients, for example 10-15kg of phosphorus per hectare per year for passive agricultural activities such as annual pasture growth for stock grazing. These are known as diffuse sources of nutrients, however, point sources (sources concentrated at one small location) also contribute to the problems in the estuarine system. Point sources include intensive animal industries, stock holding yards and horticultural developments.

The Ministerial conditions and their implications

Ministerial Conditions were set on 3 January 1989 under Section 45 of the Environmental Protection Act for the Peel-Harvey Stage 2 Environmental Review and Management Programme. These conditions imposed constraints on developments in the catchment with the objective of reducing the flow of nutrients into the estuary to about half their present level.

The Stage 2 proposal by the Ministers for Transport, Agriculture and Waterways sought to improve flushing of the estuary by constructing the Dawesville Channel and to reduce the flow of nutrients by controlling developments in the catchment. The proposal included a commitment to a moratorium on further clearing and drainage in the catchment. In approving the proposal, the Minister for Environment set the condition that the moratorium should continue "until the Minister for Environment is satisfied that these activities would be environmentally acceptable."

The implementation of this Condition requires that a proposal which involves some additional clearing and/or drainage may be approved provided that the proponent can demonstrate that the proposal incorporates sufficient ameliorative measures to ensure that the overall impact is consistent with the objective of reducing nutrient inflows to the estuarine system by about half.

Condition 2 specifies interim target levels for the quantity of phosphorus flowing into the estuary. In operational terms these targets mean that on average phosphorus losses to the estuary should not exceed 0.375kg of phosphorus per hectare per year. Conditions 3 and 4 require the proponents to prepare an Environmental Protection Policy and a Catchment Management Plan designed to meet the targets in Condition 2. These documents are currently in preparation.

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