Impacts of Rural Drainage on Nature Conservation Values

Nyabing Case Study 1:

Self-Assessment

Project for Department of Conservation and Land Management

RFQ 46510/99

Prepared by

actis Environmental Services and Regeneration Technology Pty Ltd
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Disclaimer:
The assessment criteria presented in this report are suggestions made by the consultants for consideration. The assessment criteria do not represent the views of CALM or any other organisation. Further more the case study results cannot be used to evaluate the Nyabing Drainage Project, as there was no opportunity for the proponents to review the process or data used. Official Project data may have been subsequently modified after the initial exchange of information.

Self Assessment

Introduction

The Nyabing Drainage Project is used in this section as a case study example of the evaluation process presented in Parts A and B of Evaluation of Saline Drainage (*actis* Environmental/Regeneration Technology 2000). The outcome of this case study will not affect the progress of this project, which has already met the requirements the present NOI scheme.

The case study presents the outcomes of the SELF ASSESSMENT process. The Nyabing TECHNICAL ASSESSMENT is presented in a separate document:
The technical assessment is based on a more detailed investigation and modelling of the hydrology of the Lake Coyrecup Catchment, as well as some biological investigation of wetland flora and fauna.

Summary

The results of the self-evaluation process for the Nyabing Drainage Project is given below. Based on the information provided by the proponents, the project as planned, which is 78kms of drainage to be constructed over 10 years, will:

1. marginally exceed the allowable discharge for flood risk for the Final Wetland (11.2%),
2. exceeds the allowable discharge for salt load (it is noted that this result is very dependant on estimate of the 'do nothing' salt export),
3. marginally exceed the 20% allowable difference in the ratio of ions for sodium (24%).

The project is within acceptable limits for all other parameters.

The project area comprises 19% of the Nyabing subcatchment. This drainage may be approved if it can be shown by the proponents that a substantial part of the remaining subcatchment will not be drained, thereby 'purchasing' additional drainage allowance. If this is not the case, the intended drainage would need to proceed to a technical assessment.

Results of the Self-assessment indicate a Technical Assessment is required for Nyabing (see Impacts of Rural Drainage on Nature Conservation Values –Nyabing Case Study: 2. Technical-Assessment).

Part A – Guidelines for Drainage Planners

Step 1:
Defining the Drainage System:

Step 1: Drainage System Checklist

A. Drainage Area

i. Name of the surface hydrological subcatchment Nyabing Creek

ii. Area of the surface subcatchment to be drained (ha)__3600 ha______

iii. Using a soil map or on-site test data, list the main soil types (eg. clay, sand, loam) and area of each soil type in the proposed drainage area:

Soil type : shallow duplex *Area(ha)___3600*
Soil type: _______________ *Area(ha)*_______

iv. Project maps attached? ____yes___

B. Drainage Design

v. Type of drain :_Closed Drain_*eg. closed/open drain*

vi. Length of each drain type (km): __78_

vii. Total length of drain (km): ___78__

viii. Attach design drawings and specifications. Yes

ix. Name & contact no. of accredited drainage contractor, if known:

Name: Kevin Lyons *Accreditation Lic. No.*_____________

x. If the drain is to be constructed on slopes >0.2%, or if drain type is **high risk**, complete the following questions (refer to Keen, Appendix 3):

- Describe erosion, sediment, nutrient & organic pollutant control options *(eg. sediment traps, vegetated swales)*:
  ___Vegetated swales each side of drain and creeks
- Describe drain safety controls (eg. stock, humans, fire):
  Spoil around drain and fenced off ________________________
  ____
- Describe flood performance (eg. where it will overflow & how this will affect downstream infrastructure). Define for 1:5 year & 1:20 year events:
  Closed groundwater drains surrounded with spoil to keep out surface water, overflow of drains will only cause silting in immediate area.

Step 2:
Defining the Receiving Wetland System

Step 2: Receiving Wetlands Checklist

A. Receiving Wetland System:

i. Name of the final receiving wetland catchment Coyrecup Lake

ii. Total area of the final receiving wetland catchment (ha) 194 000 ha

iii. Approximate number of receiving wetland types between point of discharge and final receiving wetland: (0-5, 5-10 or >10).

Channels: 5-10 Flats: 0-5 Basins:_______

Primary receiving wetland:

iv. Name: *Nyabing Creek* *eg. Nyabing Creek*

v. Wetland Type: channel *(ie. flat, basin, channel)*

B. Final receiving wetland:

vi. Name: Coyrecup Lake *eg. Coyrecup Lake*

vii. Wetland Type: basin (ie. flat, basin, channel)

viii. Area (ha): 455 ha

ix. T-factor (years) 10

Step 3:
Conservation Risk Assessment

Step 3: Conservation Risk Assessment

A. Receiving Wetland System:

i. Does the primary receiving wetland, or any downstream wetland other than the final receiving wetland, have a conservation listing?

~~Yes~~/No

If yes, describe ___________________________

ii. Does the final receiving wetland have a conservation listing?

Yes/~~No~~

If yes, describe: Coyrecup Nature Reserve "A" 28552 and 26020
Letter from National Parks and Nature Conservation Authority attached

Primary receiving wetland
- Nyabing Creek

Final receiving wetland
Lake Coyrecup lake bed

Step 4:
Project Details

Step4: Project Details

A. PROJECT TITLE & GOALS

i. Title: Nyabing Drainage Project

ii. Briefly outline what you intend to do and what you expect to gain from your drainage project.

- To reduce water logging at crossings, remnant vegetation in Nyabing Creek and farm land
- Reduce salt scald on farmland

B. INFORMING OF STAKEHOLDERS

iii. Have relevant stakeholders been informed of the project? _Yes________
(Attach relevant letters, advertisements etc).

C. MONITORING PLAN

iv. Monitoring plan attached? _No_____

Part B – Self-Evaluation

This section is to be completed by working through each of the questions, tasks and methodologies for each criteria. The criteria are as follows:

SUBCATCHMENT FACTOR
VEGETATION CONDITION
WATER – FATE & FLOOD RISK
WATER – HYDROPERIOD
SALT – CONCENTRATION
SALT – LOAD
IONIC COMPOSITION
NUTRIENTS

In most cases, the same data (eg. wetland area or drain flow) will be used to answer questions in more than one section.

Use the checklist as a record of data, filling each criteria in as you work through the worksheets.

Key Data

1. T-factor (years) ____10_______
2. P-factor ____18.5%___
3. Drain discharge over six months (Q_d m^3), 137 488m^3
4. Peak & average flow in primary receiving channel (m^3)1454
5. Ellipsoid wetland area ha __455______
6. Wetland depth (m) __2____
7. Ellipsoid wetland volume (m^3)__6 630 000
8. Effective evaporation (mm/day)_2.352_

A. Sub-Catchment Factors

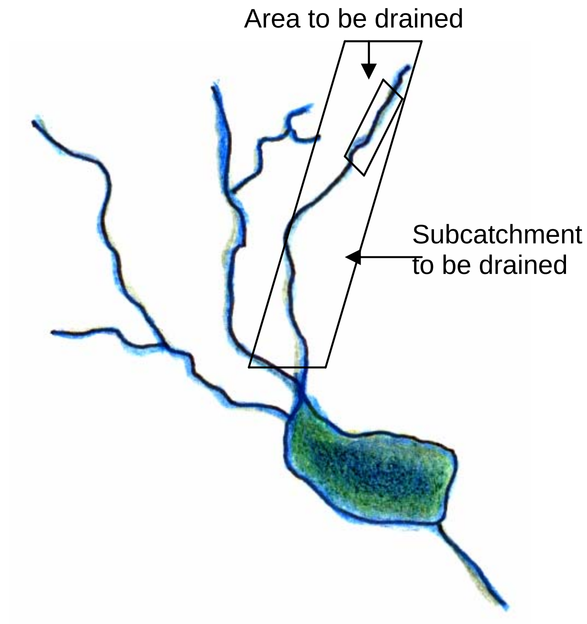
P-FACTOR

The impact of a single drainage proposal needs to be viewed in terms of existing and future drainage within the receiving wetland catchment, i.e. cumulative impact. The proponents factor ("P-factor") allocates a drainage proponent an upper limit for allowable salt and water discharge. This is based on the proportion of the subcatchment controlled by the proponents to the subcatchment area above the relevant receiving wetland. For the primary receiving wetland, this will be the area above the point of discharge, and for the terminal receiving wetland, this will be the whole subcatchment draining into the lake.

For a project that comprises 26% of the total subcatchment, the proponents are allocated 26% of the **allowable change** to the receiving wetland in terms of salt load, water load, nutrient load. The **allowable change** is 10 percent of the existing load in the system (in one criterion the **allowable change** is 20 percent). In the above case the drainage project would be considered not to have a change if the estimated change in the natural system was less than 26% times 10% of the existing load.

An alternative and more technical method of calcula~~ting the~~ P-Factor is to estimate the area of salt scald to be drained and the total salt scald in the subcatchment. These figures will need to be independently determined. The P-Factor is the proponents proportion of the total area of salt scalds in the subcatcment.

Calculation
Area controlled by the proponents = 36 000 ha
Area in Coyrecup Lake Catchment = 194 000 ha
36000/194000 = **0.185 or 18.5% = P Factor**



B. Vegetation Condition

A. RECEIVING WETLAND

1. Is there remnant vegetation present fringing the wetland YES/~~NO~~ ____

Approximate % cover living: 50

2. Identify habitat types:

(a) Large trees present?		~~YES~~/NO	____
(Eucalyptus, Casuarina, Melaeuca)	% living		
b) Understorey present?		YES/~~NO~~	____
Shrubs	% living	80	
Rushes/sedges	% living		
Samphires/saltmarsh	% living	100	

Attach photo

B. FINAL WETLAND

1. Is there remnant vegetation present fringing the wetland YES/~~NO~~ ____

Approximate % cover living: 10

2. Identify habitat types:

(a) Large trees present?		YES/~~NO~~	____
Eucalyptus, Casuarina, Melaleuca	% living	90	
b) Understorey present?		YES/~~NO~~	____
Shrubs	% living		
Rushes/sedges	% living		
Samphires/saltmarsh	% living	90	

Attach photo

C. Water – Fate and Flood Risk

QUESTION

Will from the drain increase the maximum wetted area of the wetland by less than 10%? Compare with a year of median rainfall.

Primary Wetland

EVALUATION **(please** *tick correct box)*

■ Yes — Go to Final Wetland below

☐ No — Discharge high risk, undertake technical assessment or consider alternatives.

Final Wetland

EVALUATION (*please tick correct box)*

☐ Yes — Go to D. HYDROPERIOD

■ No — Discharge high risk, undertake technical assessment or consider alternatives.

RATIONALE

Water depth and surface area

The depth of water in a drain or wetland is a factor affecting the rate of any seepage to or from any underlying aquifer. Moreover, the depth of water controls the wetted area of the wetland bed. This usually has a major effect on the rate of leakage from the wetland by seepage through its bed.

Minimising the change of water depth will ensure that there is minimal change of rate of seepage of water through the bed of a wetland. Moreover, since the change of water level in an aquifer beneath land surrounding the wetland must be less than that beneath the stream or wetland, there will be minimal impacts of drainage disposal on regional groundwater levels.

There is a large change of surface area for only small changes of water level in the great majority of streams and wetlands in rural areas of WA. Therefore, it is considered that control of water surface area will provide control of both area and water depth.

C. Water – Fate and Flood Risk continued

TASK

METHODOLOGY

1. Estimate discharge from the drain for a six-month period.

Determine the soil types the drain is passing through using local knowledge or AgWA maps. Overlay soil types on the drainage map and determine the length of the drain in each soil type. Use the DATA INPUT spreadsheet.

2. Identify available wetland capacity of the primary receiving wetland

For a channel (ie. river or creek), work out the size of the catchment above the point of discharge in hectares. Enter in the DATA INPUT spreadsheet.

3. Identify available wetland capacity of the terminal wetland.

Work out the size of the subcatchment and the wetland turnover factor. Enter in the DATA INPUT spreadsheet.

D. Water - Hydroperiod

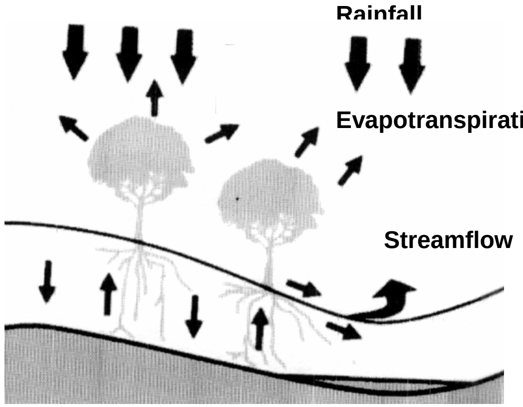
QUESTION

Is the drainage discharge (during the month of lowest evaporation) less than 45 days (x P-factor) of the median effective evaporation from the wetland?

EVALUATION **(please** *tick correct box)*

■	Yes	Go to E. SALT
□	No	Discharge high risk, undertake technical assessment or consider alternatives

Movement of water in landscape



RATIONALE

The period that the level of water in a wetland exceeds a specified level affects wetland vegetation, dependent fauna etc, and is referred to as the hydroperiod. The hydroperiod for any specified water level can be derived from the hydrograph of water level in the wetland.

Most wetlands in the wheatbelt have excess evaporation while the wetland is at its lowest, and the drains contribute little while the effective evaporation is high. The danger of detrimental increases of hydroperiod is during the 6 months of the year with the lowest effective evaporation.

Changes in the biomass and species composition of submergent aquatics is strongly modified by the hydroperiod. Biomass declines significantly with longer flooding duration, which reduces the amount of food resources to waterbirds.

Modified flow regimes significantly alter invertebrate diversity and abundance, favouring only resilient taxa. The duration of high water levels is considered a more significant factor than seasonality in changing microfaunal communities.

Some aquatic and fringing plant species need a draw down of water level to germinate and establish.

It is assumed that 45 days of increased saturation / flooding at any point of the wetland profile will have a detrimental effect on the ecosystem.

D. Water – Hydroperiod continued

TASK

1. Determine median effective evaporation for an average year.

2. Calculate the area of final receiving wetland

3. Calculate volume of receiving wetland

METHODOLOGY

Collect the average rainfall and evaporation data for the meteorological station closest to your project site. This data is available from the Bureau of Meteorology. Add this data to the relevant section in the DATA INPUT spreadsheet.

The ellipsoid shape is the simplest shape & would best approximate the shape of most wetlands in the wheatbelt.

Wetland area = 3.141 x (0.5 x width) x (0.5 x length).
Add this data to the relevant section in the DATA INPUT

Wetland volume = 2.0944 x (0.5xwidth)x (0.5xlength)x depth.
Add this data to the relevant section in the DATA INPUT spreadsheet.

E. Salt – Concentration

QUESTION

Will there be less than 10 percent change in TDS concentration of the receiving wetland after drain water has been added?

↓

EVALUATION **(please** *tick correct box)*

■ Yes — Go to F. SALT LOAD

□ No — Discharge high risk, undertake technical assessment or consider alternatives

RATIONALE

The concentration of salt in a stream or drain will generally increase in the direction of flow, due to evaporation. It will reach a very high level in a wetland where the entire flow is lost by evaporation alone. Maximum salinity will be lower in wetlands where water is lost by a combination of evaporation and seepage into the bed of the wetland, or via surface discharge.

A maximum salinity criterion may be almost impossible to meet. As stream salinity will be lower during the higher flows that spread over a larger area of land, it is argued that the criterion should be a flow-related concentration.

An immediate indication of the salinity range characterising a receiving wetland can be gauged from a biological assessment of the wetland. The following table gives indicative species for each salinity category. As a guide, a receiving wetland in the meiomesosaline or hyposaline range will probably be unsuitable as drainage discharge wetlands. (see Table 1, Appendix)

E. Salt – Concentration continued

TASK	**METHODOLOGY**
1. Determine the salinity of the primary receiving wetland .	If salinity information for the wetland is not already available, measure the salinity of the receiving wetland during the winter months. Salinity can be measured with a hand-held TDS salinity meter. Data should be collected monthly for a minimum 3-month period. Refer to Appendix -- for more detailed methodology. Add data to DATA INPUT spreadsheet.
2. Determine the salinity of the drainage water	Measure the salinity of the groundwater within the proposed drainage area during the winter months. Salinity can be measured with a hand-held TDS salinity meter. Data should be collected monthly for a minimum 3-month period. Refer to Appendix 2 for more detailed methodology. Add data to DATA INPUT spreadsheet.

F. Salt - Load

QUESTION

Will there be less than 10 percent change in SALT Load in the wetland after drain water has been added?

EVALUATION **(please** *tick correct box)*

☐	Yes	Go to G. IONIC COMPOSITION
■	No	Discharge high risk, undertake technical assessment or consider alternatives

RATIONALE

Basins and temporary storage wetlands will accumulate salts over time. It is important that the TDS load (that is, amount) does not increase to a level that is detrimental to the receiving wetlands.

The only types of wetland that would not be affected in the long term by increased loading of salt are those that are already hypersaline for the greater part of a year or those that 'turnover' (discharge its own volume) more frequently than every two years.

Do not complete this section if your final receiving wetland is hypersaline

F. Salt - Load continued

TASK

1. Determine the amount of additional salt that will be carried to the primary and terminal receiving wetlands after drainage

METHODOLOGY

Salt load is automatically calculated from data already entered in the DATA INPUT spreadsheet.

Nyabing Creek – 31 msm salt

Sampling salt concentration of drain water

G. Ionic Composition

QUESTIONS

1. Is the pH of the drain water less than 2 units different from the receiving wetland?

↓

EVALUATION **(please** *tick correct box)*

■ Yes Go to G_2 ION RATIO

□ No Discharge high risk, undertake technical assessment or consider alternatives

2. Is the ratio of ions in the drain water within 20% of the receiving water?

↓

EVALUATION (*please tick correct box)*

□ Yes Go to H.NUTRIENTS

■ No Discharge high risk, undertake technical assessment or consider alternatives

RATIONALE

The pH is a measure of the acidity of the water. A low pH will increase the release of nutrients from the sediment affecting the number and type of algae species. A low pH will also dissolve limestone and increase the bicarbonate concentration. A high pH will precipitate out limestone causing scale and in general reduce the nutrient concentration in the water. Both a high and low pH will have implications for animal and plant life.

Whereas pH is a measure of the hydrogen ion or acidity, the other dissolved chemicals or ions are just as important. The concentration of dissolved chemicals such as calcium will affect the precipitation of gypsum and limestone and is implicated in the fixing of nutrients. Most plants and animals also use it. The ratio of potassium to sodium plays an important role in the osmotic regulation of both plants and animals. Sulphate is an important chemical used by hypersaline bacteria that are part of the biological cycle.

Ionic composition changes with changing total ion concentration, and it is therefore necessary to compare brines from different sources with a standard such as evaporated seawater. The selection criteria should consider whether the drainage water will significantly change this balance.

The chemistry the water may have important ramifications for industries using the water. Salt producers for instance, aim to reduce calcium and magnesium in the final product. Changing the chemistry can change the salt quality. In some cases the water is used commercially as cooling water. Increased scaling can be very costly just as low pH water can corrode concrete culverts.

G. Ionic – Composition continued

TASK	METHODOLOGY
1. Analyse the wetland for pH, Na, Cl, Mg, Ca, SO4	Take at least two 200ml samples from different locations in the wetland. Send to a NATA accredited laboratory for analysis
2. Analyse the groundwater for pH, Na, Cl, Mg, Ca, SO_4	The pH can be determined in the field using a hand-held meter.
	The drain water can be analysed by sampling from groundwater bores in the area to be drained.
3. Compare the pH of the wetland and the pH of the drain	Enter the average values for each ion into the DATA INPUT spreadsheet. The SELF-EVALUATION spreadsheet will calculate the difference in pH and ionic composition between the wetland and the drain waters.

H. Nutrients - Concentration

QUESTION

NUTRIENTS AND ORGANIC METALIC POLLUTANTS

Will the drain increase the Total Nitrogen and/or Total Phosphorus concentration in the receiving wetland by less than 10%?

↓

EVALUATION **(please** ***tick correct box)***		
☐	Yes	EVALUATION COMPLETE
■	N/A	EVALUATION COMPLETE
☐	No	Discharge high risk, undertake technical assessment or consider alternatives

RATIONALE

Increases in the concentration of nitrogen and phosphorus in soil, soil water and ground water is known to be a significant contributor to the decline of riparian vegetation and spread of weeds in agricultural regions of Australia and overseas.

Altered nutrient regimes significantly affect invertebrate, phytoplankton and macrophyte diversity and abundance.

Excessive nutrients in waterways can lead to algal blooms that are toxic to livestock and native flora. Metal and organic pollutants (i.e. pesticides, herbicide, other agri-chemicals) from human activities can have a detrimental effect on the flora and fauna of a natural wetland.

Increased nutrient loading will increase the depth of organic sediments and anaerobic recycling of nutrients will become a more prominent feature of the wetland. Significant changes to biology may result.

*** Assess only if the drainage system collects surface water**

H. Nutrients – Concentration continued

TASK	METHODOLOGY
1. Analyse the wetland for Total Phosphorus and Total Nitrogen	Take at least two 200ml samples from different locations in the wetland. Send to a NATA accredited laboratory for analysis. Refer to the Ag West Bulletin on Environmental Water Quality for further information on how to sample (Appendix 2).
2. Analyse the groundwater for Total Phosphorus and Total Nitrogen	The drain water can be analysed by sampling from groundwater bores in the area to be drained.
3. Compare the nitrogen & phosphorus of the wetland and the nitrogen & phosphorus of the drain	Enter the average values for Nitrogen & Phosphorus into the DATA INPUT spreadsheet. The SELF-EVALUATION spreadsheet will calculate the difference in pH and ionic composition between the wetland and the drain waters.

Self Evaluation-Spreadsheet

PROPOSAL TO DRAIN

DATA INPUT WORKSHEET **24-Sep-2000**

Complete yellow boxes only

Blue boxes are HELP boxes - do not fill in

Project Title:	**Nyabing Drainage**	
Date of Application:	16/12/99	
Step One - General Information		
1. Catchment Name:	Blackwood	
2. Rank the secondary salinity problem in the catchment		
(Near natural 1 to severely affected 5)	4	
3. Area of Subcatchment to be drained	7200	ha
4. Area of Subcatchment under the control of the proponents	36000	ha
5. Type of Drains (brief description)		
6. Length of Drain (total project)		
In clay	78	km
In sand		km
In loam		km
7. Estimated time of drain construction (years)	10	years
8. Estimated discharge from drains	8.84	L per second
Step Two Receiving Wetland		
Primary Receiving Wetland		
1. Primary Receiving Wetland Name		
2. Wetland Type (place a "1" next to the most appropriate type)		
Basin	1	
River		
Flat		
3. Catchment Size above point of discharge	60,000	ha
(lowest point if more than one)		
Final Receiving Wetland		
8. Final Receiving Wetland Name	Coyrecup Lake	
9. Subcatchment Name	Coyrecup Lake	
10. Subcatchment Size	194,000	ha
11. Is the calculation to be based on salt scald area or tenure?		
If using salt sclad place a '1' in the yellow box		
12. Area of subcatchment affected by salt	20,000	ha
13. Turn Over Factor (T-factor) (use help box below)	2	

Continued from previous page.

16. Enter Climate Data		
Collect averages from Bureau of Meteorology for nearest station		
Month	**Rainfall (mm per month**	**Evaporation (mm per day)**
January	13.26	8.95
February	17.27	7.90
March	22.01	6.15
April	28.67	3.70
May	53.75	2.40
June	64.32	1.70
July	60.92	1.65
August	50.52	2.10
September	38.55	3.05
October	31.29	4.70
November	21.12	6.45
December	13.67	8.20
17. Chemical Analysis		
Collect from groundwater samples for drainage water, and from final receiving wetland as outlined in main document		
	Discharge (g/L)	**Final receiving wetland (g/L)**
Sodium (Na)	14	36
Magnesium (Mg)	1.2	5.4
Calcium (Ca)	0.17	2.8
Potassium (K)	0.026	0.062
Chloride (Cl)	21	64
Sulphate (SO4)	2.4	11
Total Phosphorus (TP)	0.16	0.14
Total Nitrogen (TN)	0.05	0.03
pH	8.3	7.2
Salinity g/L	15	130

PROPOSAL TO DRAIN
SELF-EVALUATION ANALYSIS

	Nyabing Drainage			
This sheet auto-calculates answers for each section from data entered in the DATA INPUT SHEET				
C. Water - Fate and Flood Risk				
Primary Wetland				
1. Is the additional flood risk due to the water load from drainage significant?	Yes	**If NO, consider alternatives,**		
		or staging of drainage project		
Peak Flow for Primary Wetland	1.454	cubic metres per second		
Drain Flow	0.009	cubic metres per second		
Percentage Change	0.6%			
Proponent's proportion of catchment above discharge	60.0%			
Proponent's proportion of change to flood risk	**1.0%**			
Final Wetland				
2. Is the additional flood risk due to the water load from drainage significant?	No	**If NO, consider alternatives,**		
		or staging of drainage project		
Maximum volume for Final Wetland	6,630,012	cubic metres		
Drain Flow for six months	137,488	cubic metres per six months		
Percentage Change	2.1%			
Proponent's proportion of total catchment	19%			
Proponent's proportion of total discharge change	**11.2%**			
D. Water Hydroperiod for Final Wetland				
1. Will the drainage discharge over a month be less than 45 days of moderate (median) evaporation?	Yes	**If NO, consider alternatives,**		
		or staging of drainage project		
Median Effective Evaporation (mm/day)	2.352	mm per day		
Area of final receiving wetland	4,550,000	metres squared		
One month of discharge	22,915	cubic metres		
Proponent's proportion of catchment above final wetland	19%			
Volume evaporated in one day of median evaporation	10,702	cubic metres		
Days to evaporate one months drainage	2.1	days		
Proponent's proportion of increased hydroperiod	**11.5**	days		
E. Salt Concentration				
1. Will the net change in Total Dissolved Salts be insignificant?	Yes	**If NO, consider alternatives,**		
		or staging of drainage project		
Average annual stream flow into wetland	6,630,012	cubic metres		
Estimated salt runoff from catchment	62,925,876	kilograms		
Estimated salt runoff from drained scalds (do nothing option)	487,500	kilograms		
Estimated average salt concentration from runoff	9.49	g/L		
Estimate average salt concentration with drain water (six months)	9.53	g/L		

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F. Salt Load			
1. Will the net change in Salt Load be insignificant?	No	**If NO, consider alternatives,**	
		or staging of drainage project	
Estimated salt runoff from catchment	62,925,876	kilograms	
Estimate salt load from drains	2,062,317	kilograms	
Estimated salt runoff from drained scalds (do nothing option)	487,500	kilograms	
Percentage increase in salt load	3%		
Proponent's proportion of catchment above final wetland	19%		
Proponent's proportion of increased salt load	**13%**		
G. Ionic Composition			
1. Is the pH of the drain similar to the final wetland?	Yes	**If NO, consider alternatives,**	
		or staging of drainage project	
2. Are all of the ions in the drain water similar to the wetland water?	No	**If NO, consider alternatives,**	
Percentage difference between major ions in drain and final wetland (flow weighted)?		**or staging of drainage project**	
Sodium (Na)	**24.0%**		
Magnesium (Mg)	**11.5%**		
Calcium (Ca)	**10.6%**		
Potassium (K)	**1.3%**		
Chloride (Cl)	**18.3%**		
Sulphate (SO4)	**11.0%**		
3. Will the nutrient load be less than 10%?	Yes	**If NO, consider alternatives,**	
Nitrogen Load increase	**1.35%**	**or staging of drainage project**	
Phosphorus Load increase	**0.29%**		

EVALUATION SUMMARY:
The evaluation for Nyabing indicates that the proposal will exceed acceptable criteria for:
Flood risk
Salt load
Ionic composition
This is partly due to the relatively small catchment area occupied by this subcatchment (19%).

Recommendation: Request proponents seek additional discharge allowance from adjacent landholders in the catchment who do not intend to drain.

Attachments

Include copies of letters from relevant stake-holders, maps and other documentation

NOTICE OF INTENT TO DRAIN - NYABING CREEK CATCHMENT GROUP

25 Landholders in Kojonup Shire. Details withheld for the purpose of this case study.