TECHNICAL NOTE

Drain Prioritisation

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Outlined below is the process used to determine how the drains were prioritised.

1) Our reconnaissance Streamline Study (early 2000's) identified 62 sub-catchments (first order catchments) within the Yarra Yarra Drainage Basin (National Catchment Number 618). The sub-catchments in turn are grouped into 11 minor catchments (second order catchments), which we recognise as administrative 'zones'. Both the sub-catchment and zones are distinct geomorphological entities, i.e. they have a physical reality – they are not merely our own administrative divisions (Fig. 1).

2) Workshops were held (2002-2003) for each of the 11 zones, and were open to all landholders in the area. These meetings resulted in a decision-making process (Fig. 2, see (*) below) that decided which of the sub-catchments in each zone were most suitable for drainage. This decision was reached by the farmers involved, using their local knowledge and supported by information provided by the Yarra Yarra Group. The major deciding factor was landholder-concensus.

3) These initial meetings nominated a single sub-catchment in each of the zones, with the exception of Darling Creek, i.e. 10 in all were found to be suitable for drainage trials. Three sites were added at a later date, on the recommendation of the Morawa Farm Improvement Group.

4) A feasibility study (2003 – 2005) was carried out for each of these 10 sites. At NACC's insistence, the proposed drains were ranked in order of feasibility at this point in time (late 2005).

5) Funding was made available in 2005 for a single drainage project, to be excavated as a trial in 2006.

6) Sub-catchment Mongers 55 was determined by the Yarra Yarra committee (September 2005) to be the sub-catchment most suitable for the trial drain, largely because of the perceived 'cross-regional significance' (a requirement of the funding body). See 'Report to YYCMG committee about prioritising the sub-catchments' (Sept 2005).

7) A further round of zone workshops was held in early 2006. These meetings further confirmed the suitability of the13 sub-catchments, and gave landholders an opportunity to consider data obtained since the last zone meetings.

8) In addition to landholder preferences and soil & groundwater conditions, other factors considered include
    - Ratio of benefit to cost
    - Ratio of public benefit to private gain
    - Suitability of groundwater-disposal site
    - Number of landholders
    - Suitability as a demonstration site
    - Maximising the variety & geographical spread of trial conditions
    - Accessibility to land to be drained
    - Legislative obstacles that were previously unknown
    - Mobilisation expenses

N.B. This is not an exhaustive list. The attached table (Sub-catchment Attributes) summarises the most important factors considered. It is anticipated that other criteria will be added to the list over time, i.e. the list will remain flexible.

(*) Other points to consider

If landholders were not present at the initial workshops, then they were not involved in the decision-making process, i.e. the farmers who did go to the meetings were able to highlight their own problems and therefore these have subsequently risen in the priority listings. It is hoped that if the drains prove to be successful, more landholders will be interested in drainage, and the decision process will start from the beginning again (i.e. as Fig. 2 demonstrates).

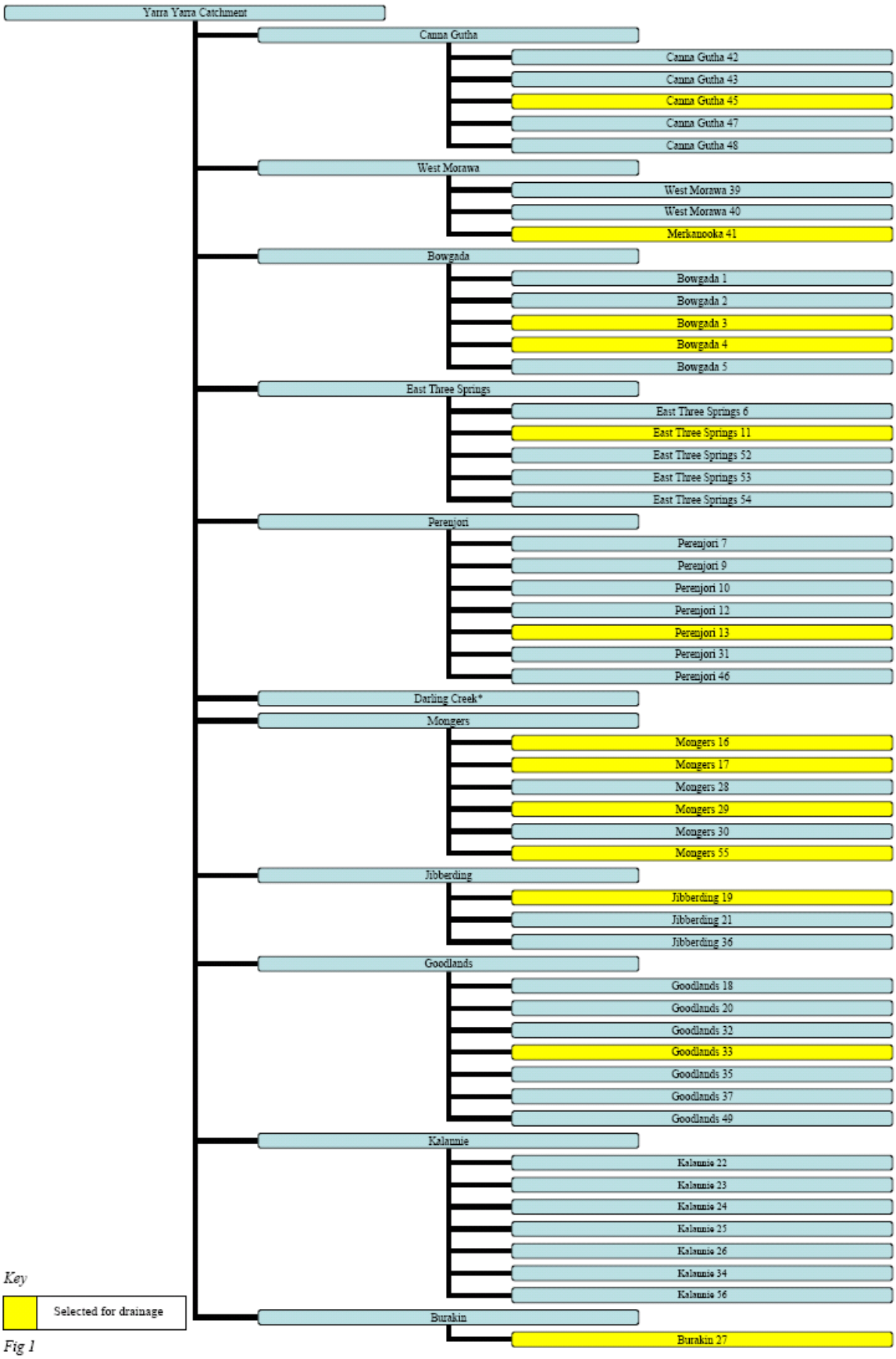
Catchment
Zone
Sub-Catchment
Yarra Yarra Catchment
Canna Gutha
Canna Gutha 42
Canna Gutha 43
Canna Gutha 45
Canna Gutha 47
Canna Gutha 48
West Morawa
West Morawa 39
West Morawa 40
Merkanooka 41
Bowgada
Bowgada 1
Bowgada 2
Bowgada 3
Bowgada 4
Bowgada 5
East Three Springs
East Three Springs 6
East Three Springs 11
East Three Springs 52
East Three Springs 53
East Three Springs 54
Perenjori
Perenjori 7
Perenjori 9
Perenjori 10
Perenjori 12
Perenjori 13
Perenjori 31
Perenjori 46
Darling Creek*
Mongers
Mongers 16
Mongers 17
Mongers 28
Mongers 29
Mongers 30
Mongers 55
Jibberding
Jibberding 19
Jibberding 21
Jibberding 36
Goodlands
Goodlands 18
Goodlands 20
Goodlands 32
Goodlands 33
Goodlands 35
Goodlands 37
Goodlands 49
Kalannie
Kalannie 22
Kalannie 23
Kalannie 24
Kalannie 25
Kalannie 26
Kalannie 34
Kalannie 56
Burakin
Burakin 27
Key
Selected for drainage

Fig 1

Zone Workshop – Decision Making Process

For Example

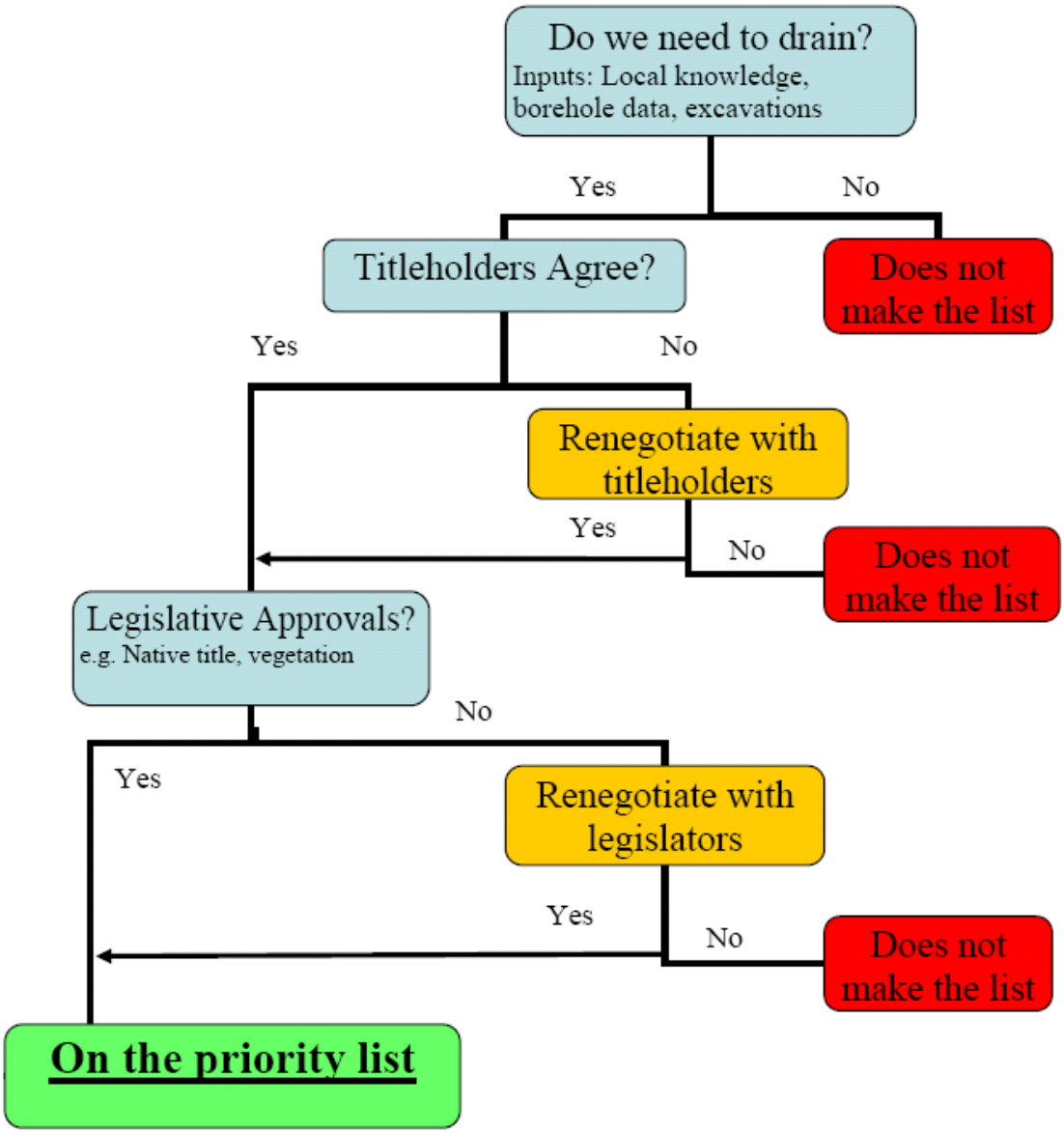

Fig 2

Report to the YYCMG committee about prioritising the sub-catchments.

Ian Fordyce
3/9/05

Introduction

NACC has more or less agreed to make funding available for a single drain in the Yarra Yarra catchment in 2006. This single drain is expected to be an extension of the feasibility study, and its success or failure might determine the fate of any future submissions for on-ground drainage works. Ideally, the drain should also have some kind of cross-regional significance, i.e. its benefits should extend beyond local catchment boundaries.

YYCMG has examined 10 sub-catchments in its 2003-5 feasibility study. An additional three sub-catchments have been put forward recently, in the interests of 'regional fairness'. NACC require that, from this list, we nominate a single sub-catchment for the 2006 work. Rather than strictly prioritise the sub-catchments, we (the staff) have drawn up a table of attributes that might be regarded as pros or cons. It should be pointed out that there is no perfect candidate. Each of the sub-catchments has at least one attribute that is less than ideal. By the same token, each sub-catchment would benefit from and is deserving of a drain. It is only because of the peculiar funding situation that we need to select a single drain.

Selection

Attributes are listed in the accompanying table. Most attributes are presented simply as figures. For most of the sub-surface attributes, such as pH or depth to groundwater, these figures represent averages from all the bores and pits along the route of the proposed drain. For some attributes, such as inflow, where assigning a precise value would dishonestly exaggerate our understanding of the soil-water system, we have given relative terms like 'slow' and 'fast'. For some attributes, such as 'Cross-regional Significance', the only possible answer is Yes or No. Shaded attributes are those considered critical. The sub-catchments on the table are listed in order of latitude; there is no implication intended that sub-catchments high in the order are 'better' than others.

Below are brief comments on each of the sub-catchments.

Canna-Gutha 45: A major project -- the funds likely to be available in 2006 wouldn't even get the drain to a point where individual landholders could be expected to contribute. In other words, there's no possibility of making this one a demonstration project.

Merkanooka 41: no sub-surface information (bores and pits) apart from Kevin Lyon's work, but believed to be highly favourable, in terms of soil and water.
long narrow strip at lower end (few landowners)

Bowgada 4: small catchment
needs a lot more work
no sub-surface information

Bowgada 3: excellent soil and water properties, very deep topsoil
not one of the 'priority catchments' nominated at the 2004 meeting
discharge into isolated claypan (not part of the main saltlake chain)

East Three Springs 11: believed to be high-value land
not one of the nominated 'priority catchments'
no sub-surface information, apart from Kevin Lyon's work, but said to have very permeable soil (which would probably translate as good drawdown)
not much information of any kind

Perenjori 13: moderately good soil and water properties
discharge into existing drain
ultimate discharge area (Perenjori ski lake) on leasehold land
landowner in middle refuses to sign MOU

Mongers 29 deep topsoil, moderately good inflow, watertable generally shallow
digging moderately easy
only one landowner
some hard-digging sections
A good, solid but unremarkable choice.

Mongers 16 shallow watertable
pitwater not sampled, poor inflow information

Mongers 17: very easy digging
groundwater probably deeper than 2 m for much of the proposed drain's length

Mongers 55 very fast inflow, very shallow groundwater
very easy digging
excellent prospects for a demonstration project
cross-regional possibilities
multiple landowners, all contributing
low pH (but this isn't necessarily such a bad thing)

Jibberding 19 needs long delivery drain from cropland to lake
all soil and water attributes moderately unfavourable
only one landowner (this might actually turn out to be a good thing, but at the planning stage, there's not much scope for spur drains and sharing the load)

Goodlands 33 excellent inflow rate, shallow watertable
needs long delivery drain to eventual discharge (Lake Goorly)
fairly hard digging

Burakin 27 very easy digging
not suitable for whole-of-catchment demonstration
major engineering work required (railway and highway crossings)
this's the worst one in terms of soil and water – acidic, slow infill, marginal watertable depth, very shallow topsoil (that said, it should be noted that Robert Nixon's drain passes through identical material 'downstream' from the Burakin proposal, and yet has clearly been successful)

Recommendation

In our opinion, the stand-out winner in this selection process is the sub-catchment Mongers 55. In pits, there was a very high rate of groundwater inflow (a surrogate for drawdown – which can't be measured until you actually have a drain). Our network of bores and pits indicates that the groundwater is shallow and highly saline. There are immediate threats to private property (cropland/pasture, McPherson's house, several farm sheds, numerous fences), public assets (crossings on Wasley and Richards Roads), and environmental assets (large patches of remnant vegetation on the lake shore and at Buntine East Water Reserve, and several kilometres of revegetation efforts). The landholders are without exception enthusiastic about the project, and have committed to excavate spur drains at their own expense. Moreover, it is the only sub-catchment where we can see a significant cross-regional benefit.

Our concept of the drain in this scenario is the centreline of a revegetated strip, i.e. the final result would be a 100 m-wide vegetation corridor along the valley floor (much of this land is currently under samphire, so it's not as though farmers are expected to surrender valuable cropland). With a short extension across the catchment divide to the approx. 3 000 ha Buntine Reserve in the Moore Catchment (using an alternative funding source, e.g. Envirofunds), the final corridor would provide continuous cover to Mongers Lake and beyond. From the lake, there is continuous vegetation through the CALM Jibberding Reserve to Lake Goorly, and from there, via the Goodlands Environmental Link, to Lake Moore in the Ninghan Cathment.

Yarra Yarra Sub-Catchments

Sub-Catchments discussed in this report are shaded

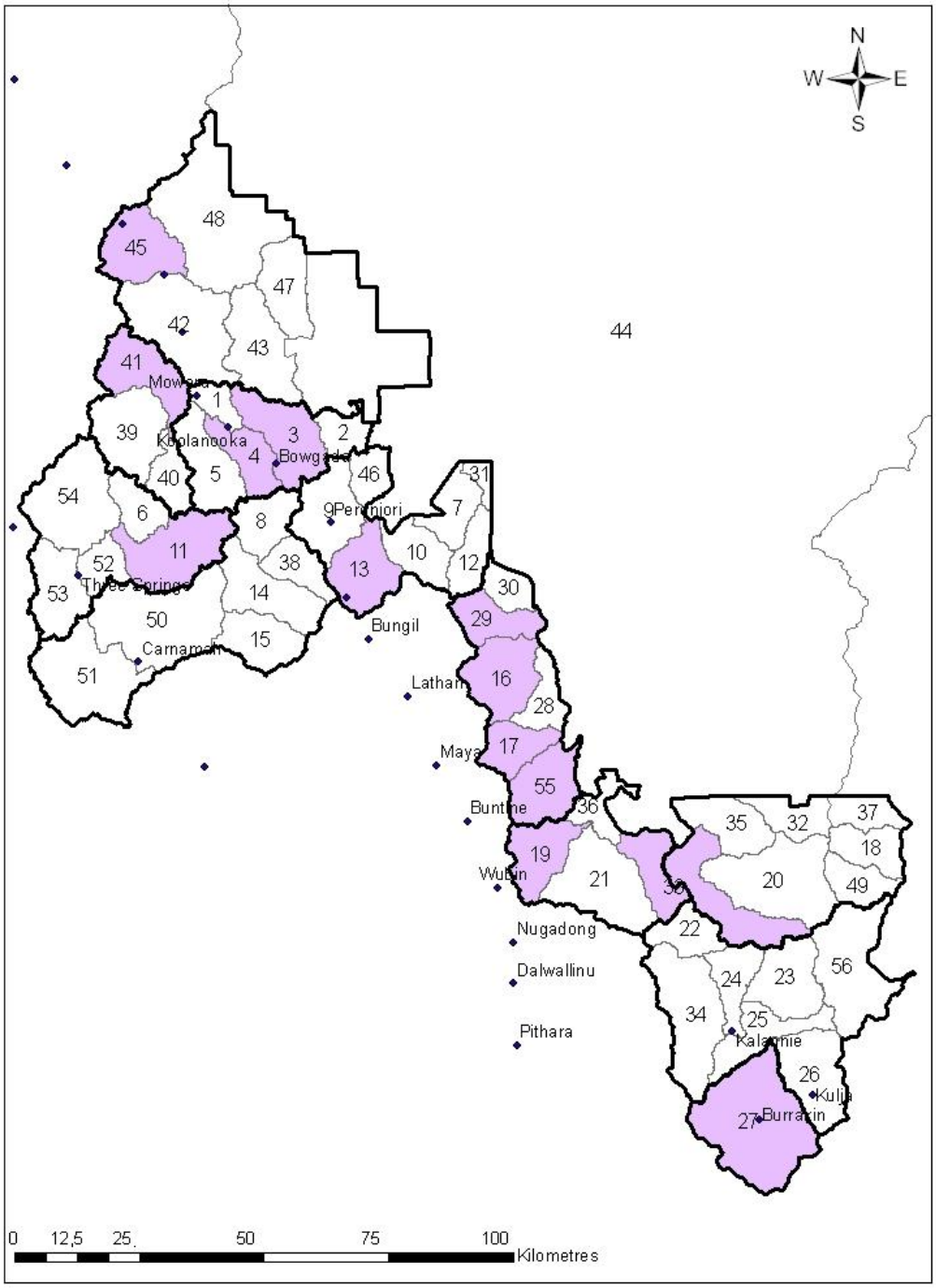

Table: Sub-catchment Attributes. Shaded attributes are those considered critical - at least for the current selection process.

Sub-Catchment Number	45	41	4	3	11	13	29	16	17	55	19	33	27
Sub-Catchment Name	CannaGurtha	Mt Kamacka	Bowgada- 4	Bowgada- 3	East Three Springs	Perenjori	Morgens-29	Morgens-16	Morgens- 17	Morgens-55	Jilbanding	Goodlands	Burakin
Total Catchment Area	19 079	18 785	12 230	id	25 410	17 788	12 431	19 647	11 478	17 754	15 831	14 796	44 911
Average Gradient	0.2	0.19	0.23	id	0.06	0.13	0.25	0.24	0.28	0.2	0.21	0.1	0.1
Workable Gradient for all Sections	Yes	Yes	Yes	id		Yes			No	Yes	Yes	Yes	Yes
Number of Contributing Landholders (#)													
Discharge Area	Small Saltlake	Playa	Small Saltlake	Claypans	Small Saltlake	Small Saltlake	Large Saltlake	Large Saltlake	Large Saltlake	Large Saltlake	Large Saltlake	Large Saltlake	Existing Drain
Threatened Private House	0	0	0	0	0	0	0	0	0	1	1	0	1
Threatened Public Road (km)													
Threatened Arable Land													
Threatened Vegetation													
MOU (Memo of Understanding)	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes	No	Yes
NOI (Notice of Intent)	Yes	Yes	Yes	No	No	No	No	submitted	No	Yes	submitted	in progress	submitted
Clearing Permit	Yes	Yes	Yes	No	No	No	No	submitted	No	Yes	submitted	No	submitted
Aboriginal Heritage Clearance	Yes	Yes	Yes	No	No	No	No	Yes	No	Yes	Yes	No	No
Agreeable to Easement	Yes	Yes	Yes	No	No	No	No	No	No	No	Yes	No	Yes
Agreeable to 100m Buffer	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Subsurface Attributes													
(i) Pits													
Water													
pH	7.4	id	id	7.4	id	6.7	7.9	nd	8.5	3.8	4.8	6.7	4.9
Inflow	Med-Fast	id	id	Med-Fast	id	Med-Fast	Slow-Med	Med	Slow	Fast	Slow-Med	Fast	Slow
Depth to Groundwater (m)	1.7	id	id	1.6	id	1.5	2.1	1.3	2.1	1.2	1.9	1.3	1.6
Salinity (mS/cm)	37	id	id	32	id	61	24	nd	32	57	49	54	36
Soil													
Depth of Topsoil (cm)	85	id	id	116	id	72	125	nd	115	81	54	72	37
Firmness	Med-Soft	id	id	Med	id	Soft	Med	Soft	Soft	Soft	Med-Hard	Med-Hard	Soft
(ii) Bores													
Depth to Groundwater (m)	id	0.8-2.12	0.8-2.9	0.4-1.6	1.3-4.5	0.8-2.3	0.5-1.3	1.2-1.9	0.8-1.4	0.2-1.5	0.6-2.5	0.9-2.0	0.2-1.6
pH	id	nd	6.5-7.8	6.1-7.5	5.4-7.4	6.2-6.8	5.8-8.2	6.3-6.9	8.2-8.6	3.1-7.2	3.3-7.4	3.7-7.2	4.8-6.2
Salinity (mS/cm)	id	nd	18-59	6.7-59.1	9.2-53.0	57.4-82.4	11.1-48.7	16.5-44.8	23.7-64.9	34.4-77.0	5.5-97.6	18.0-111.0	3.9-11.5

id insufficient data
nd not determined