

Reconnaissance of Soils for Irrigation in East Gippsland

1965-66

- I. Areas between La Trobe River and Mitchell River
- II. Areas South of the La Trobe River

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The reconnaissance was undertaken at the request of the State Rivers and Water Supply Commission to assist in preparation of evidence presented to the Parliamentary Public Works Committee in April 1966. The inquiry concerned the allocation of water resources east of Melbourne, particularly in regard to the future water supply for the Melbourne Metropolitan area.

The lands investigated were specified by the Commission and were those which might be capable of being irrigated from the Thomson, Macalister, Avon, La Trobe and Mitchell river systems. The first part of the investigation was completed prior to April 1966 and concerns the areas between the La Trobe and Mitchell rivers. Subsequently, further areas to the south of the La Trobe river were investigated. The present report, together with two accompanying maps, deal with both stages of the investigation.

Part 1 Areas between La Trobe and Mitchell Rivers

This section of the report covers a total of 343,000 acres in six localities which will be referred to as:

1. The Thomson River	12,700 acres
2. The Avon River area	12,300 acres
3. The Mitchell River area	18,200 acres
4. Toongabbie area	48,200 acres
5. The Pearsondale area	10,400 acres
6. The Stratford – Bairnsdale area	241,000 acres

The total of 343,000 acres is slightly more than that originally indicated by the State Rivers and Water Supply Commission.

In the six localities, associations of landscape and soil types occur which are similar to those of the Macalister Irrigation District, part of which has been mapped and described in detail by Skene and Walbran.* In particular, the gravelly uplands with soils of the Tanjil series dominate the present area. However the intermediate levels here include less of the Acre, Heyfield and Denison soil series and more soils with bleached subsurfaces not unlike Tanjil sandy loam.

East of Stratford, and particularly east of the Perry River, there is superimposed on the upland surfaces a series of sand dunes and sand sheets – the stringy bark and bracken fern country.

Mapping Criteria – In subdividing the six localities into units according to their suitability for large scale irrigation, only “on the farm” costs, benefits and hazards have been taken into account, and **not** the district engineering problems. This has resulted in eight land units being defined as set out below under “Mapping Units”.

General Conclusions

The distribution of eight land units in six localities is shown on Map N. 1. Of these, Unit 6, that part of Unit 3 bordering the La Trobe river, and small portions of Unit 2 and of Unit 4 are considered unsuitable for irrigation.

Unit 5 is a special case whose development would depend on special markets. Its problems demand more fuller investigation.

Over the major part of the remaining 250,000 acres, or 275,000 acres if the total surveyed area is considered, the benefits to accrue from irrigation and its complementary drainage are quite definite. Units 1 and 2 would benefit most. Units 1^A, 1^B and 4 would show an increase in production similar to that of Unit 1, but offset somewhat by higher costs of operation. Unit 3 would benefit least, as much of it is irrigated already.

The acreages of each unit within limits of “present survey”* as delineated on the map are summarized in the following table for each locality.

* Dept. Agric. Vic. Tech. Bull. No. 7 – 1948
Dept. Agric. Vic. Tech. Bull. No. 8 - 1949

Locality	Suitability of Units for Irrigation								
	Mainly Suitable				Partly suitable		Doubtful	Unsuitable	Total Acres
	1 Acres	1B Acres	2 Acres	3 Acres	4 Acres	1A Acres	5 Acres	6 Acres	
Thomson R.			4,000 (5,700)	5,600 (6,300)		700			10,000 (12,700)
Avon R	3,300			9,000					12,300
Mitchell R				14,000 (14,400)		3,400 [∅] (3,800)			17,600 (18,200)
Toongabbie	21,600 (33,000)		11,500	3,700					36,800 (48,200)
Pearsondale	4,300		4,600	1,500					10,400
Stratford- Bairnsdale	91,500 (102,700)	32,000		3,500	30,000	15,000	51,000	7,000	230,000 (241,200)
Total	120,700	32,000	20,100	37,500	30,000	19,100	51,000	7,000	317,400 343,000

* Figures for Pearsondale include areas outside “present survey”; total areas for other localities are shown in parentheses.
Not recommended for irrigation

∅ Largely unsuitable

The Mapping Units

Unit 1 – This is the level to gently undulating surface of the older coastal plain, locally warped upward to form slightly steeper slopes. The soils are mostly of the Tanjil series, that is they have a strongly developed subsoil horizon of yellow-brown clay which is often gravelly, with a surface of 6 to 14 inches of fine sandy loam or clay loam. This surface is grey or grey-brown and strongly bleached (“white”) below about 3 inches. Although these soils are very uniform over large areas, some small areas have a very variable depth to the clay, or moderate amounts of gravel near the surface, or greyer subsoil colours, or clay surface textures. In the Stratford – Bairnsdale area, the unit includes scattered low sandy ridges. Salinity is uniformly low throughout Unit 1.

Unit 1A – This is the more eroded edge of the gravelly uplands mapped as Unit 1. Slopes are steeper and more complex, and soils are more variable in that there is a larger proportion of gravelly and shallow surfaces. There is some exposure of the sediments which lie below the gravelly clay, and some sandy overlay. There is some evidence of localised salinity connected with seepage at lower levels.

Unit 1B – This is an almost level plain, either part of the same formation as Unit 1, or a similar formation at a slightly lower level. The unit receives run-off water and seepage from Units 1, 4 and 5. The soils are closely related to those of Unit 1, but a larger proportion of them show the grey colours of poor profile drainage, and there is a greater proportion of sandy loams in low ridges and sand sheets. Salinity is not evident, but minor occurrences are to be expected.

Unit 2 – The flood plain and levees of prior streams form this unit, at a level intermediate between the contemporary deposits of Unit 3, and Units 1 and 1B. It is not always clearly separable from Unit 3 or Unit 1B at the scale of mapping used, and at Cowwarr and Bush Park the boundaries separate soil characteristics rather than formations. Gradients are similar to those in Unit 1 (level to gently undulating), but slopes may be much shorter (of the order of 5 or 6 chains). Soils are varied and will be described under localities.

Unit 3 – This comprises the river flats which are composed of the near flood plain and levees of the present or very recently abandoned stream courses of the La Trobe, Thomson, Avon and Mitchell Rivers, and of Middle, Freestone and Valencia Creeks. Very small areas of Unit 3 occur along the Blackall Creek, Perry River and Toms Creek but have not been delineated on the map. Much of this unit is subject to flooding and the topography is varied. The northern-most part of the Avon River flats at Little Plains, and much of the Mitchell River flats are almost level; elsewhere the surface is broken by numerous billabongs and low ridges. Soils range from grey-brown fine sandy loam at Little Plains to dark grey silty clay loam and silty clay at Heyfield. They are mostly deep, permeable and have a high natural fertility. Sandy and gravel sometimes occur within 3 feet of the surface, but are usually much deeper, if present at all.

Water tables may fluctuate with river levels, or build up under irrigation. Salinity however, is localised to seepage spots, with an added hazard from lake and morass water south-east from Bairnsdale.

Unit 4 – This differs from Units 1 and 1B which it adjoins, only in containing more sandy ridges and sandy flats, and (sometimes) sufficient dissection to influence irrigation layout. These elements probably comprise less than 20% of the whole unit although as much as 50% may be present in specific areas of about a square mile. Slopes are seldom more than gentle (up to 8%). The soils of the sandy element are grey, bleached sands from 2 to more than 10 feet deep, usually with iron/organic and clay accumulations between 1½ and 4 feet. Drainage of the sandy flats is very poor, and salinity a possibility.

Unit 5 – This area is dominated by sand ridges and sand sheets, but does contain considerable patches of Tanjil series soils on level surfaces. Therefore the boundary of separation from Unit 4, and also from Units 1 and 1B, depends on the scale of mapping. In the map presented, compact areas of 1 square mile contain more than 50% of deep sandy soils, often with inter-dune swamps. Slopes are mostly gentle, with a few steeper ridges.

The soils are probably similar to the deeper sands of Unit 4.

Unit 6 – This consists of low level flats along the shores of Lake Wellington and Lake Victoria below the 25 foot contour line. There is a level surface, with local swamps and varying degrees of salinity.

Assessment of Six Localities

The Thomson River area

A survey of 10,300 acres in this locality was requested by the State Rivers and Water Supply Commission. This is shown on the map inside the boundary defining the “present survey”. However, during the course of the survey, the areas has been extended slightly to 12,700 acres to include similar irrigable country slightly above the 200 ft. contour line.

Inside the boundary of the “present survey” are 5,600 acres of Unit 3, mainly Thomson silty clay loam, approximately 4,000 acres of Unit 2, and 700 acres of Unit 1A.

Unit 2, south of the river, has surface soils similar to Unit 3, but with a restricting clay horizon, whereas north of the river there are bleached soils similar to Tanjil loam of Unit 1. The latter soils form a complex with unit 1A between Dawson and Heyfield.

Assessment – The area south of the Thomson River is mainly irrigated (by pumping) and is highly productive. North of the river Unit 3 is partly irrigated, while Unit 2 is mainly under dry pasture in various stages of development. The advantages of development as an Irrigation District would be mainly in the control of river levels, assured supply in dry years, lowered costs on perhaps two thirds of the area suited to flood irrigation, and in extension of irrigation north of the river. This latter would need protective drains.

The Avon River area

The area indicated by the S.R. & W.S.C. in this locality is 12,300 acres. This includes a fringe of higher terrace soils of Unit 1 amounting to 3,300 acres and 9,000 acres classed as Unit 3, although consisting of soils on at least two terrace levels and not subject to frequent flooding. The two terraces have been mapped together on the ground of short compound slopes and permeable soils.

The Unit 3 soils extend into the Stratford – Bairnsdale area along Freestone Creek beyond Briagolong. This additional area is estimated to be 3,300 acres.

Many of the soils are deep, very free draining, fine sandy loams and sandy loams; others at higher levels have a red-brown clay subsoil which is crumbly and permeable to water. They are partly under irrigated pasture, lucerne or maize.

Assessment – The permeable soils with deep subsoil drainage to the Avon River ensure that the relatively steep compound slopes can be watered by flood irrigation without waterlogging when the water is pumped.

A channel supply could result in excessive loss of water and some trouble from local water tables. The area is capable of considerably increased production, either under irrigated pasture, or under cash cropping for which the free draining soils are especially suited.

3. The Mitchell River area

The area of 17,600 acres which is shown inside the boundary of the “present survey” has been extended by 600 acres bordering Clifton Creek.

The area consists of 14,200 acres (extended to 14,600 acres) of Unit 3 and 3,400 acres of 1A as a northern fringe.

The soils of Unit 3 are mostly dark grey-brown deep loams and sometimes fine sandy loams, with little drainage to 4 feet.

Variations are heavier or lighter textures, (clay loam to silty clay or sandy loam and sand), below 2½ ft.

Much of Unit 3 is irrigated by pumping, (flood or spray irrigation), and carries highly productive pastures, lucerne or vegetable crops. Unit 1A is steep and dissected, apart from small area at Wy Yung and Lucknow.

Assessment – Development of the locality as part of an Irrigation District based on a Mitchell River dam would not greatly increase the irrigated area. It would permit increased winter production by decreasing flooding, but would increase seepage from Unit 1 and 1A with possible local salting. Decreased summer flow in the Mitchell River could extend the zone of brackish water above Bairnsdale.

4. The Toongabbie area

Here the area of 36,800 acres indicated by the S.R. & W.S.C. has been extended to 48,200 acres by including 11,400 acres of similar irrigable soils between the western boundary and the Glengarry-Cowwarr railway and mostly below the 200 ft. contour line.

Inside the boundary are:

- 21,600 acres of Unit 1
- 11,500 acres of Unit 2
- 3,700 acres of Unit 3

The extension includes:

- 11,400 acres of Unit 1.

Assessment – Soils of Units 1 and 2 are freely and successfully irrigated in the nearby Central Gippsland Irrigation Area, and these two units in the Toongabbie area would be suitable for irrigation, except possibly for several thousand acres in the south-east where a salting problem may exist.

Unit 3 which adjoins the La Trobe River has problems of flooding, water tables and irregular surfaces and is regarded as unsuitable for irrigation.

One difficulty would appear to lie in small areas of Unit 1 which have either a very variable depth of surface (2 to 12 inches), or gravel near the surface. Both of these would interfere with the border check layout for flood irrigation. Some areas show evidence of waterlogging and would require district drains.

A more general condition is that water penetration and aeration are likely to be only moderate. This would limit plant growth, especially root development. The deeper bleached surfaces could become very boggy in wet winters. A detailed soil survey would be desirable to delineate possible problem areas.

5. The Pearsondale Area

The 6,000 acres, approximately, indicated by the S.R. & W.S.C. has been extended to 10,400 acres as shown on the map.

The whole locality contains:

- 4,300 acres of Unit 1
- 4,600 acres of Unit 2
- 1,500 acres of Unit 3

Unit 1 has long gentle slopes. The soils which are of the Tanjil series are of moderate depth (about 10 inches). There are limited areas of shallow gravelly soils. Unit 2 has variable gentle slopes and varied soils of prior streams, levees and clay flats. Unit 3 on the La Trobe River frontage is variably swampy.

Assessment – With irrigation, Units 1 and 2 should show results at least equal to those obtained on these units in the Nambrook – Denison area. Salinity should be a very minor hazard owing to the free drainage to the La Trobe River, and to comparative isolation from sources of underground water to the north.

The tongue of Unit 3 to the north with protection from flooding grows good pastures, but the rest of Unit 3 has salinity common to the La Trobe flats and is not recommended for irrigation.

6. The Stratford – Bairnsdale Area

The 230,000 acres inside the boundary of the “present survey” has been extended slightly to include a further 11,200 acres of suitable irrigable country up to the 235 ft. contour approximately.

The area of 230,000 acres comprises:

- Unit 1 91,500 acres
- Unit 1A 15,000 acres
- Unit 1B 32,000 acres
- Unit 3 3,500 acres
- Unit 4 30,000 acres
- Unit 5 51,000 acres
- Unit 6 7,000 acres

The additional area are of Unit 1, 9,300 acres north of Fernbank, and 1,900 acres adjoining the Perry River.

Units 1, 1A and 1B constitute the former red gum forest now largely cleared and carrying pastures of very uneven quality and development. Some are good, but cut grass, sags, old tussocks, and tree stumps dominate much of the so-called native pastures, and onion grass much of the sown pasture. In Unit 1B there is a larger proportion than in Unit 1 or 1A of shallow, poorly drained soils, and consequently of weedy, scrubby pastures, with areas of swamp paperbark.

Units 3 which is in the vicinity of Briagolong consists largely of soils on permeable red-brown clays and, as indicated previously, would be better regarded as part of the Avon River area.

In Unit 4, many of the sandy rises carry good pastures, but a large proportion carry bracken fern and/or poor stringy bark timber.

Unit 5 is dominated by stringy bark timber and bracken fern, but carries also a varied understorey of native shrubs.

Unit 6 is below the 25 ft. contour line. It contains sandy soils and some finer alluvium, and carries native pasture, with swamp vegetation and some areas of salt tolerant species.

Assessment – Despite local problems and some unsuitable areas which would have to be defined by detailed soils survey before development began, a large proportion of Units 1, 1A and 1B and 4 could be developed to carry satisfactory irrigated pastures.

Unit 1A would require more complicated layout and management than Unit 1, with some spray irrigation on the steepest slopes which would otherwise be excluded from irrigation.

Unit 1B would require more elaborate drainage, on account of low gradients and run-off from adjacent higher areas.

Unit 4 is broken by sand ridges which would require pumping to irrigate, probably by sprays to avoid undue seepage onto lower areas.

Despite great increases in production in recent years, these four units probably still carry an average of less than two dry sheep per acre. Departmental trials at Bengworden indicate that the stocking rate can be at least doubled under dry farming conditions. It is anticipated that there could be a further substantial increase with irrigation.

The better developed of the sandy rises are probably producing at present nearly as much per acre as the red gum plains of Unit 1, but are more difficult to manage. This would apply equally under irrigation.

Unit 5 has the lowest economic production of all the units, through there is a considerable honey harvest, and some timber is sawn for local farm use. It is doubtful if Unit 5 could be developed economically on a large scale as irrigated pasture, though there would undoubtedly be pressure to do so by pumping onto limited areas were water generally available.

Given a market for a range of high value cultivated annual crops which could repay the considerable costs of development, of spray irrigation and of fertilisers, this sandy country of Unit 5 would have advantages over Unit 1 in that it could be cultivated at any season of the year and would have a higher infiltration rate, and probably, therefore, a higher average growth rate. It would have one slight advantage over the Mitchell River area, though not the Avon River area, in freedom from flooding.

Unit 6 cannot be recommended for irrigation but is in need of extensive drainage. Even with drainage and a strongly limited amount of irrigation, high water tables and salinity would continue to pose acute problems.

Part II Areas South of the La Trobe River

This section of the report concerns a total of 159,000 acres, or nearly 250 square miles, in two localities, namely:

1. The Rosedale – Longford area 21,000 acres
2. The Ninety Mile Beach area 138,000 acres
(Dutson, Seaspray, Woodside)

The soils have been examined only briefly, but sufficiently to note some points of similarity and some differences from the areas described in Part I of the report.

General Conclusions

The country is described in terms of five of the eight land units described previously, with the modifications mentioned below the “The Mapping Units”. The distribution of the units is shown on Map No. 2 reproduced at a scale of 1 in. = 4 miles.

Of the total area of 159,000 acres, two areas totalling 29,300 acres were excluded from further investigation as unsuited to development for irrigation. Much of this is, in fact, vested in the La Trobe Valley Water and Sewerage Board as a disposal area.

Of the rest, an area comprising Units 1, 1B, 2 and 4 and totalling about 100,000 acres is largely unsuitable, and would certainly show benefits from irrigation and its accompanying drainage. Unit 5 is a special case and must be regarded as very doubtful at this stage for reasons given in Part I.

The rainfall is probably higher than in the Stratford – Bairnsdale area, and this would reduce slightly the benefits to be expected from irrigation.

The acreages in various categories are listed below.

Area in Acres and Suitability of Units for Irrigation Development							
Locality	Mainly suitable			Partly suitable	Doubtful	Unsuitable	Total
	1	1+2	1+1B	4	5		
Rosedale - Longford		18,700				2,300	21,000
Ninety Mile Beach	57,000		6,500 (6,000)	18,000	29,000 (19,000)	27,000	138,000 (127,000)
Totals	82,200 (81,700)			18,000	29,500 (19,000)	29,300	159,000 (148,000)

The figures in parentheses exclude areas vested in the La Trobe Valley Water and Sewerage Board as disposal areas.

The Mapping Units

The general descriptions of the land units given in Part I of the report apply, here, with these modifications:

1. Unit 1 may be slightly more dissected (shorter slopes).
2. Unit 2 contains only a minor component of the lighter, prior stream soils comparable with the Heyfield soil series, and this being low-lying and adjacent to the swamps of Lake Wellington has a greater likelihood of salinity than situations near Heyfield.
3. Unit 5 has not been separated as rigorously from Units 1 and 1B as was done in the Providence Ponds area, i.e. it may contain rather more of the flat heavier soils. On the other hand, the native vegetation suggests and even lower chemical fertility.

The presence of the Sewerage Board disposal area on soils of this unit offers an opportunity to investigate their development potential.

Assessment of Localities

1. *Rosedale – Longford Area*

Of the total area in this locality, 2,300 acres was excluded from further survey on the grounds of swampiness on the lower situations, and of dissection of the higher portions into steep slopes with sandy cappings.

The remaining 18,700 acres appears to comprise roughly equal areas of Units 1 and 2. It is mainly very suitable for flood irrigation, though some slightly saline areas would require draining.

Spring water of good quality has long been used for irrigation at Dutson. Though not examined in this reconnaissance, it appears that the comparatively high flat country extends south of Rosedale and Longford for a further mile or so as indicated on Map No. 2. There seems to be no reason why the areas indicated should differ from Unit 1.

2. *The Ninety Mile Beach Area*

Very sandy or low-lying country between Lake Wellington and the coast totalling 27,000 acres has not been examined. Much of this is vested in the La Trobe Valley Water and Sewerage Board as a disposal area.

The balance of 111,000 acres is separated from the low sandy country of the coast by a well defined scarp about 50ft. high, and is backed on the west by forested ranges which provide water catchment and also increased rainfall as compared with the central East Gippsland Plan.

This locality consists mainly of Unit 1 suited to flood irrigation. It is dissected by Warrigal Creek, Merriman's Creek, and several minor water courses which are all moderately deeply incised, although the area as a whole is flat, with ill-defined drainage ways.

The acreage of actual swamp is quite small.

Scattered dunes or low sandy rises, and some black clay flats representing former bark swamps, occupy the area classed as Unit 4 near Woodside. Soils like those of Units 1 and 1B predominate.

In Unit 5, sand sheets and dunes of white fertile quartz sand, with intervening poorly drained flats, dominate the main section near Dutson Downs. South of Merriman's Creek Unit 5 is more undulating, but possibly more fertile.