

Joining the Dots: Analysis of the Trigonometric Surveys of the Adelaide Plains, 1837 – 1838

John Reginald PORTER and Kelly HENDERSON, Australia

Key words: Coordinated cadastre, Land administration, Historical surveys, Adelaide

SUMMARY

The trigonometric surveys of the City, Port and District of Adelaide provide an exemplar *par excellence* of the key role of surveyors in securing a sustainable future for all. South Australia's first Surveyor-General, Eurasian William Light (1786–1839), born in Kedah, Malaya, made far-sighted, environmentally sensitive decisions for land settlement of the new British Province of South Australia, and its seat of government. Beset by physical, technical, logistical and political challenges, Light surpassed the genius of those of previous and subsequent centuries – L'Enfant (Washington, D.C., USA), and Marion Mahoney and Walter Burley Griffin (Canberra, Australia) and set the benchmark for current and future generations. The methodology employed delivered holistic integrated land and water management, in the public interest and with a view to future-proofing the Province. This is equally, or even more, relevant for meeting the challenges of this century, and the next. This paper publishes enabling research for further identification and monumentation of the original District of Adelaide trigonometric stations, initiated in 2010 by Jan de Graeve, Director, FIG International Institution for the History of Surveying and Measurement.

SUMMARY

Les enquêtes trigonométriques de la ville, du port et du district d'Adélaïde constituent un exemple par excellence du rôle clé des arpenteurs dans la garantie d'un avenir durable pour tous. Le premier arpenteur général d'Australie-Méridionale, l'Eurasien William Light (1786–1839), né à Kuala Kedah, Malaisie, a pris des décisions clairvoyants, sensibles à l'environnement, concernant la colonisation de la nouvelle province britannique d'Australie-Méridionale et son siège de gouvernement. En proie à des défis physiques, techniques, logistiques et politiques, Light surpassé le génie de ceux des siècles précédents et suivants – L'Enfant (Washington, DC, USA), et Marion Mahoney et Walter Burley Griffin (Canberra, Australie) et a établi la référence pour les générations actuelles et futures. La méthodologie employée livrée une gestion holistique intégrée des terres et de l'eau, en dans l'intérêt public et en vue de pérenniser la province. Cela tout aussi pertinent, voire plus, pour répondre les défis de ce siècle et du prochain. Cet article publie des recherches permettant une identification et la monumentation des stations trigonométriques originales du District d'Adélaïde, initiées en 2010 par Jan de Graeve, Directeur de l'Institution internationale FIG pour l'histoire des arpenteur et des mesures.

Joining the Dots: Analysis of the Trigonometric Surveys of the Adelaide Plains, 1837–1838

John Reginald PORTER and Kelly HENDERSON, Australia

1. INTRODUCTION

As first Surveyor-General of the new British Province of South Australia, Colonel William Light (1786–1839) was instructed by its Commissioners that “*whenever you find a good harbor you will cause the neighbouring land for a considerable distance to be carefully examined, and if the spot is well suited for the site of even a secondary town, you will direct such a survey to be made as will enable the Colonial Commissioner, if he thinks proper, to include the district in the lands offered for selection by the holders of the first 437 land orders*” (Colonization Commissioners for South Australia, 1836).

Immediately on his arrival in South Australia, Light commenced mapping the land in preparation for the establishment of the new settlement. Initial surveys were carried out on Kangaroo Island and at Rapid Bay, and enough Field Notes of this work have survived to demonstrate that Light had determined before arriving in the new Colony the methodology to be used for the capture of data relevant to the planning of its occupation.

He chose to apply the concepts of trigonometric surveying – establishing survey stations at key points within the area to be mapped and interconnecting them geometrically to establish a coordinated framework. This framework was then to be used for collection of geographical data, and later for accurate set out of the corners of the designed land parcels (Porter, 2007). This methodology also helped Light to design, define and set apart land to be dedicated to public access and health: an integrated transport network; 100ft wide coastal reserve, the City of Adelaide’s 66ft wide riverbank reserve, and Adelaide’s Park Lands.

2. ESTABLISHING THE TRIGONOMETRIC NETWORK

Light’s survey work associated with the land divisions of the Adelaide Plains surrounding the City of Adelaide are particularly significant as he was required to create 134 Acre rural parcels for initial selection, then a re-subdivision of the unselected areas into 80 Acre parcels for more selections, and finally the remainder disposed of by auction or sale.

2.1 Topographical Genius and Innovation

Adapting navigational techniques to the complex task of designing and delivering ‘priority of choice’ Preliminary Country Sections as well as subsequent 80 Acre parcels, Light used the trigonometric network to pioneer an innovative co-ordinated cadastre. Chosen off the plan, the 134 Acre sections were not pegged until taken up, saving time and resources.

To meet the Commissioners' commitments for preliminary 'priority of choice' and other pre-sold land, a city site adjacent to 60,000–100,000 fertile acres, and a safe harbour for merchant shipping, was required. Recognising “*almost ideal geographical conditions for the site of a city*” on the Adelaide Plains, Light sought “*to make the best use of geographical advantages*” (Historical Memorials Committee, 1937). Respecting how Nature broke and directed his intended lines, he had the good sense to “[*i*n all, let Nature never be forgot” (Henderson, 2008). He selected a beautiful inland site for the capital, forming the best connection with, and spanning, the River Torrens, on rising ground, avoiding areas liable to inundation. He thereby guarded against flooding, fixed the focal point of his transport network and Country Sections design, and faced trenchant bitter partisan opposition for selecting this site.

Light was anxious to have an accurate measurement from the city to the sea to determine the number of rows of rural parcels he could establish, and directed Finniss to connect between **Station A** and Holdfast Bay **Flagstaff**. To do this Finniss twice measured a baseline westward from **Station A** to his **Station D**. Using this base he made the requested trigonometric connection to the **Flagstaff Station**, and Light was able to accurately determine the amount of land available from the city alignment to the sea and formulate his plan for the rural parcels.

Light was free to select parcel dimensions that could best accommodate factors of 80 and 134. He chose rectangles with dimensions of 4000 Links x 3350 Links for 134 Acre Sections, and 4000 Links x 2000 Links for 80 Acres. This gave him a common long side of **4000 Links**.

The design of ANZAC Highway had to incorporate existing ford crossings at Snake River (Brownhill Creek) near Ashford, and the River Sturt (near Morphett Road) as both watercourses had already proved difficult hurdles during winter travel to the city. Recognizing future expansion of rural land was likely to occur in a north-south direction, Light oriented rural parcels so the key transport roads ran in the same direction and provided direct access to both the ANZAC Highway and Port Road.

To ensure their alignments would not be affected by the change from 134 Acre parcels to 80 Acre parcels, he separated these One Chain wide transport roads by exactly 1 Mile. This equates to 8000 Links – the width of two parcels for both his chosen 134 and 80 Acre sections. The direct consequence is that Adelaide's north-south roads are generally continuous straight lines (e.g. Marion and Portrush Roads), while several east-west are stepped (e.g. Springbank–Daws–Oaklands Roads in the south, and Regency–Foster's Roads in the north).

A review of field notes and measurements made by Light's survey teams between 1837 and 1838 provides evidence of the logic adopted in designing the rural parcel framework and main road systems as they exist in Adelaide suburbs today. Furthermore, they provide clear evidence of the manner of determining the outer boundary of the city's Park Lands.

2.2 The City of Adelaide

On 11 January 1837, Light commenced marking City of Adelaide land parcels, by placing the first peg at the corner of North and West Terraces. This point (**Station A**) was to become the

major control point for both the survey of city lots and surrounding rural lands. The only known District of Adelaide trigonometric station placed prior to this was the Holdfast Bay **Flagstaff**, established on a sandhill south of the Patawalonga mouth circa late 1836.

Light established three survey parties, under B.T. Finniss (1807–1839), G.S. Kingston (1807–1880) and G.O. Ormsby (1842–1861), and initially completed the Town survey in late February. Due to Kingston's blunders, purchasers' selections were delayed for 14 days whilst Light had Ormsby and Finniss re-survey the Town Acres of western South Adelaide 'so wretchedly executed' by Kingston (Stevenson, 1838). Kingston was not employed on the trigonometric surveys – he sailed for England and was absent for a year.

Light's team of surveyors eventually completed the pegging of Town Acres on 13 March 1837 (Jacob 1837). Selection commenced on 21 March 1837 followed by disposal by auction. This was remarkably rapid compared with a better provisioned, logistically easier, but slower survey of a smaller area for Melbourne, Port Phillip (Victoria).

2.3 The District of Adelaide

Light elected to coordinate the significant topographical detail by means of a series of interconnected trigonometric surveys. From these, he proposed to develop an appropriate design plan and then use the network of stations to mark out the corners of the rural parcels **as and when required by the eventual owners**. The survey teams were re-assigned to duties associated with the design of the rural land parcels that were to surround the city, and of the survey personnel available to Light, Finniss and Ormsby were particularly experienced in conducting trigonometric surveys to the accuracy he required. Accordingly, for the survey of the Adelaide Plains he divided the area into three specific survey sectors, namely:-

- 1 North of the River Torrens from the foothills of the Mount Lofty Range to the sea – supervised by himself ;
- 2 South of the River Torrens and east of a baseline defined by the extension of the city's West Terrace alignment southwards to the foothills of the Mount Lofty Range – supervised by Ormsby; and
- 3 South of the River Torrens and westward of the baseline to the sea – supervised by Finniss.

From late 1837, Light also considered John Cannan (1814–1852) and Alfred Hardy (c1814–1870) to be assistant surveyors, giving them charge of parties accordingly and finding their services were of much value.

Finniss's Field Notes (Finniss, 1837-38), covering the survey of his allocated sector have survived, while only a few records of Light's work, and none of Ormsby's, have been located. However, Finniss made enough survey connections to their work to indicate that a standard field approach was taken in all three sectors. These connections provide mathematical

evidence of the design criteria that Light chose in fixing the road alignments, outer boundary of the City of Adelaide Park Lands, and division of land into 134 Acre parcels.

2.4 Light's surveys at the Port River

Before Light could commence work on the rural surveys he had to solve another pressing survey issue. A number of land grantees had lobbied Governor Hindmarsh to have a separate town of One Acre allotments laid out adjacent to the Port River landing place. Light commenced a survey there on 14 March 1837.

Arising from the March 23 land selection meeting he was further required to survey preliminary land order 'priority of choice' Town Acres at the Port "*in such a place and manner as may be desired by the majority of declared proprietors there*". Proprietors opted to select a total of 29 Town Acres at the Port, and Light later carried out a trigonometric survey there in November 1837 (Figure 1).

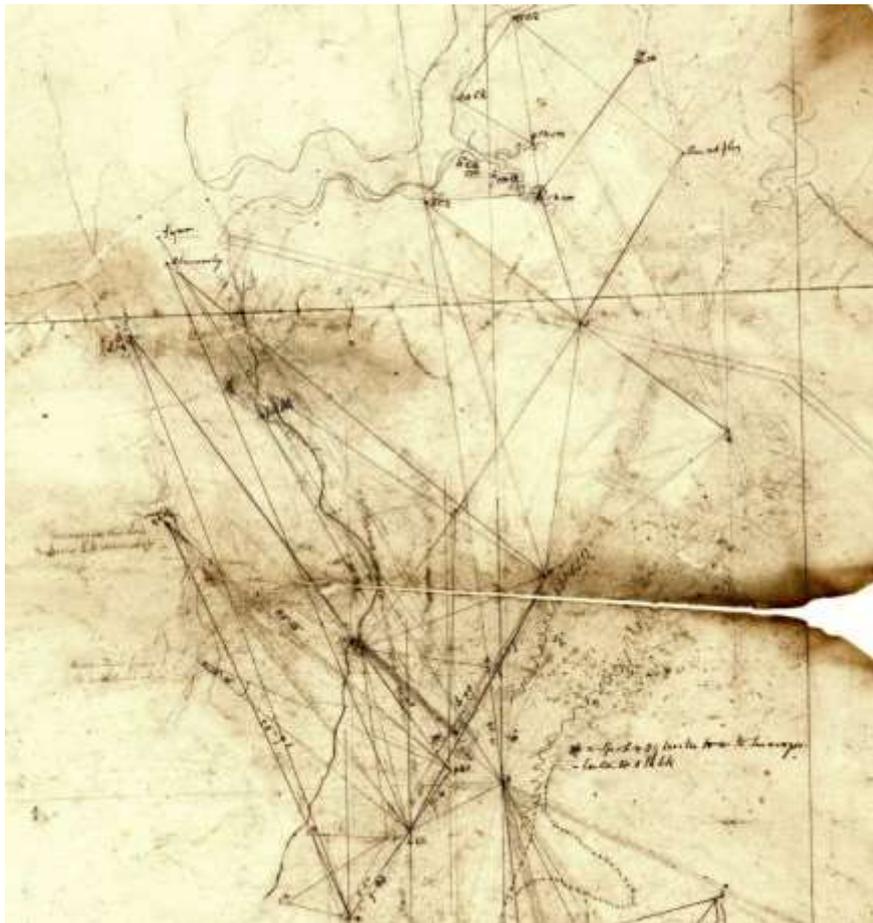


Figure 1: Detail of Light's Port River Trigonometric survey network, circa November 1837. State Library of South Australia PRG1/6/262 [Light Collection].

Light used Stations along the left bank of the river (**Stations 1Lbk, 2Lbk, etc.**), the right bank (**Stations 1Rbk, 2Rbk, etc.**), and Tam O'Shanter Creek (**Stations 4aCk, 5Ck, 6Ck, etc.**). Ships at anchor nearby, *Syren* (Siren) and *Abercromby*, served as Trigonometric Stations (Figure 1). From *Syren* and **Station 3** Light triangulated west to a sandhill on the coast, thought to be Finniss's **Station G**. *Syren* had arrived on 12-13 October and was in South Australian waters until late November, and *Abercromby* arrived on November 11, and on November 21 sailed for King George Sound, Swan River and Mauritius.

Light's trigonometric survey observations for this work were incorporated into the consolidated topographic map of the Adelaide Plains completed by Henry Nixon and used for the overall design of the rural parcels. While only 29 Town Acre parcels were taken up by the grantees, the survey is significant in that it provides the geometric link for the fixing of the north-west corner of the original 134 Acre rural land parcel design (Figure 2).



Figure 2. Detail from 'Plan of the Preliminary Country Sections in the District of Adelaide, South Australia. From the Surveys of Wm Light Esqr Survr Genl. and Assistant Surveyors, drawn by Henry Nixon late Lieutenant 96th Regiment. c.1838.' Image reproduced by courtesy of The National Archives of the UK. CO700/SOUTH AUSTRALIA-2Pt1 (4).

3. SURVEY EQUIPMENT

To carry out the trigonometric surveys, Light's teams were equipped with a number of chains and tapes for distance measurement, and theodolites for angle measurement and magnetic bearings. A stocktake list of 10 April 1837 prepared by Light's Deputy Surveyor George Kingston included the following items brought out on the *Rapid*, *Cygnets* and *Buffalo*:-

- 1 x 7 Inch diameter theodolite, reading to 20 Seconds of arc
- 3 x 5 Inch diameter theodolites, reading to 1 Minute of arc
- 1 x 8 Inch sextant
- 12 x 4 Pole (100 Link) chains, and
- 12 x 4 Pole tapes.

A further list prepared by Ormsby on 29 October 1838 included the following items:-

- 1 x large 9 Inch diameter "Cary" theodolite with stand
- 1 x 6 Inch diameter "Cary" theodolite with stand
- 1 x 5 Inch diameter "Jones" theodolite with stand
- 1 x 6 Inch common theodolite
- 2 x 5 Inch diameter theodolites (unserviceable)
- 1 x marine prismatic azimuth compass with stand.

In his earlier trigonometric surveys at Rapid Bay in November 1836, Finnis and his Assistant Surveyor John Cannan used a 5 Inch theodolite to read the angles of the trigonometric network, and an azimuth compass to fix the position of topographical features. Prior to the commencement of his baseline measurement, he compared the length of the two chains he had been given – one measured 66 Feet 11½ Inches and the other 66 Feet 2½ Inches (referred to as '*a new chain with a notch*'). His Rapid Bay field notes do not state whether these were compared against a **standard** 4 Pole (100 Link / 66 Feet) chain.

Finnis eventually moved up to Adelaide on 21 January 1837 where he was initially occupied on the pegging of One Acre parcels before commencing his trigonometric survey within his allocated sector west of the city on 2 May 1837. His field notes record the following series of chain length checks between May 1837 and February 1838 (Table 1) :-

	Date	Length	Too Long	Too Short
Chain A 100 Feet by Standard	11 May 1837	99' 11¾"	-	¼"
	15 May 1837	99' 11⅞"	-	⅛"
	24 May 1837	100' 0"	-	-
Chain B – Brass Handle	11 May 1837	65' 11⅝"	-	⅜"
Chain C – Notched in handle probably chain used at Rapid Bay	11 May 1837	66' 5½"	5½"	-
Chain D – Simmonds plain This chain has bold mark across?	11 May 1837	66' 2¾"	2¾"	-
	13 Feb 1838	66' 2 ⁹ / ₁₀ "	2 ⁹ / ₁₀ "	-

Table 1: Finnis's Trigonometric Survey Field Notes 1837–1838.

4. ESTABLISHING THE TRIGONOMETRIC BASE LINES

It is clear that **Station A** was selected by Light as the starting point of all three sectors. Despite being the corner of Town Acre 1, surveys of North Terrace carried out in 1839 indicate that this point remained free of fencing and accessible as a survey station for both the trigonometric survey in 1837 and initial set out of the rural land parcels in 1838.

Mount Lofty was visible from this station, and Finnis read angles between it and his base stations to the west of the city. Existing records of Light's work show that he read angles to both **Station A** and **Mount Lofty** (see Light's Traverse, section 5.2).

Finniss commenced his trigonometric survey on 2 May 1837 when he "took a right angle at the N-W corner of the Town [**Station A**] towards the south" and "ran a line in that direction." The following day, Assistant Surveyors Richard Symonds and Alfred Hardy measured this line using a Gunter's chain, recording chainages "to the great street" (Grote Street) of 3714 Links, and "Side of the town from **Station A**" (North Terrace to South Terrace) of 7621 Links. These measurements were taken prior to the establishment of the 100 Foot length Standard.

Applying the 2³/₄ Inch correction recorded for Symonds' chain on 11 May 1837 (Table 1), these dimensions become 3726.92 Links and 7647.52 Links respectively (Table 2) and compare favourably with more recent surveys:-

SURVEYOR	DATE	FROM	TO	DISTANCE
R. Symonds	1837	Station A	North side of Grote Street	3726.92
G. McCoy	1902	Station A	North side of Grote Street	3724.00
R. Symonds	1837	Station A	North side of South Terrace	7647.52
G. McCoy	1902	Station A	North side of South Terrace	7649.50
GPS Coords	2007	Station A	North side of South Terrace	7651.22

Table 2: Measurements south from Survey Station A.

Because of a sharp terrain rise immediately south of **Station A**, trigonometric angles could not be read directly to points placed at the West Terrace/South Terrace intersection or along the extension of West Terrace towards the southern foothills. Nevertheless, a number of magnetic bearings were taken at various stations along this alignment, thereby providing a reasonable check on the angular closures of the various triangles of the trigonometric survey.

4.1. Finnis's Survey Party Baselines

Finniss measured angles and bearings at **Station A**, and angles at new **Stations B** and **D** on the plain to the west of the city. Finnis established **Station D** approximately 5.7 Kilometres to the west of **Station A** as the termination point of the baseline for his trigonometric survey. Symonds, Cannan and Hardy commenced measuring this baseline using a 100 Foot chain.

The measuring of both of these lines was done prior to the establishment of a length standard in the Colony. Accordingly, and immediately following the establishment of the standard on 11 May 1837, Finniss re-measured the baseline from **Station A** to **Station D**. He then measured a shorter, second baseline from **Station B** to **Station E** (Figure 3) cutting across line **A-D** “*over a perfect flat*”. He considered this “*likely to be free of errors of measurement*”.

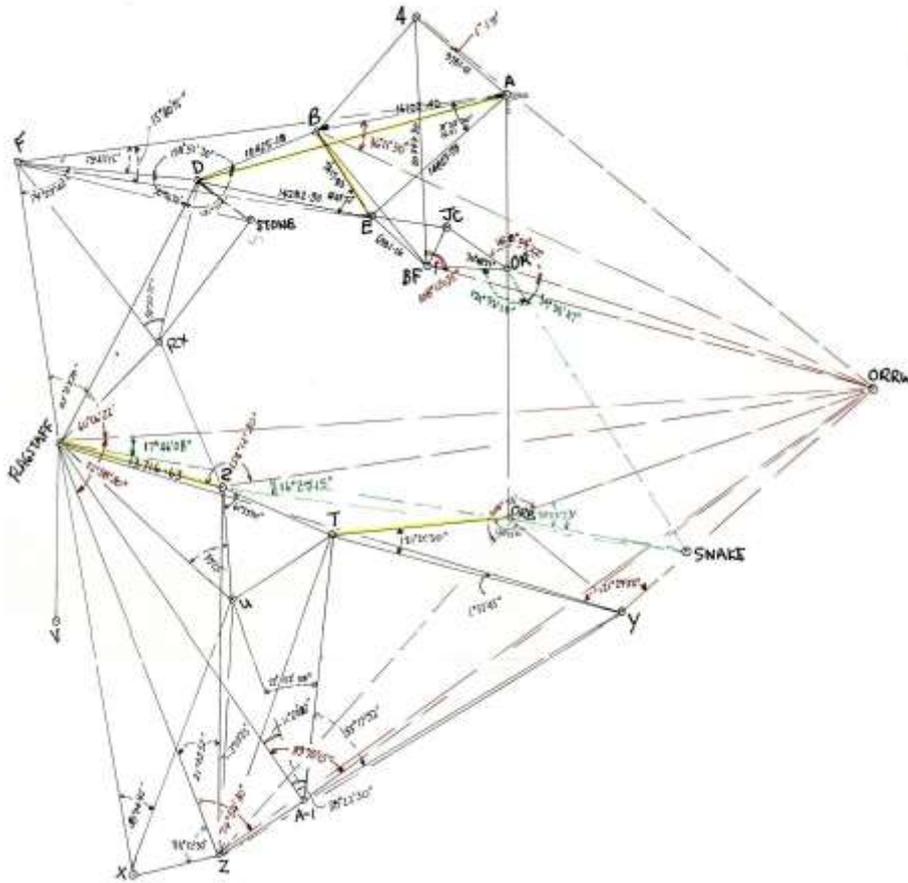


Figure 3: Working diagram identifying original District of Adelaide Trigonometric Stations established 1837-1838, and Baselines **A–D**, **B–E**, **Flagstaff–No.2** and **T–ORB**. Derived and drawn by J.R. Porter, from Finniss’s Trigonometric Survey of Adelaide and Environs Field Notes (Finniss, 1837-38); as edited by K Henderson, 2021.

4.2 Other Baselines

Ormsby commenced his trigonometric survey from the peg placed, during the survey of the city blocks, at the corner of South and West Terraces. He extended the established alignment of West Terrace southwards along Goodwood Road to **Station OR** (later the north-east corner of Country Section No. 7, near Wayville Showgrounds), and **Station ORB** (north of the Daws Road / Goodwood Road intersection) and placed a number of trigonometric stations on the foothills that formed the physical boundary of his allocated sector.

Although there are no records yet found of baseline measurements and calculations by Ormsby's survey party, on 5 February 1838 Finniss refers to the west front of the Town base. After taking a bearing of the line of separation from Ormsby's work (Goodwood Road), Finniss takes a bearing of $81^{\circ} 30'$ to a "Perpendicular base". He also records the angle between "**Colonel Light's Station**" and the "**Boarding Pike base 5 chains**" and takes an angle from the **Boarding Pike** between **Station No.4** and **Colonel Light's Station**.

5. THE DISTRICT OF ADELAIDE TRIGONOMETRIC STATIONS

Finniss recorded a number of angular observations to elevated points in Ormsby's area from different stations within his network (Figure 3), and measured a distance to Ormsby's terminal station on Goodwood Road (**ORB**) from his own trigonometric station (**T**).

Finniss's field notes also record a limited number of connections to stations placed by Light, indicating that all three sectors were surveyed in the same manner and properly interconnected. This enabled topographical data collected by all survey parties to be integrated and plotted to form the base plan for the design of the original layout of the rural Sections and road alignments, the 'Plan of the Preliminary Country Sections in the District of Adelaide, South Australia' (Figure 2).

5.1 Ormsby's Traverse

Surveyor George Ormsby arrived in February 1837 and was immediately engaged in laying out Town One Acre parcels. Assistant Surveyor William Jacob (1815–1902) was directed to assist him. After a period involved in drafting plans for Light, Jacob was again assigned to Ormsby on 14 August 1837 to assist him with the trigonometric survey for the sector of the Adelaide Plains to the east of the West Terrace/Goodwood Road baseline. While no records prepared by Ormsby during this period have yet been located, Jacob included a number of entries in his Journal that give an indication of the manner in which the work proceeded.

On 21 August 1837, he went into the field with Ormsby and Hardy. They pitched their tent "*by the side of a very small, clear rivulet of fresh water, immediately under the Hills distant about 4 miles from Adelaide in a south-easterly direction.*" Work commenced on 23 August, and Jacob recorded that he "*put up a flag on the hill the other side of the brook to our encampment*". The following day, the team was engaged in "*putting flags up for the country survey*", and on 25 August a baseline was laid out. This was measured six days later, and re-chained the following day. For 16 to 29 March 1838, Jacob records Colonel Light being "*very ill*", and that Light had deservedly drawn (on 28 March) first choice for selecting a Country Section. He chose Section 1, with River and Park frontages, near his earlier triangulations.

5.2 Light's Traverse

Some Trigonometric Stations in the area north of the River Torrens are referred to by Finniss, and details of these are provided by a fragment in Light's papers of his survey of a former watercourse north of the River Torrens (Bowden / Brompton / Hindmarsh) (Figures 4 and 5).

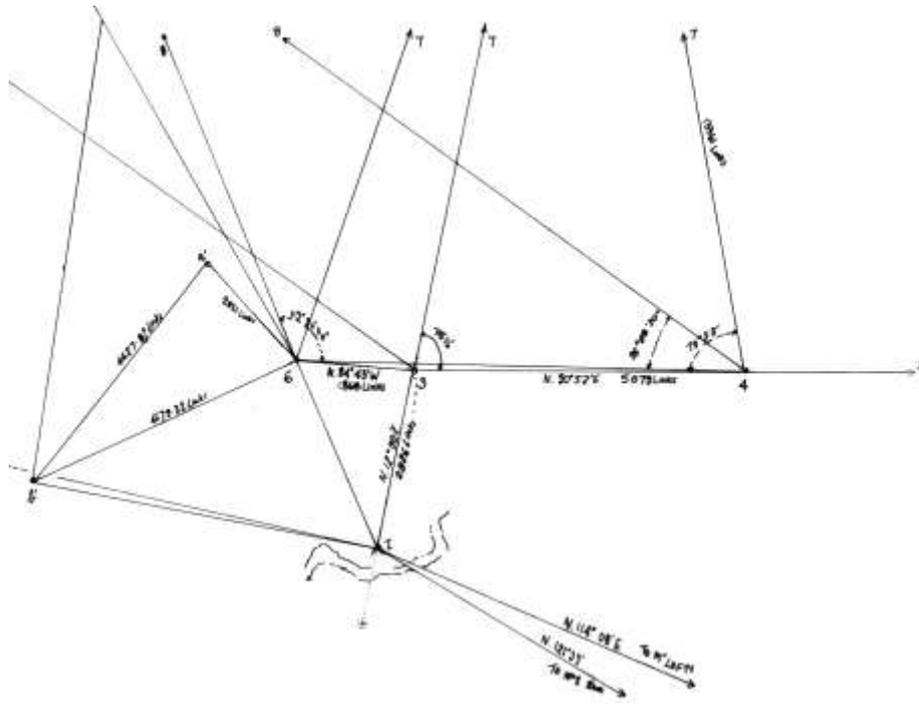


Figure 4: Diagram detail of Light's Traverse north of the River Torrens, with bearings to Mt Lofty, N 114° 08' E, and to No.1 Town [Station A] N 121° 33' [E]. Drawn by J.R. Porter, from State Library of South Australia PRG1/6/261 (see Figure 5).

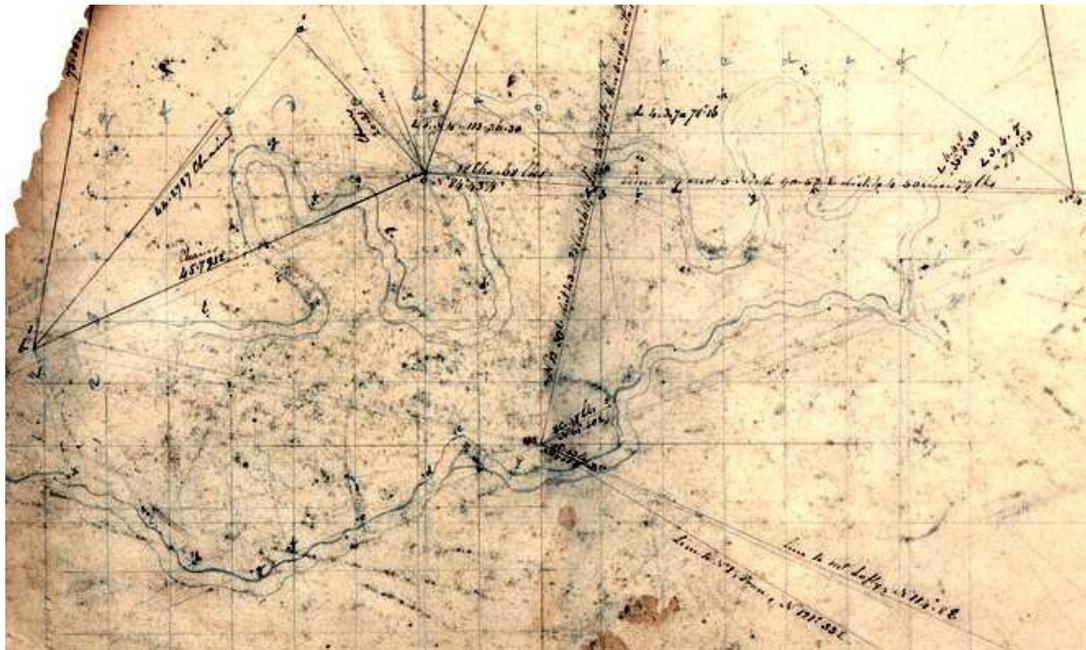


Figure 5: Detail of Light's trigonometric survey network of former river course, north of the River Torrens, State Library of South Australia PRG1/6/261 [Light Collection].

5.3 Finnis's Survey Field Notes

In addition to detailed records of Stations in his area west of Goodwood Road, Finnis made several connections to Ormsby's stations on the Mt Lofty foothills, and his traverses of the River Torrens and surveying of the lagoons and Reed Beds connected to several of Light's stations. Therefore it is possible to identify the name, and approximate location, of over 60 of the District of Adelaide's original trigonometric stations (Figure 6; Table 3).

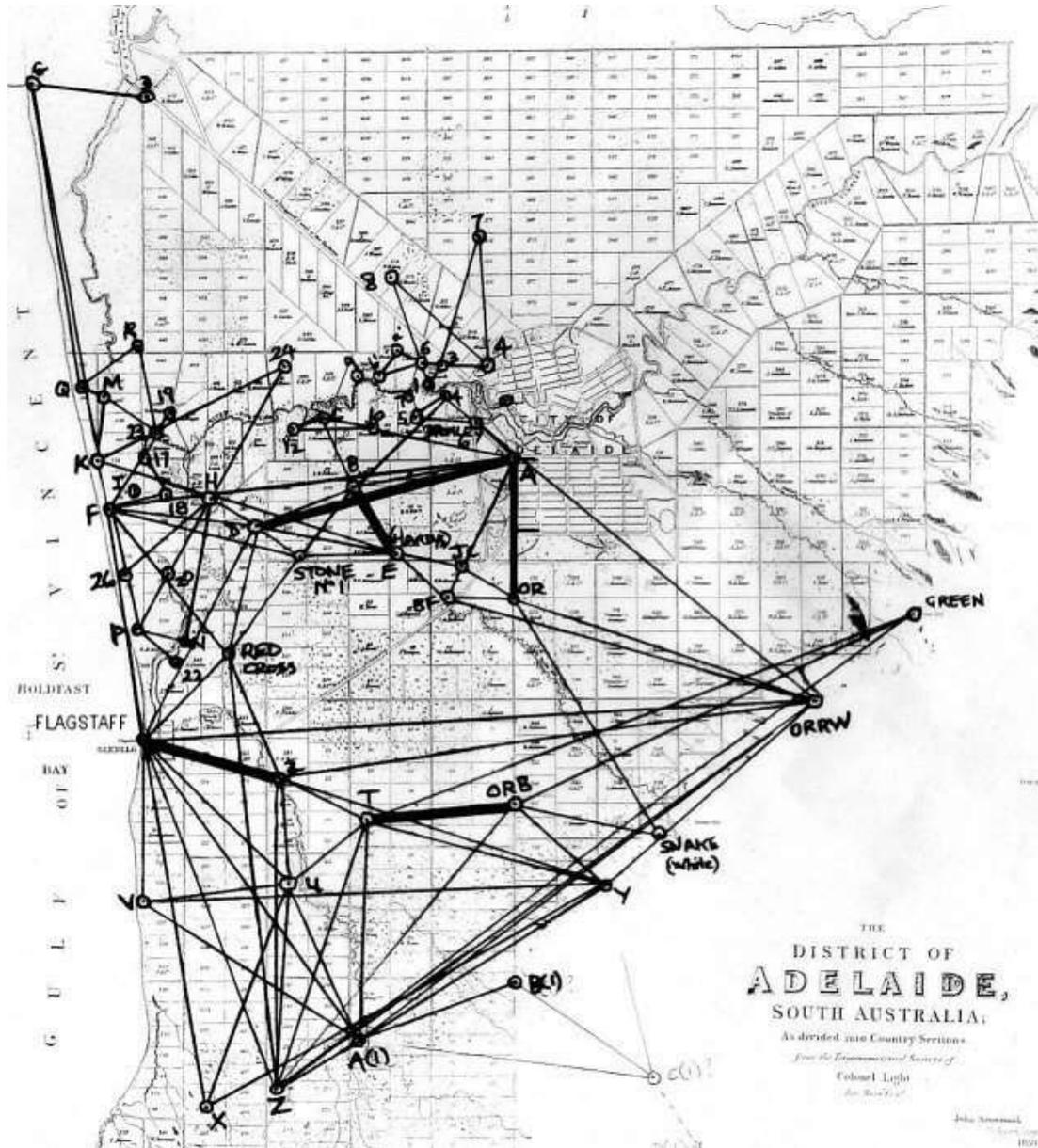


Figure 6: Working diagram of original District of Adelaide Trigonometric Stations' names and approximate localities, identified by J.R. Porter and K. Henderson as at end of March 2021. Rough working diagram by K. Henderson, March 2021.

DATE	TRIG STATION	LOCATION	DESCRIPTION
Late 1836	Flagstaff at Holdfast Bay	Sandhill on coast, south of Patawalonga	Established by Light
Jan 1837	A	Town Acre 1 NW corner (North Tce/West Tce)	Starting point of Light's Town Survey
?March 1837	G – Red & Blue, on coast	Flagstaff west of old Port, sighted from Syren and No.3 by Light in his Nov survey	Sighted to by Finniss on 6 May 1837
2 May 1837	A	Country Survey commenced at Trig Station A (Trig Station 1)	Finniss with 4 men: Symonds, Hardy, Finch and Wellman
	B	Country Section 92	by Cannan & Stone
	C	north of Section 97	by Cannan & Stone
by 3 May 1837	(?G) Red & Blue on coast		
	E (Hardy's Flag or Peg)	Country Section 50, on plain	
3 May 1837	D	Country Section 164	Put up by Finniss with Cannan & Stone
	A, B and D; Base A-D	Angles taken	
	From A	Measurement along line run south from A	Symonds, Hardy, Finch & Wellman
4 May	AD Base line	Base line flagged out; measured 2 miles	Finniss, Cannan, Hardy, Symonds, Finch & Stone
6 May	Flagstaff Holdfast Bay	Sandhill on coast, south of Patawalonga	Finniss took angles
6 May	F – two Red stripes, Blue between, on sea coast	Country Section 230	Put up by Cannan and Stone
14-15 May	Base AD remeasured and second re-measure		
17 May	Base BE measurement; measured across Base AD		
4-5 June		Finniss laying down small triangles	
by 12 June	No. 4 – near bridge	Section 46	
	No. 5 – tree with White & Blue	White & Blue in the plain opposite Bridge, Country Section 47	
	Station No. 6 by Captain Bromley's	In the Park, edge of Port Road; east of Country Section No.1	
	No. 7 (near cherry trees)	Country Section 47; River Torrens south bank, west side of South Rd	
	No. 9	Bend of River near Light's Camp	
	No.10 – blue & white	Country Section 95	
	Red No. 13		
12 June		Secondary triangles, River Torrens Survey	Finniss
by 13 June	No. 12	Northern edge of Country Section 144	Repairing theodolite
14-27 June		Light interrupted, called away to Encounter Bay trip	
16-21 June		Wet weather no field work	
by 28 June	Stone's Flag 'on road'	Country Section 158	Stone discharged 28/6
30 June		Finniss ordered to mark out Town (rescinded 1 July)	
12 July	H	Camp Lagoon, Country Section 192	
13-14 July		Surveyed lagoon	Finniss, Black, Rogers, Wellman & David
by 14 July	13 – Flag on bush near lagoon		
	14 – Blue flag		
	15 – Flag on plain		
	16 – Wellman's flag on river		
	Red flag by fork of river		
	I – Black stump of Red & White	?east side of Section 192	
15 July	Large White flag	at termination of winding river	Put up by Finniss' party
By 15 July	No. 17	End of winding stream, north branch	
	No. 18		

Table 3. District of Adelaide Trigonometric Stations recorded by Assistant Surveyor B.T. Finniss. Tabulated by K. Henderson from Field Notes (Finniss, 1837-38).

DATE	TRIG STATION	LOCATION	DESCRIPTION
18 July	K – large white, on coast	Section 223, on coast	
By 26 July	M	Section 447	
	Mainmast of <i>Tam O'Shanter</i>		
	White flag towards camp		
8–13 Aug	Men putting up stations & making flags all week		
By 21 Aug	N	Country Section 187 on eastern edge of river	
	O	Country Section 170	
	P – Red over white, on coast	On unnumbered Country Section west of Section 226	
	20 – 1 st flag on River, Glenelg	On northern edge of Country Section 224	
	22 – flag at head/?bend of River	West side of Section 186	
	26 – White, on coast	On boundary between Sections 227 & 228	
By 22 Aug	19		
	23	Boundary of Sections 433/434	
	24		
	Q – white on coast	Section 448 on coast	
	R	East of Port River, west of Section 443	
By 6 Sep	Ormsby's Red & White (ORRW)	on hills face	
By 13 Sep	JC	Country Section 45	
	BF	Country Section 44	
	OR – Ormsby's	3350 south of Green Hill Rd; A-OR Base line	
By 13 Sep	a, b, c	Survey of Snake River (Brownhill Creek)	
By 19 Sep	White at source of Snake River	Now named Brownhill Creek	
	No.4 – Kingston Bridge		
By 13 Oct	Small white by Strangway's stream		
By 16 Oct	U	On Country Section 146	
	T	On Country Section 87	
	V – on coast	On Country Section 236	
	X	Last station on hills	
	Y	East of Section 261	
	Z		
	Also Stations No.*2; Green Hill; Red & White; Arrow A to right of O; Arrow left of O		
16 Oct 1837	Base No.*2 to Flagstaff		By Cannan, Chain D
By 14 Nov	*S		
	Gilles' House		
By 22 Nov	A(1)		
6 Jan 1838	Base T on Ormsby's White on Line of Town 14,320 links (corrected to 14,388.374 links)	Flag comes at the corner of Section 7	Using Chain D
By 5 Feb 1838	B(1)	Range leading to Hurtle Vale	
	C(1)		
	D(1)		
Stations likely established by Light early-mid 1837	Colonel Light's Station	Opposite No.4 (Kingston Bridge)	Finniss refers to these in Feb 1838 when he returns to the City environs to carry out detailed survey of the River Torrens
	Flag at Station opposite Canal		
	Boarding Pike base	In River Torrens survey; between No.4 and Colonel Light's Station	
	W	Park line, North Adelaide	
	Station where Park Line of South Adelaide & Canal Road meet		

Table 3. (Continued) – District of Adelaide Trigonometric Stations recorded by Assistant Surveyor B.T. Finniss. Tabulated by K. Henderson from Field Notes (Finniss, 1837-38).

6. MAPPING ADELAIDE

On 5 February 1838, Finnis finished his angles to stations on the northern flank of the range leading to Hurtle Vale. In the City he took River Torrens bearings, and from the SW corner of the Town he measured south: 150 feet for roadway, and an additional 30 chains for the width of ‘Park grounds’ that Light had proposed to set apart in early February of the previous year. Thus, Light’s design and layout of the City of Adelaide and its unique figure-eight Park was completed by the District of Adelaide Trigonometric Survey delineating its outer boundary.

In the Survey Office, mapping had been progressing apace, until early March 1838, when proprietors obtained a court injunction against the Resident Commissioner James Hurtle Fisher. Wanting to make their choices from a greater extent of land, they demanded deferral of the imminent land selections, and extension of the survey to other areas.

Under oath, in South Australia’s Supreme Court on 6 March 1838, Light testified that plans of surveyed lands were being prepared “*with all possible expedition*”. Furthermore, that by 24 December 1837 the “*survey had then been carried to an extent exceeding 60,000 acres, and upwards of 100,000 acres would in a short period from that day be surveyed*”. The Commissioners’ required extent of surveyed lands had been effected prior to 20 February.

The surveyors persevered through a myriad of obstructions: survey labourer strikes; short provisions; scurvy; equipment breakages; bad weather, and factional opposition spurred on by a petulant Governor and venomous press. From a preliminary **Flagstaff Station** (Figure 7), and master station, **Station A**, the trigonometric network was extended across the Adelaide Plains from the foothills to the coast, and from Grand Junction road to Marino. In so doing, the surveyors achieved greater accuracy than the contemporary British Ordnance Survey.



Figure 7: Flagstaff Station, Holdfast Bay. Established late 1836, on a sandhill on the Adelaide Plains sea coast, south of the Patawalonga. Artist J.M. Skipper.

7. POSTSCRIPT

On 2 June 1838, at a dinner given to Light and the Officers of the Survey, all present were unanimous in their testimony of Colonel Light. However, with Kingston’s return came

instructions from the London Commissioners directing Light to abandon the trigonometric survey and instead institute a running survey. Light resigned and his entire Survey Department staff swiftly followed, excepting only Kingston and three officers, two of whom were comparatively recent arrivals.

On 4 July, Light, Finniss, Nixon, Jacob and draughtsman Robert George Thomas met and resolved to form a private company as Land Agents and Surveyors, styled “Light, Finniss & Co.” Soon after the firm was commissioned to provide a plan of the District of Adelaide showing the property of the South Australian Company (Figure 8).

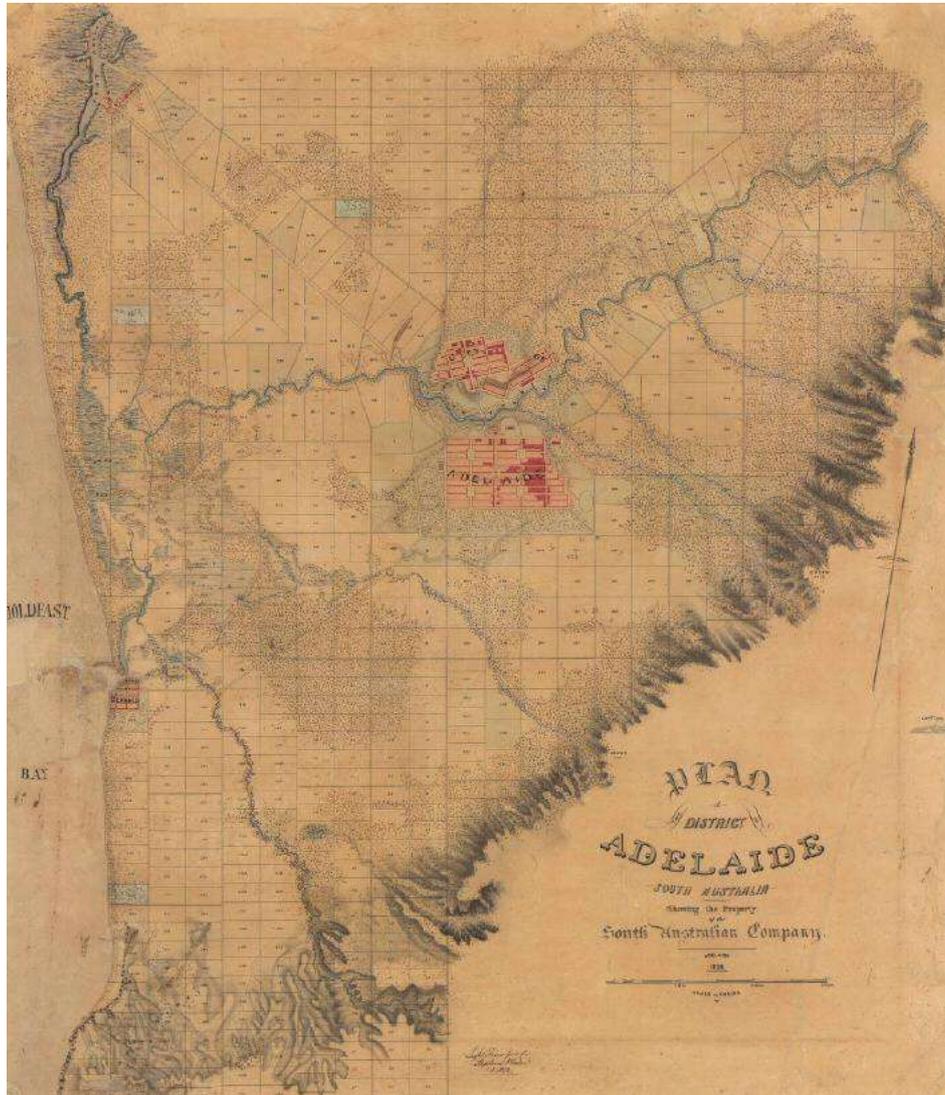


Figure 8: Detail of ‘Plan of the District of Adelaide South Australia Shewing the Property of the South Australian Company. Adelaide, 1838.’ Signed “Light, Finniss & Co, Stephens Place, Oct. 1838.” Composite map of original 134-Acre Preliminary Country Sections and 80-Acre sections. State Library of South Australia MLSA BRG 42/120/17.

8. LANDSCAPE AND LEGACY

In 2010, following the Sydney FIG Congress, Jan de Grave, Director of FIG IIHSM initiated the **Trig Station A** project, to monument the Master Station of the District of Adelaide Trigonometric Survey 1837-1838. This research aims to facilitate marking of further original trigonometric stations of the District of Adelaide Survey, similar, albeit on a smaller scale, to the example set by monumentation of the Struve Geodetic Arc Trigonometric Stations.

Commendation of Light, soon after his completion of the District of Adelaide Survey and resignation, is equally applicable to his survey team. They:

“... had no common work to achieve; ... had to perform it under no common circumstances; ... had done it in no common manner. On him devolved the sole responsibility of fixing the site of the principal city of a new empire, and of surveying an extensive tract for immediate possession. With limited means, in a limited time, against all the opposition which a jealousy of trust so properly confided to him would provoke in one and all, that bigoted ignorance or personal interest could contrive in others, amidst slanders here, and in spite of complaint sent to England, he has gone steadily on – has give us a spot and a plan for a capital of which we may justly be proud, and has already surveyed lands to the full extent that the sales made by the Commissioners require ... Even those who sanctioned any opposition have done him one service – they cannot rob him of the honor of doing all that has been done.” (Southern Australian, 9 July 1838 p3).

Light’s Statue stands on a prominent hill overlooking the Park Lands he created, a continuous reminder to South Australians of the insight, perseverance and resolve that were necessary to build the State’s capital on such a unique landscape. The Trigonometric Survey and its Stations, the means by which Light, with his survey team, founded the District of Adelaide, is equally worthy of recognition.

REFERENCES

- Colonization Commissioners for South Australia, (1836), Letter of Instructions to Colonel William Light, Surveyor-General for the Colony of South Australia, First Report of Commissioners, Appendix 9, p 33, London, (House of Commons).
- FINNISS, B.T., Trigonometric Survey of Adelaide and Environs 2 May 1837 to 5 February 1838, Cadastral Survey Field Book 76, Adelaide, Surveyor-General’s Office.
- JACOB, W., Diary 1 Jan 1837–23 Sep 1838. State Library of South Australia, PRG 558/23.
- KINGSTON G.S., List of Surveying and Drafting Equipment, 10 April 1837, State Library of South Australia, PRG 1/1-2, Item 41.
- DUTTON G., ELDER, D.F., (1986), William Light, Founder of a City, Adelaide, Rigby Ltd.
- ELDER, D.F., (1984), Light, W. (1839), *William Light’s Brief Journal and Australian Diaries with an introduction and notes by David Elder*, Adelaide, Wakefield Press.
- HENDERSON, K., (2008), William Light’s Adelaide: the genius of place and plan. 16th General Assembly and International Scientific Symposium, Quebec, ICOMOS.
- ORMSBY G.O., (1838), A List of Instruments and Other Articles in the Surveyor-General’s Office, 30 October 1838, State Library of South Australia, PRG 1/ [Light Collection].

PORTER, J.R., (2007), Light's Survey of Adelaide – facts, fables and fancies', *South Australian Geographical Journal*, Vol 106, pp 53-83. Adelaide, Royal Geographical Society of South Australia Inc.

PORTER, J.R., (2010), South Australia's Shining Light. *Proceedings of the FIG Congress 2010 History Workshop, Sydney, Australia. 9-10 April 2010*, FIG.

STEVENSON, G. (ed), (1838), Col. Light and Mr. Kingston, 16 Jun 1838, p2, Adelaide, *South Australian Gazette and Colonial Register*.

BIOGRAPHICAL NOTES

John Porter is a former Surveyor-General of South Australia and Fellow of the Institution of Surveyors, Australia. He graduated from the University of Adelaide with a Degree in Surveying in 1962, and holds Post-graduate Diplomas in Town Planning and Business Administration. Through his earlier association with the South Australian Government's services export company SAGRIC International, he spent over 15 years working in the global market, much of this time on long-term implementation of land administration functions. He has worked in a range of countries with differing social, political, economic and religious institutions and has visited many others in the pursuit of market opportunities, particularly in regard to UN, World Bank, Asian Development Bank, EU and AusAID funded projects. Earlier in his career in the South Australian Government, he held the position of Assistant Commissioner of Highways before being appointed Surveyor-General in 1988. A Fellow of the Institution of Surveyors, Australia, he served as South Australia's Division President and Federal Councillor, and while stationed overseas represented Australia in Commission 1 of FIG. He is now retired.

Kelly Henderson graduated from Flinders University of South Australia (B.Sc., Comp. Sci.), holds a Post-graduate Certificate in Telecommunications, is a Life Member of the Royal Geographical Society of South Australia Inc (RGSSA) and served as an RGSSA Councillor (2003-2009), and Chairman of the RGSSA's Geographical Heritage Committee (2004-2009). Kelly Henderson takes responsibility for any and all errors in this paper made in editing and presenting John Porter's research on the original District of Adelaide trigonometric stations.

CONTACTS

John Porter AUSTRALIA
14 Orleana Street
Flagstaff Hill
SOUTH AUSTRALIA 5159
jandrporter@internode.on.net

Kelly Henderson AUSTRALIA
PO Box 59
North Adelaide SOUTH AUSTRALIA 5006
khenderson002@gmail.com