



**HERITAGE  
COUNCIL**  
OF WESTERN AUSTRALIA

## **REGISTER OF HERITAGE PLACES ASSESSMENT DOCUMENTATION**

### **11. ASSESSMENT OF CULTURAL HERITAGE SIGNIFICANCE**

The criteria adopted by the Heritage Council in November 1996 have been used to determine the cultural heritage significance of the place.

#### **PRINCIPAL AUSTRALIAN HISTORIC THEME(S)**

- 3.11 Altering the environment
- 3.26 Providing health services
- 4.1 Planning urban settlements
- 4.2 Supplying urban services (inc sewerage)
- 4.6 Remembering significant phases in the development of settlements, towns and cities
- 7.6 Administering Australia
- 8.13 Living in cities and suburbs

#### **HERITAGE COUNCIL OF WESTERN AUSTRALIA THEME(S)**

- 108 Government Policy
- 112 Technology and technological change
- 404 Community services and utilities
- 507 Water, power, major transport routes

#### **11.1 AESTHETIC VALUE\***

*Metropolitan Sewerage Vents* is an example of decorative but functional cast iron work in public infrastructure. (Criterion 1.1)

#### **11.2. HISTORIC VALUE**

*Metropolitan Sewerage Vents* is remnant visible infrastructure from the earliest phase of Perth's deep sewerage system, which was connected to individual properties from February 1911, with one vent (Gray Street Vent) being remnant from the significant extension of the system through Subiaco from 1927. (Criterion 2.1)

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\* For consistency, all references to architectural style are taken from Apperly, R., Irving, R., Reynolds, P. *A Pictorial Guide to Identifying Australian Architecture. Styles and Terms from 1788 to the Present*, Angus and Robertson, North Ryde, 1989.

For consistency, all references to garden and landscape types and styles are taken from Ramsay, J. *Parks, Gardens and Special Trees: A Classification and Assessment Method for the Register of the National Estate*, Australian Government Publishing Service, Canberra, 1991, with additional reference to Richards, O. *Theoretical Framework for Designed Landscapes in WA*, unpublished report, 1997.

*Metropolitan Sewerage Vents* provides evidence of the establishment of a deep sewerage system for Perth (operational from 1911), which was the culmination of decades of agitation and over ten years of active consideration and planning in response to concerns at the increasingly unsanitary condition of the State's capital, and was a significant milestone in the development of Perth as a modern city. (Criterion 2.2)

The Perth sewerage system as a whole was primarily designed and its roll-out overseen by PWD engineer Hugh Oldham, and *Metropolitan Sewerage Vents* is one of the few visible elements remaining of the substantial system he implemented. (Criterion 2.3)

### 11. 3. SCIENTIFIC VALUE

*Metropolitan Sewerage Vents* are a visible remnant of the deep sewerage scheme implemented in Perth and Fremantle between 1906 and 1930. The *Metropolitan Sewerage Vents*, together with six 1913–16 sewerage pumping stations at Perth and Fremantle<sup>1</sup>, demonstrate the technical achievements of the Public Works Department (PWD) and the Metropolitan Water Supply Sewerage and Drainage Department (MWSS&DD) in executing the scheme, a significant milestone in the development of Perth as a modern city (Criterion 3.3)

### 11. 4. SOCIAL VALUE

Individual elements within *Metropolitan Sewerage Vents* are valued by people who live and work near them as attractive and quirky mementos of the history of Perth. (Criterion 4.2)

## 12. DEGREE OF SIGNIFICANCE

### 12. 1. RARITY

*Metropolitan Sewerage Vents* is a small sample of surviving c.1911–1930 sewerage ventilation shafts, a once-common piece of sewerage infrastructure that appears to have largely been removed and/or forgotten across the country. (Criterion 5.1)

*Metropolitan Sewerage Vents*, together with six 1913–16 sewerage pumping stations at Perth and Fremantle, provides the only known visible evidence of the sewerage scheme implemented in Perth and Fremantle. (Criterion 5.1)

*Metropolitan Sewerage Vents* demonstrates the once-common practice of natural ventilation for deep sewerage systems, which is no longer practised in Perth and also appears to have become uncommon elsewhere, due to changing sewer technology. (Criterion 5.2)

### 12. 2 REPRESENTATIVENESS

*Metropolitan Sewerage Vents* comprises six representative examples of the standard ventilation shafts erected for the Perth and Fremantle sewerage systems from 1911 to at least the late 1920s. (Criterion 6.1)

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<sup>1</sup> P3298 *Low Level Sewage Pumping Stations No.s 1 & 2, Perth* (RHP) (1914); P22775 Beach Street Pumping Station (Fremantle MHI) (1916); P22558 Former Pumping Station (Fremantle MHI) (1913); P21271 M.W.S.S. & D.B. [sic] Pumping Station (Fremantle MHI) (1913); 1914 pumping station and adjacent toilet facility located within P17714 Fremantle Esplanade Reserve (Fremantle MHI).

### 12.3 CONDITION

*Metropolitan Sewerage Vents* is in good condition.

Several examples exhibit some level of corrosion, which has been managed by repainting of the base.

### 12.4 INTEGRITY

*Metropolitan Sewerage Vents* comprise six examples of ventilation shafts erected between 1911 and the 1920s. The vents were installed as circumstances required, in response to specific demand. They operated independently of each other and were disconnected from the main sewerage system in the 1970s in response to changing sewer technology. Although it is unlikely that the vents would be redeployed for their original purpose, they have retained their original appearance and the majority of original fabric remains.

The original function of *Metropolitan Sewerage Vents* is clearly discernable from the form and appearance of the individual elements. Collectively, the vents have a moderate degree of integrity.

### 12.5 AUTHENTICITY

*Metropolitan Sewerage Vents* has a moderate level of authenticity. Most of the original fabric of the individual vents appears to remain, although the cowl at the apex of the vent appears to have been removed from each vent, with the exception of the Cook Street vent. It is possible that some upper segments of the pipes have also been removed. Some corrosion has been observed, but this has been managed by the repainting of the cast iron bases.

### 13. SUPPORTING EVIDENCE

The documentation for this place is based on the heritage assessment completed by Clare Menck, historian, in November 2013. The physical evidence, amendments and additions have been undertaken by Karina Williams, Senior Heritage Officer with the State Heritage Office, and the Register Committee.

#### 13.1 DOCUMENTARY EVIDENCE

*Metropolitan Sewerage Vents*, a collection of six circular metal ventilation shafts approximately 30-50 feet (9-15 metres) high, with decorative cast iron bases, was erected between c.1911 and 1928 to assist in reducing odours associated with the completion of Perth's new sewerage system.

What is now central Perth was established as a townsite in August 1829. It developed through the nineteenth century along the lines of early 1830s plans but without coordinated drainage or sewage disposal systems. By the late 1860s there were reports that this situation was causing illness in the Perth population. The construction of the Claisebrook Drain in the 1870s improved drainage, but sewage continued to be a major problem, with Perth even referred to as a 'dunghill'.<sup>2</sup> The Perth Board of Health, established in 1886, made minor improvements, but the city's sanitation provisions were entirely unprepared for the population boom brought by the gold rushes of the 1890s.<sup>3</sup>

Perth City Council finally introduced a pan collection system from 1893, superseding the ad hoc arrangement of cess pits, earth closets and home-solutions that had been in place. Some politicians, including Winthrop Hackett and William Traylen, began to agitate for a deep sewerage system, but it was viewed as generally not desired by the general public and unreasonably expensive. By 1900 the pan collection operated twice weekly.<sup>4</sup>

Typhoid outbreaks in 1895, 1896 and 1897 brought mounting pressure to improve the city's sanitation. Doctors in 1898 petitioned the government for deep sewerage.<sup>5</sup> However, it was not until 1903 that the government finally gave serious attention to planning deep sewerage for Perth.<sup>6</sup>

Plans were developed from 1903 under Hugh Oldham, the senior engineer for water and sewerage matters with the Public Works Department (PWD) and later the first Principal Engineer of the new Water Supply, Sewerage and Drainage Department, with expert advice from C.S.R. Palmer. They built on earlier work commissioned by Napier Bell in 1897, and further developed by consultant engineer Thomas Cowley Hodgson in 1900, but achieved a much cheaper sewerage solution.<sup>7</sup>

Commenting on the various schemes proposed to manage Perth's sewerage, Palmer in 1903 noted that one of the most challenging matters for dealing with sewerage was its propensity to generate 'noxious gases'. This was particularly a

<sup>2</sup> Stannage, C.T., *The People of Perth*, Perth City Council, Perth, p. 177.

<sup>3</sup> HCWA register documentation, P03298 *Low Level Sewage Pumping Stations Nos. 1 & 2, Perth*, 2006, pp.4-5

<sup>4</sup> *ibid.*, pp.5-6

<sup>5</sup> *ibid.*

<sup>6</sup> *ibid.*

<sup>7</sup> *ibid.*; Annual Report of the Water Supply, Sewerage and Drainage Department, 1912-13

problem in large main sewers where sewerage travelled long lengths while decomposing. The problem was dealt with to some extent by 'ventilating upcast pipes' but it was also proposed to install small scattered processing installations rather than transport waste matter long distances to a single facility.<sup>8</sup> However, small processing installations do not appear to have ever been installed.

A 1903 plan for the proposed sewerage system shows ventilators alternating with manholes along both the main and reticulation pipes, spaced about 50-100 metres apart. Presumably these were intended as small vents flush with the ground, as they are largely through roadways, but later plans do not show this extensive ventilation system.<sup>9</sup>

From 1906, engineer Frederick Waslington Lawson joined the PWD sewerage team and contributed significantly to the final plans for the Perth and Fremantle sewerage systems.<sup>10</sup> The Perth system comprised four septic tanks at treatment works at Claisebrook, which saw the treated waste sent by syphon across the river to filter beds at Burswood Island, before being discharged into the Swan River.<sup>11</sup>

Work on the Claisebrook treatment plant began in June 1906. The following year the 'Claisebrook Main Sewer' was begun, following the valley between Lake Monger and the Swan River at Claisebrook. Four branch sewers fed into this main, being the Terrace, Parry Street, Hyde Park and Mount Lawley Main Sewers.<sup>12</sup> Once main sewers were laid, 'reticulation' piping was installed to bring the sewerage system to every street. Work began on the Claisebrook Main Drain and Parry Street Branch in August 1907, and the Mt Eliza Main Sewer in January 1908. The Hyde Park drain and sewer had also been commenced by this time.<sup>13</sup> New filter beds were also constructed south of the Claisebrook treatment works, on firmer ground, with first new bed put into use in June 1913.<sup>14</sup> A new syphon line of Monier concrete pipes was laid across the Swan River to the filters and began operating in May 1915.

Both Parliament and the local newspapers heavily criticised the sewerage works, eventually bringing about a Royal Commission in 1909 to investigate them. The Commission's findings were entirely in favour of the works as being carried out by the PWD.<sup>15</sup>

Ventilation shafts do not appear to have been included in the original planning of the sewerage system. In March 1909, the PWD requested that the City Engineer, Mr Haynes, be made available for a committee to consider proposals for ventilation of the Metropolitan sewerage system. The committee was to comprise Mr Hugh Oldham (Engineer for Water Supply & Sewerage), Dr Cumpston and Mr Haynes. The City Engineer was permitted by Perth City Council to participate in

<sup>8</sup> C.S.R. Palmer, Engineer-in-Chief, 'Report and Recommendations', 10 Sept 1903, in Public Works Department 'Reports on the Sewerage of Perth and its Environs', Government Printer, Perth, 1903, pp.27-31, SROWA Cons 855 Item 1903-04/099

<sup>9</sup> 'Perth Sewerage: Scheme No.5: General Plan', PWD plan 16 March 1903, SROWA Cons 1647 Item 10724

<sup>10</sup> HCWA register documentation, P03298 Low Level Sewage Pumping Stations Nos. 1 & 2, Perth, 2006, p.7

<sup>11</sup> Hunt, Su-Jane, *Water: the abiding challenge*, Metropolitan Water Board, Perth WA, 1980, pp.63-66

<sup>12</sup> HCWA register documentation, P03298 Low Level Sewage Pumping Stations Nos. 1 & 2, Perth, 2006, p.7

<sup>13</sup> 'Sewerage Scheme – Correspondence from 23 June 1905 to 31 August 1909' (Perth City Council file) SROWA Cons 2920 Item 193C

<sup>14</sup> Dr Sue Graham-Taylor, email to Karina Williams (HCWA), 21 March 2014, 24 May 2014

<sup>15</sup> HCWA register documentation, P03298 Low Level Sewage Pumping Stations Nos. 1 & 2, Perth, 2006, p.7

the committee, but the Council was clear that it would not accept responsibility for implementing any decisions of the committee.<sup>16</sup>

By the end of 1910, all was in order to begin connecting properties to the sewers that had been constructed. House connections began in February 1911.<sup>17</sup> By this time, 291 miles (approximately 468 kilometres) of reticulation piping had been laid, mostly in the previous twelve months. This allowed sewerage connection for 'practically the whole of the residential portion of Perth proper' with 'the main business part of the city' to be covered by impending works for another ten miles (16 km) of such piping. The laying of reticulation piping was completed by day labour.<sup>18</sup> House connection work continued at pace, such that two years later over 2,500 properties were connected to the sewers and the Metropolitan Water Supply Sewerage and Drainage Department (MWSS&DD) was connecting around 50 houses each week in the Perth District.<sup>19</sup>

Between 1912 and 1914, three Pumping Stations were constructed to pump the sewage from the low level area along the Perth foreshore to the Terrace branch sewer.<sup>20</sup> The stations were single storey ornately styled buildings with gentlemen's toilets located at ground level, and underground concrete receiving tanks and machinery room situated below.<sup>21</sup> Construction of Low Level Sewage Pumping Station No. 3 (demolished 2004) at the foot of Mill Street was completed in April 1913.<sup>22</sup> Low Level Sewage Pumping Station No. 2, south of Terrace road near Hill Street, and Low Level Sewage Pumping Station No. 1, on the Causeway north of the line of Terrace Road, were finalised in February and June of 1914 respectively.<sup>23</sup>

In 1913, a pumping station of similar design to the Perth stations was established on Fitzgerald Terrace (now Marine Terrace) in Fremantle, as houses in South Fremantle began to be connected to the deep sewerage system.<sup>24</sup> Two additional stations were constructed on Market and Essex Streets in 1914, the Essex Street facility including an adjacent, detached toilet block.<sup>25</sup>

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- 16 'Sewerage Scheme – Correspondence from 23 June 1905 to 31 August 1909' (Perth City Council file) SROWA Cons 2920 Item 193C  
Note: Searches of the SROWA and Water Corporation databases to date have found no further material relating to this ventilation committee.
- 17 'Sewerage Connections etc' (Perth City Council file) SROWA Cons 2920 Item 193B
- 18 *The West Australian*, 10 Feb 1911, p.3, accessed at [trove.nla.gov.au](http://trove.nla.gov.au), 30 Sept 2013
- 19 'Sewerage Connections etc' (Perth City Council file) SROWA Cons 2920 Item 193B  
Note: Construction was managed by the Public Works Department, until June 1912 when the works were taken over by the MWSS&DD.
- 20 Kelly, I & Moulds, T, 'Assessment of Cultural Significance of Perth Low Level Sewerage Pumping Stations (Nos: 1, 2 & 3), July 1992, p. 2
- 21 HCWA register documentation, P03298 Low Level Sewage Pumping Stations Nos. 1 & 2, Perth, 2006, p. 12.
- 22 Kelly & Moulds, T, 'Assessment of Cultural Significance of Perth Low Level Sewerage Pumping Stations (Nos: 1, 2 & 3), July 1992, p. 2
- 23 Kelly, I & Moulds, T, 'Assessment of Cultural Significance of Perth Low Level Sewerage Pumping Stations (Nos: 1, 2 & 3), July 1992, p. 2
- 24 InHerit, Government of Western Australia, 'M.W.S.S. & D.B. Pumping Station, 166 Marine Terrace', accessed at <http://inherit.stateheritage.wa.gov.au/Public/Inventory/>, 18 March 2014
- 25 HCWA register documentation, P03298 Low Level Sewage Pumping Stations Nos. 1 & 2, Perth, 2006, pp. 9–11, 15  
Note: The assessment documentation for P03298 Low Level Sewage Pumping Stations Nos. 1 & 2, notes that although the buildings were constructed in 1914, the buildings both bear the date 1913. Similarly, the

As the sewerage system began processing household sewage, complaints of foul odours began to emerge, particularly in summer. The smell of sewage worried residents not only for its obvious unpleasantness, but because it was believed by some to be a cause of disease.<sup>26</sup> Many of these complaints related to the Claisebrook and Burswood treatment works, with the river in the vicinity of the sewerage works reported as foul smelling much of the time.<sup>27</sup> The odours related to the excessive growth of algae that resulted from the discharge to the river from the filter beds. Other odours were found to relate to stormwater, which, though it included horse manure washed off roads and some household waste and was little different in substance to sewage, was managed by Perth City Council rather than the MWSS&DD.<sup>28</sup>

Noxious odours in sewerage are predominantly caused by hydrogen sulphide. Hydrogen sulphide is produced when fresh sewage has insufficient oxygen to maintain an aerobic character and begins to go septic. As hydrogen sulphide can be detected by smell with a concentration as low as one thousandth part per million, it very easily creates an odour nuisance. The main source of hydrogen sulphide in sewerage systems is the slime that builds up on sewer walls, not the ongoing flow of fresh sewage.<sup>29</sup> As well as being malodorous, hydrogen sulphide is highly corrosive. Ventilating sewerage systems is important for the longevity of the piping itself.<sup>30</sup>

In December 1911, the MWSS&DD notified Perth City Council that it was about to go ahead with work to erect a ventilating shaft at Cook Street. It was to be 'a cast iron base and the usual standard pattern for streets'. Another such vent was also to be constructed 'at Adelaide Terrace near the corner of Victoria Square easterly there from to just opposite the Loretto Convent'.<sup>31</sup> The tone of the letter and reference to 'the usual standard pattern' suggests that these two were not the first ventilators constructed. The Adelaide Terrace Vent, which was in operation by February 1912, was erected in response to complaints of noxious odours.<sup>32</sup> It is likely the erection of Cook Street Vent was similarly motivated, especially as it was located on reticulation piping rather than above a sewer main.

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former pumping station building at 1 Elder Street, Fremantle (corner of Market Street) bears the date 1913, but was also constructed in 1914.

26 At least as late as the 1890s, and likely later, medical personnel in Perth are known to have believed typhoid could be caught by smelling night soil. Hunt, Su-Jane *Water: the abiding challenge*, Metropolitan Water Board, Perth WA, 1980, pp.32-33

27 *The West Australian*, 27 May 1915, p.6, accessed at [trove.nla.gov.au](http://trove.nla.gov.au) 30 Sept 2013

28 'Sewerage Connections etc' (Perth City Council file) SROWA Cons 2920 Item 193B; 'Sewerage Scheme – Correspondence from 23 June 1905 to 31 August 1909' (Perth City Council file) SROWA Cons 2920 Item 193C; Various newspaper articles eg *Sunday Times*, 12 Feb 1911, p.11, accessed at [trove.nla.gov.au](http://trove.nla.gov.au) 30 Sept 2013; Hunt, Su-Jane *Water: the abiding challenge*, Metropolitan Water Board, Perth WA, 1980, pp.63-66.

Note: A separate storm water system was developed at the same time as the Perth sewerage system. Stormwater pipes took run off from large open spaces, road and roof run off while sewerage pipes took toilet, bath and kitchen waste. Where possible, stormwater and sewer pipes were laid in the same trench; however this was not always feasible.

29 'Control of Odours from Hydrogen Sulphide in Sewage Works', Dr. W. Muller, MWSS&DD, Perth WA, 1956, SROWA Cons 6887 Item 5

30 'Sewerage Collection System Research – Perth Main Sewer Diversion Hydrogen Sulphide – Deterioration Investigational Work' (Metropolitan Water Authority file) SROWA Cons 7313 Item 10A05303/8

31 MWSS&DD to City Engineer, on 'Sewerage Connections etc' (Perth City Council file) SROWA Cons 2920 Item 193B

32 'Sewerage Connections etc' (Perth City Council file) SROWA Cons 2920 Item 193B

A consistent rationale for installing ventilating shafts has not been able to be determined. It has been suggested that vent shafts were erected at high points on the sewers, as this is where noxious gases accumulated.<sup>33</sup> However, 'high points' occur only in pressure mains, as gravitational sewers require a constant downward flow to work effectively. High points in pressure mains occur where pipes rise above the level of the final discharge point. These may have 'air release valves' but would not be expected to have ventilation shafts. While the gradient of underground pipes cannot be ascertained from the surface topography,<sup>34</sup> the above-ground gradient at Arthur Street, Hyde Park and Gray Street Vents makes it unlikely they are 'high points', casting doubt on this theory of vent location.

Ventilation shafts would ordinarily be erected in areas of high flow and/ or where the sewage is less fresh – generally along the main sewers. Less sewage passes through reticulation than mains sewers, and what does pass is relatively fresh and unlikely to have developed significant odours.<sup>35</sup> However, both Cook Street and Arthur Street Vents appear to be erected above reticulation piping rather than mains, and Gray Street Vent may also have been initially.

Another possible reason for erecting ventilating shafts is where the distance between houses was too great, resulting in a lengthy section of unventilated sewer piping, as house connections provided some ventilation. A 1956 report noted that additional ventilation may be required on small sewers (under two feet [60 centimetres] diameter) if the distance between house vents was greater than 300 feet (91.5 metres). Larger sewers could double or even treble this distance, provided the vent pipes when erected were also larger in diameter.<sup>36</sup> Some of the vents within *Metropolitan Sewerage Vents* could conceivably have been on sections of unvented pipe over 300 feet long, but Cook Street Vent is definitely not on a long section and Gray Street Vent is probably not either.

It appears therefore that ventilating shafts may have been installed in an ad hoc manner, probably due to odour complaints within the first year or two of a sewered area being connected. Sewerage systems are known to have ventilation 'problem points' where 'abnormal turbulence' of unknown cause heightens corrosion.<sup>37</sup> In early 1912, the MWSS&DD noted in response to smell complaints that 'wherever possible' they were installing ventilators.<sup>38</sup>

Royal Street Vent and Arthur Street Vent are located in areas that were house-connected during 1911, and it is likely that, like Cook Street Vent, they were also erected around this time.<sup>39</sup>

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33 Ted Evans, former Asset Manager, Perth Region, Water Corporation, quoted in email from Simon Maughan (Water Corporation) to Sian Ferraz (HCWA), 9 March 2012

34 Charles Sardi, Senior Design Manager – Infill (Water Corporation), conversation with Clare Menck, 6 Nov 2013

35 *ibid.*

36 Sept 1956 report, pp.24-25, on 'Sewerage Research: Sewerage Design Allowances Review', Water Corporation file, Cons 7398 Item 10A111313

37 'Sewerage Collection System Research – Perth Main Sewer Diversion Hydrogen Sulphide – Deterioration Investigational Work' (Metropolitan Water Authority file) SROWA Cons 7313 Item 10A05303/8

38 'Sewerage Connections etc' (Perth City Council file) SROWA Cons 2920 Item 193B

39 *ibid.*



In December 1912, Perth City Council gave permission to the MWSS&DD to use the Council Depot at the corner of Stuart and Palmerston Streets as a 'house connection depot' for six months. This is the exact location of the Stuart Street Vent. The December 1912 correspondence makes no mention of a ventilation shaft, suggesting it was erected after this time.<sup>40</sup> However, it is likely it was put up within the following year as the area was house-connected.

By June 1913, residences in the vicinity of the Stuart Street Vent had been connected to the sewers. In Perth, 3498 houses were already connected to the sewers, with another 361 in Fremantle. Ventilation of the sewerage system was reported to be largely by way of the connections to private premises. All water closets were being installed without a boundary trap, therefore 'simplifying the connection' and 'improving' the ventilation system.<sup>41</sup>

Although not noted in the Department's annual report, private premises not only were not to install boundary traps, they were obliged to install approved individual ventilators. A lengthy opinion piece in *The Daily News* in October 1913 argued that sewer ventilation should be entirely through vents on the main sewers. The complainant noted, however, that 'there are some comparatively small ventilators constructed to ventilate the sewers which are not on private property'.<sup>42</sup>

The initial rush of house connections lasted into 1915. By June 1915, 7730 houses in Perth were connected. In subsequent years the number of new connections per year dropped from around 2000 to several hundred. The annual report for 1914-15 noted that 'the ventilation of the sewers has proved satisfactory, and a further extension of this branch of the system will shortly be introduced'.<sup>43</sup>

Complaints were raised about what were perceived as high costs for house connections to the sewerage scheme.<sup>44</sup> Householders were compelled to connect, with most apparently complying by around 1914-15. However, the Council continued to provide a pan collection as many buildings, especially government premises, including schools, and public buildings such as churches, remained unconnected. This was a concern for the Council's Health Committee for both sanitation and budgetary reasons, as requiring a night soil collection for a dwindling number of premises was a cost the Council did not want to bear.<sup>45</sup>

Other ventilation shafts known to have been erected in this early period were at the intersection of Aberdeen and William Street (1912, to ventilate storm water)<sup>46</sup>, at the Claisebrook treatment works (prior to February 1914)<sup>47</sup>, near the caretaker's cottage in the Council's Mulberry Plantation, 58 Trafalgar Road (late 1913)<sup>48</sup> and outside 241 Murray Street (prior to March 1915)<sup>49</sup>. The latter two were, at least

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40 'Sewerage Connection – Stuart Street – Council's Property' (Perth City Council file) SROWA Cons 3054 Item 1912/435

41 Annual Report of the Water Supply, Sewerage and Drainage Department, 1912-13

42 *The Daily News*, 16 Oct 1913, p.9, accessed at [trove.nla.gov.au](http://trove.nla.gov.au) 30 Sept 2013

43 Annual Report of the Water Supply, Sewerage and Drainage Department, 1914-15, and subsequent years

44 *The Daily News*, 16 Oct 1913, p.9, accessed at [trove.nla.gov.au](http://trove.nla.gov.au) 30 Sept 2013

45 Minutes of the Perth City Council Health Committee, 1912-1920, SROWA Cons 2894 Item 6

46 'Sewerage Connections etc' (Perth City Council file) SROWA Cons 2920 Item 193B

47 'Perth (WA) Sewerage System', in *The Commonwealth Engineer*, 3 Feb 1914, pp.222-25

48 'Sewerage Scheme – General File' (Perth City Council file) SROWA Cons 2920 Item 193A

49 'Sewerage Ventilator 241 Murray Street' (Perth City Council file) SROWA Cons 3054 Item 1915/0585

initially, lower than the roof of nearby buildings, earning complaints of ‘offensive smell’<sup>50</sup> in hot weather, when ‘the stench at night-time [became] almost intolerable, and at times [woke] up every member of the family’.<sup>51</sup>

The area surrounding Hyde Park was house-connected in 1914,<sup>52</sup> but the Hyde Park Vent does not appear to have been erected until some years later. The Hyde Park Main Sewer at that time terminated at Hyde Park near the end of Lincoln Street, about forty metres north of where the Hyde Park Vent is located.<sup>53</sup>

The MWSS&DD’s 1915-16 annual report noted that ventilation of the system remained good, except for ‘the main sewer and the outfall at Fremantle’. By 1916, an additional pumping station had also been constructed at Beach Street, Fremantle<sup>54</sup> and at least three ventilation shafts were added in Fremantle in the year, and another two each in 1916-17 and 1917-18. The number of houses connected in Fremantle by mid-1918 was 3798.<sup>55</sup> It appears that, as in Perth, ventilating shafts were erected as the amount of household sewage the system was handling increased and areas with odour problems were identified. The locations of the Fremantle ventilation shafts were not included in the reports.

In its 1917-18 annual report, the MWSS&DD reported that the sewerage systems of Perth and Fremantle now had a combined number of 27 ‘main ventilating shafts’ in operation, serving a total of 13,441 houses. Most public buildings and all state schools in sewered areas were also connected.<sup>56</sup>

The following year, two new ventilating shafts were erected, one in Perth and one in Fremantle.<sup>57</sup> A northern extension to the Hyde Park Main Sewer had been completed in 1915-16<sup>58</sup> and residences in an area north of Hyde Park roughly bounded by Venn Street, Walcott Street and minor roads two or three blocks west of Fitzgerald Street were connected to this main by 1920.<sup>59</sup> It is likely that the shaft erected in Perth in 1918-19 was Hyde Park Vent, corresponding to both the completion of the Hyde Park Main extension, and the additional house-connections in the area. The location of the Fremantle shaft is not known.

In 1919-20, one ventilation shaft at Fremantle was ‘re-erected’.<sup>60</sup> The following year ‘the whole of the vent shafts were taken down and retarred, repainted and re-

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Note: This street address was probably between William and Barrack Streets, towards the William Street end, in what is now Murray Street mall.

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ibid.

51

‘Sewerage Scheme – General File’ (Perth City Council file) SROWA Cons 2920 Item 193A

52

Annual Report of the Water Supply, Sewerage and Drainage Department, 1913-14

53

Surveyor’s field book Hyde Park extension – W. Fred Samson, 17 April 1915, SROWA Cons 3464 Item 02128. This field book does not show the Hyde Park Vent.

54

InHerit, Government of Western Australia, ‘Beach Street Pumping Station’, accessed at <http://inherit.stateheritage.wa.gov.au/Public/Inventory/>, 18 March 2014

55

Annual Reports of the Water Supply, Sewerage and Drainage Department, 1915-16, 1916-17; 1917-18. From 1918 Department was the *Metropolitan* Water Supply, Sewerage and Drainage Department.

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Annual Reports of the Metropolitan Water Supply, Sewerage and Drainage Department, 1917-18 & 1918-19

57

Annual Report of the Metropolitan Water Supply, Sewerage and Drainage Department, 1918-19

58

Annual Report of the Water Supply, Sewerage and Drainage Department, 1915-16

59

‘City and suburbs of Perth: plan showing sewers and stormwater drains constructed and handed over to 30.6.1920’, Water Supply, Sewerage & Drainage Department, SLWA 9024.P4N46

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Annual Report of the Metropolitan Water Supply, Sewerage and Drainage Department, 1919-20

erected'.<sup>61</sup> This is the last mention of ventilation shafts in the annual reports to the end of the 1920s. Items relating to ventilation shafts are listed amongst staff maintenance and construction works, indicating they were erected and maintained by departmental staff.<sup>62</sup> It is not known where or by whom they were constructed. However, manhole covers and step irons for the system were ordered from the PWD's Fremantle Workshops (later the State Implement and Engineering Works) as the sewer system was implemented<sup>63</sup> and it seems likely the ventilation shafts may have also been made in these workshops.

Complaints of foul odours from the Claisebrook treatment plant continued through the 1920s, although concern increasingly focussed on the declining condition of the river and its consequent slime and foul smell.<sup>64</sup>

Plans were drawn in 1923 to lay sewerage through Subiaco, including a pump station on Herbert Road near Jualbup Lake, only one block from the location of the later Gray Street ventilation shaft.<sup>65</sup> Gray Street had only been gazetted in the preceding ten years, as it is not shown on maps of the original sewerage system. The Subiaco system included treatment works to take pressure off the problematic Claisebrook site.<sup>66</sup>

The Subiaco system's particular feature was an ocean outfall pipe, which had been agitated for in Perth since the beginning of sewerage planning. Work began in February 1924. Detailed lists of the elements planned for the Subiaco system, including numbers of manholes, do not list any ventilation shafts. The ocean outfall, mains and reticulation were completed by 1927. House connections began in June 1927, and within a year 1689 of the 3254 houses in the Subiaco reticulated area had been connected. A further 1503 were connected in 1928-29.<sup>67</sup>

It is likely that Gray Street Vent was erected c.1928 as part of these works. However, later plans show a second north-south sewer main leading to the Subiaco works that runs along Gray street to connect with the 1920s east-west main at Nicholson Street, less than fifty metres from Gray Street Vent.<sup>68</sup> The date this north-south main was laid is not known. It is possible it was laid between 1930 and 1935, for which MWSS&DD annual reports are unavailable. Gray Street Vent may have been erected in response to this sewer main rather than the initial house connection of the area.

Plans in the 1930s to abandon sewerage treatment at Claisebrook altogether required substantial changes to the system. A west-flowing gravitational sewer was installed between Mt Lawley and West Perth.<sup>69</sup> This main gravitational sewer

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- 61 Annual Report of the Metropolitan Water Supply, Sewerage and Drainage Department, 1920-21
- 62 Note: Annual Reports are not available for the years 1930-1935. Ventilation is not mentioned in later reports.
- 63 'Sewerage Collection System Investigation and Design: Claisebrook Main Sewer', Water Corporation file, Cons 7386 Item 10A10286D
- 64 Hunt, Su-Jan, op cit., pp.70-75
- 65 Annual Report of the Metropolitan Water Supply, Sewerage and Drainage Department, 1922-23
- 66 Hunt, Su-Jane, op cit., pp.70-75
- 67 Annual Reports of the Metropolitan Water Supply, Sewerage and Drainage Department, 1923-1929
- 68 'Sewerage Collection System Research – Perth Main Sewer Diversion Hydrogen Sulphide – Deterioration Investigational Work' (Metropolitan Water Authority file) SROWA Cons 7313 Item 10A05303/8 (1949 plan)
- 69 Hunt, H.E. *Perth's Early Water Supplies*, Australian Heritage Engineering Board, Perth WA, 1984, p.35

from Mt Lawley to West Subiaco was begun in 1934 and completed in 1935-36.<sup>70</sup> From January 1937, the problematic Burswood filter beds were taken completely out of operation as the pumping station at Claisebrook had come on line moving sewerage west to Subiaco.<sup>71</sup>

The pumping station at Claisebrook, required as part of the 1930s works, exacerbated hydrogen sulphide problems in the Perth Main Sewer, and further measures to vent the noxious and corrosive gas were explored.<sup>72</sup>

A 200-foot (61 metre) circular steel ventilation stack was erected at West Subiaco in 1939, half a mile upstream of the treatment works.<sup>73</sup> It was intended as the first of a series of large stacks to be built at three-mile intervals through the system. These vents would remove sewer gases and, when the sewer system was completely enclosed as planned, deaerate the sewerage. The vent included extraction fans. No mention of smaller vent shafts is made in reporting this new approach to ventilation.<sup>74</sup>

In early 1941, a 125-foot (38 metre) masonry sewer ventilation tower building was constructed near the corner of Smith and Lincoln Streets in Highgate. It operated until at least February 1944.<sup>75</sup> By 1945, however, it appears to have been used only intermittently or not at all.<sup>76</sup>

Plans were drawn in mid-1943 for the installation of 'natural ventilation' along the Main Gravitation Sewer between the Subiaco treatment works and the Lincoln Street ventilation tower. The plans allowed for alternating induct (intake) and educt (extraction) vents at roughly 100 metre intervals, with an estimated cost of around £3180 to install 56 vents. Most of the induct vents were to be slightly tapered three-foot (0.91 metres) high pillars, with five being instead designed as grates inserted into manhole covers. The educt vents were to be welded steel circular towers with a concrete kerbing base. Twenty-six were to be 50 feet (15.24 metres) in height and the remaining two slightly higher at 60 feet (18.29 metres). Although of a scale similar to the earlier cast iron vent towers, these educt vents were designed with none of the detailing or tapering of the earlier structures. Updates to the plans dated July 1944 suggest the 'natural ventilation' system was not erected immediately.<sup>77</sup> It may not have been erected at all, but the plans indicate the MWSS&DD had moved away from the earlier cast iron ventilators of *Metropolitan Sewerage Vents*.<sup>78</sup>

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70 Annual Report of the Metropolitan Water Supply, Sewerage and Drainage Department, 1935-36

71 Annual Report of the Metropolitan Water Supply, Sewerage and Drainage Department, 1936-37

72 Perry Beor, 'Flowing Back', in *Flowing Forwards*, Water Corporation internal magazine, 24 May 2004, p.3

73 'Sewerage T and D Investigation and Design: Ventilation Stack Subiaco Treatment Works', Water Corporation file, Cons 7386 Item 10A042888

74 Annual Report of the Metropolitan Water Supply, Sewerage and Drainage Department, 1939-40

75 'Sewerage Vents and Masonry Ventilating Stacks' (Perth City Council file) SROWA Cons 3054 Item 1953/0115

For more information see HCWA's register documentation for P03137 *Lincoln Street Ventilation Stack*. Note that this document incorrectly states the stack only operated for four weeks.

76 *Sunday Times*, 11 Feb 1945, pp.5 & 6, accessed at [trove.nla.gov.au](http://trove.nla.gov.au) 5 Oct 2013

77 'Metropolitan Sewerage – Main Gravitation Sewer – Natural Ventilation', MWSS&DDWA plan series 6717, dated 1943 and 1944

78 Charles Sardi believes the natural ventilation system of the 1940s was implanted. No evidence has been located to determine if it was.

It appears only two of the planned three-mile-dispersed large stacks were erected, most likely because World War Two interrupted plans, with upward of 250 departmental employees leaving for military service.<sup>79</sup>

Departmental discussions of the problem of hydrogen sulphide corroding the concrete pipes of the sewerage system in 1949 make no mention of ventilation pipes, suggesting they may have already been disconnected from the system by this time. Ventilation was largely provided by a fan at the Subiaco ventilation stack, which blew upstream or downstream of the stack, alternating direction monthly. However, tests in 1950 showed this had little impact on levels of hydrogen sulphide at any distance from the stack. Additional natural ventilation was suggested at problem points, further indicating the 1940s plans had probably not been implemented. It was recommended in 1950 that pipes be lined with a corrosion-resistant material as the most effective way to address the problem, and noted that ventilation or partial purification, such as by adding lime or chlorine, would probably be insufficient to halt corrosion.<sup>80</sup>

The Subiaco stack had a building added in 1952 to heat the gases so as to ensure hydrogen sulphide did not escape at ground level. In weather 'favourable to smell' fans were shut off and all covers sealed.<sup>81</sup>

Most of the metropolitan area was surveyed in 1953-54 for upgrades to the sewerage system. These detailed plans show the Royal Street, Cook Street, Stuart Street and Hyde Park Vents. The Cook Street Vent is in the line of the sewerage pipes, while the other three are connected with a short length of independent piping. Cook Street Vent is notated 'VS' while the others are marked as 'VP'. The Arthur Street Vent is not labelled but an unnotated symbol on the sewer line appears in the location of the vent. At Gray Street, there is neither a vent marked nor even a sewerage pipe shown on the street.<sup>82</sup> A main sewer is known to have run along Gray Street in 1949, so it is very unusual that this is not shown in 1953-54.

In 1958, Edward Hugh Oldham, son of Hugh Oldham, retired from the Department as Engineer in Charge of the Water Supply Branch after 34 years service, ending nearly sixty years of Oldham family involvement in Perth's water and sewerage systems.<sup>83</sup>

A new sewerage treatment facility at Subiaco replaced the 1920s and 1930s works from 1961. At this time around three quarters of Perth's sewered areas fed into the Subiaco plant, from as far east as Midland and south to the Canning

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- 79 Annual Reports of the Metropolitan Water Supply, Sewerage and Drainage Department, 1940-1962
- 80 'Sewerage Collection System Research – Perth Main Sewer Diversion Hydrogen Sulphide – Deterioration Investigational Work' (Metropolitan Water Authority file) SROWA Cons 7313 Item 10A05303/8
- 81 'Treatment and Disposal – Treatment – Construction – Subiaco Prevention of Smell – Vent Stack & Treatment Works – Working File – Construction' (Metropolitan Water Supply File) SROWA Cons 6733 lte, 1960/701442
- 82 Metropolitan Water Supply, Sewerage and Drainage Dept sewerage plans, Cons 4156 Items 3 (Cook St) 51 (Royal St), 67 (Stuart St), 79 (Arthur St), 92 (Hyde Park) and 201 (Gray St)
- 83 'Oldham – Edward Hugh – Personal File' (Water Supply Sewerage and Drainage Department file) SROWA Cons 1013 Item 1923/1229; Miscellaneous Papers – Mr Oldham', SROWA Cons 6900 Item 15

River.<sup>84</sup> A sewerage treatment plant continues on the Subiaco (Shenton Park) site to the present.

Current Water Corporation staff members are unclear as to when the elements of *Metropolitan Sewerage Vents* were disconnected from the sewer system. One opinion is that, after World War Two, changes in the operation of the sewerage system did away with the need for ventilation shafts and they were disconnected.<sup>85</sup> Another is that disconnection occurred following conversion to a closed rather than open sewer system in the 1970s, although some remained connected even into the twenty-first century.<sup>86</sup> A further influence may have been the shift to plastic piping, which suffers less from the corrosive effects of hydrogen sulphide.<sup>87</sup>

As areas were redeveloped or the tall shafts deemed hazardous, many vents were removed.<sup>88</sup> It is possible that some may have originally been of galvanised steel and these would have deteriorated quicker than the surviving cast iron vents.<sup>89</sup>

In 1973, the Department of Conservation and Environment received several complaints about sewerage odours near Robertson Park in North Perth. The matter was thoroughly investigated and deemed to be due to processing changes at the Union Maltings plant nearby. None of the discussions of the matter mentioned the nearby ventilation pipe on Stuart Street, indicating it was by this time fully disconnected from the system and quite probably its existence had been forgotten.<sup>90</sup>

In recent years, photographs of some vents within *Metropolitan Sewerage Vents* have been posted in online social-media photographic collections as interesting and unusual examples of public infrastructure.<sup>91</sup>

A 2004 photograph shows Arthur Street Vent with rust marks and possible corrosion.<sup>92</sup> Images from January 2010 indicate the lower sections of the vent had been painted white by this time.<sup>93</sup>

In 2013, *Metropolitan Sewerage Vents* remains as a collection of street furniture with no current functional use.

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- 84 Metropolitan Water Supply, Sewerage and Drainage Dept. *Subiaco Sewerage Treatment Works*, Perth WA, 1963
- 85 Perry Beor, 'Flowing Back', in *Flowing Forwards*, Water Corporation internal magazine, 21 June 2004, p.3
- 86 Ted Evans, former Asset Manager, Perth Region, Water Corporation, quoted in email from Simon Maughan (Water Corporation) to Sian Ferraz (HCWA), 9 March 2012
- 87 Charles Sardi, Senior Design Manager – Infill (Water Corporation), conversation with Clare Menck, 6 Nov 2013
- 88 Perry Beor, op cit., p.3
- 89 Ted Evans, former Asset Manager, Perth Region, Water Corporation, quoted in email from Simon Maughan (Water Corporation) to Sian Ferraz (HCWA), 9 March 2012
- 90 'Perth City – Objectionable Odour cnr Newcastle and Palmerstone [sic] Street' (Dept of Conservation & Environment file) SROWA Cons 4012 Item 1973/081v1
- 91 See <http://www.flickr.com/photos/wyrmworld/sets/72157607942196234/detail/>
- 92 Perry Beor, op cit., p.3
- 93 Google Street View, January 2010, accessed at <https://maps.google.com.au/maps?hl=en> , 6 Nov 2013.

## 13.2 PHYSICAL EVIDENCE

*Metropolitan Sewerage Vents* comprises a discontinuous group of six sewerage vents located within metropolitan Perth. Three vents are located within the road reserves of Gray Street, Cook Street and Stuart Street. The Arthur Street vent is located between Arthur Street and the railway reserve alongside the Fremantle railway line. The Royal Street vent is situated within a small reserve opposite the ABC Building in East Perth, while the William Street vent is located in Hyde Park.

Each vent is similar in design, comprising an ornate circular cast iron base with fluting and moulding which contains the letters M S (Metropolitan Sewerage) in the lower portion. An access panel, measuring approximately 20cm by 10cm and secured by a bolt in each corner, provides visual access into the vents.

Some bases have been repainted. The Stuart Street and Hyde Street vent bases are painted bronze with black and scarlet lettering, respectively. The Arthur Street vent exhibited signs of corrosion and was extensively graffitied in the early 2000s. The base has since been repainted white.

The bases are approximately two metres high, set below a straight circular pipe braced by four metal rods that rise out of the base. The pipe comprises several segments connected together, each approximately a metre in length and between 5–10 cm in diameter. The bottom section of piping is slightly tapered to connect to the base. In some locations the top segments of piping, above the steel brace, have been removed, presumably for safety reasons. The height of the vents varies between the six remaining examples between approximately 9 and 15 metres (30-50 feet).

The Cook Street Vent is the only one of the six to retain the top vent cowl.

The Gray Street vent differs from the other examples in that the top segments of piping extending past the metal brace do not continue in a straight direction but extend out on an angle toward Gray Street, similar to a lamp post. A possible explanation for this is provided in an internal Water Corporation newsletter article. A former employee of the Corporation, suspecting that complaints regarding the odours from the sewerage vents arose from the fact that ‘the public know what the vents were and concluded that because they vent a sewer, they must be smelly’, reportedly replaced a West Perth vent with a modern structure ‘disguised as a real lamp post’.<sup>94</sup> It is possible that the Gray Street vent was similarly amended to enable it to blend it to the surrounding streetscape.

## 13.3 COMPARATIVE INFORMATION

As no list of the siting of sewerage ventilation pipes has been located, it has not been possible to determine either how many were erected or how many remain.

Sewerage infrastructure in Western Australia

The 1941 Art Deco style brick ventilation tower in Highgate, P3137 *Lincoln Street Ventilation Stack*, remains extant and is on the State Register of Heritage Places (RHP).

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<sup>94</sup> Perry Beor, op cit., p.3

The 1939-40 ventilation stack in Subiaco has been demolished. It is believed to have been of metal construction, approximately 61 metres high.<sup>95</sup> In 2015, two examples of sewerage vents were identified, near Claremont Railway Station, and Fremantle Prison. Both are unadorned examples and are thought to have been constructed in the 1940s.

Two of the three original sewerage pumping stations constructed for the Perth sewerage system remain extant: P3298 *Low Level Sewage Pumping Stations No.s 1 & 2, Perth* (1914). A third pumping station (P4210, the first built, in 1913) has been demolished. Four of the earliest pumping stations in Fremantle also remain, three of which are individually listed on the Fremantle Municipal Inventory (P22775 Beach Street Pumping Station, 1916; P22558 Former Pumping Station, 1 Elder Place, 1913; P21271 M.W.S.S. & D.B. [sic] Pumping Station, 166 Marine Terrace, 1913). The fourth, a 1914 pumping station and adjacent toilet facility at the intersection of Essex Street and Marine Terrace (formerly Fitzgerald Terrace) in Fremantle, is located within the Esplanade Reserve. P17714 Fremantle Esplanade Reserve is on the City of Fremantle Municipal Heritage Inventory.<sup>96</sup>

The HCWA database includes no other places associated with sewerage infrastructure in the State.

The original treatment works at Claisebrook and Burswood (constructed from 1906) were removed prior to World War Two. The original Fremantle treatment works (constructed c.1910) and ocean outfall near Robb's Jetty, South Fremantle, was superseded in the 1950s and no physical evidence of its location is known to exist.<sup>97</sup>

#### Sewerage Infrastructure on other Australian heritage lists

The New South Wales heritage database includes several dozen ventilation stacks, pipes and shafts, along with other sewerage infrastructure. Most of these ventilation shafts are more substantial masonry constructions of brick or concrete, including all eight that are entered into the NSW Heritage Register, and many are from the nineteenth century. Six vents, recognised as having Local heritage significance, are noted as being tubular metal constructions. One is a Victorian-era cast iron shaft (Queenscliff, place number 2610078) and another two have decorative cast-iron pedestals with steel tubing above (Bexley, #4576021 & #4576022). The latter are noted as c1920s or 1930s construction. The other three steel vents are noted as being typical of a common structure throughout the Sydney water system.<sup>98</sup>

The New South Wales Heritage Register also includes extensive infrastructure associated with the Bondi Ocean Outfall Sewer (#5053861), constructed 1880-89, which includes sewers, the construction cavern for the outfall, vent shafts

<sup>95</sup> HCWA RHP documentation P3137 *Lincoln Street Ventilation Stack*, December 2007, pp.7, 12; Annual Report of the Metropolitan Water Supply, Sewerage and Drainage Department, 1939-40

<sup>96</sup> A preliminary review of the Esplanade Reserve, which included the Essex Street pumping station, was considered by the Register Committee in 2013. The Committee resolved that Esplanade Reserve did not reach the threshold for assessment for the State Register of Heritage Places.

<sup>97</sup> 'Sewerage: 1896-1987' in *Fremantle Focus*, Oct/Nov 1987, p.10

<sup>98</sup> Environment and Heritage, NSW Government, Source: <http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx>, accessed 23 Oct 2013



including four large brick vents, and nineteen of the original twenty pumping stations.<sup>99</sup>

A sewerage ventilation stack at Connewarre, Greater Geelong, is listed on the Victorian Heritage database. It is a five metre high circular reinforced concrete structure approximately 800mm across. Several sewerage pumping stations and aquaducts are also noted in the Victorian Heritage database, mostly dating from the nineteenth century.<sup>100</sup>

In Queensland, three associated concrete ventilation shafts for the Brisbane stormwater system are entered into the Register (places #601995, #602067 & #602068). They date from c.1904. A search of the Queensland heritage register found only one other place associated with sewerage: P602727 East Gordon Street Sewerage Works, Mackay, a 1936 premises comprising two main buildings, which does not appear to include ventilation shafts.<sup>101</sup>

In the ACT three brick vents from the original Canberra sewer system of 1924 are listed on the Register of the National Estate (#19111, #19112, & #19113).

Online heritage lists for South Australia, Northern Territory and Tasmania cannot be searched by 'sewer'.

#### Sewerage Infrastructure in the United Kingdom

In the United Kingdom, English Heritage manages the identification and protection of heritage buildings and structures. Grade II listed buildings and structures are considered to have special architectural, historical, or cultural significance of special interest, warranting every effort to preserve them. The English Heritage database of heritage buildings includes 44 Grade II listed sewerage ventilation structures.<sup>102</sup>

The various structures include sewer ventilation pipes, sewer gas lamps and sewer vents, and are also known more colloquially as stench or stink pipes.<sup>103</sup>

Sewer gas lamps were invented in the early twentieth century to deal with the potentially explosive and lethal built up of toxic gases in the sewerage system. They were connected to the town gas supply, and coupled directly to the underground sewer.<sup>104</sup> The heat of the lamps drew the air from the sewer through a copper tube inside the column and burned the sewer gas, converting the methane into carbon dioxide.<sup>105</sup> The sewer gas lamps are often decorative elements of street furniture with cast iron bases and decorative columns, with ornate lamp heads.

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99      ibid.

100     Heritage                      Victoria,                      Victorian                      Government,                      Source:  
[http://vhd.heritage.vic.gov.au/vhd/heritagevic#detail\\_places;15234](http://vhd.heritage.vic.gov.au/vhd/heritagevic#detail_places;15234), accessed 23 Oct 2013

101     Department of Environment and Heritage Protection – Queensland Heritage Register, Queensland Government Source: <https://heritage-register.ehp.qld.gov.au>, accessed 23 Oct 2013

102     English Heritage, 2014, Source: <http://list.english-heritage.org.uk/results.aspx?index=1>, accessed 18 February 2014.

103     English Heritage, 2014, Source: <http://list.english-heritage.org.uk/resultsingle.aspx?uid=1405383>; BlogSpot —London's Stench Pipes <http://stenchpipes.blogspot.com.au/>, Accessed 18 February 2014.

104     Steel, Charlie, 'The History of Monkseaton Village', cited in English Heritage List entry — Sewer gas Lamp, <http://list.english-heritage.org.uk/resultsingle.aspx?uid=1405383>; Accessed 18 February 2014.

105     ibid.

Some were later converted to the sewer vent columns which superseded them, and simply naturally vented the gas into the atmosphere rather than burning it, a similar function to the *Metropolitan Sewerage Vents*. Sewer vent columns, sewer ventilation pipes, or stink pipes, vary in appearance, ranging from unobtrusive plain utilitarian columns to embellished columns with decorative cast iron bases and cowls, often mistaken at a casual glance for a lamp-post.

Given the relationship between Britain and Australia, particularly in the nineteenth century, it is unsurprising that there are similarities between the *Metropolitan Sewerage Vents* and the sewerage infrastructure in use in the United Kingdom before and during the period in which the *Metropolitan Sewerage Vents* were installed and in operation in Western Australia.

Although the technology has become redundant, the sewerage infrastructure relating to this period in the United Kingdom has been recognised as significant for its historical, aesthetic and scientific values, by the relevant heritage authority.<sup>106</sup>

#### Conclusion

*Metropolitan Sewerage Vents* is a collection of structures that were once common both in greater Perth and elsewhere in the country and Britain. However, changes in sewer technology mean they are no longer used and appear to have largely been removed and/or forgotten across the country.

#### 13.4 KEY REFERENCES

No key references

#### 13.5 FURTHER RESEARCH

Walking or cycling the routes of the main sewer lines in Perth and Fremantle may identify more remaining examples of ventilation shafts (*See 1949 maps at SROWA Cons 7313 Item10A05303-8*).

Further research may identify the specific reasons the ventilation shafts were erected.

Further research may identify more precise construction dates for the vents.

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<sup>106</sup> The positive online discussions regarding 'Stench Pipes' and popularity of blogs such as 'Stinkpipe Explorer' (<http://stinkpipes.blogspot.com.au/>) suggests that they are also held with some degree of interest and affection by the general public.