



NEW ZEALAND  
GOVERNMENT GAZETTE,  
(PROVINCE OF NELSON.)

Published by Authority.

*All Public Notifications which appear in this Gazette, with any Official Signature thereunto annexed, are to be considered as Official Communications made to those Persons to whom they may relate, and are to be obeyed accordingly.*

By His Honor's command,

ALFRED GREENFIELD, Provincial Secretary.

VOL. XV.

NELSON, TUESDAY, JULY 9, 1867.

No. 26.

Superintendent's Office,  
Nelson, July 8th, 1867.

**T**HE SUPERINTENDENT directs the publication of the following Report for general information.

ALFRED GREENFIELD,  
Provincial Secretary.

TO HIS HONOR THE SUPERINTENDENT.

OBJECT OF COMMISSION.

On the 7th May 1867, his Honor the Superintendent of Nelson was pleased to nominate Dr. Cusack, the Provincial Engineer Mr. Blackett, and Messrs. Hunter Brown, R. Burn, and D. Rough, to form a "commission to investigate the subject of the Drainage and Sewage in this city, and to report to him what measures should be adopted to secure the

public health with a view to those measures being embodied in a bill and laid before the Provincial Council in the ensuing Session." [Letter from Provincial Secretary, See Appendix IV.]

That Commission has now the honor to report as follows:—

SOURCES OF INFORMATION.

In the prosecution of this investigation we have examined verbally, the Inspector of Nuisances, Mr. Watts, Messrs. Clements, Cross (Pilot), Drew, Osman, Philipps, Scott, Sherratt, Strong, Webb, and Warner and Berry, laborers, employed by the Board of Works, whose evidence will be found in Appendix I, and have addressed letters to Drs. Cotterell, Irvine, Sealy, Squires, Vickerman and Williams, whose answers will be found in Appendix II, also to Messrs. Barnicoat, Kelling, J. Mackay, and Martin, settlers in the vicinity of Nelson, whose answers will be found in Appendix III. Also to Messrs. Bosely and Dodson, from whom no answers have been received. Also to the Secretary of Public Works, Christchurch, and to Mr. S. T. Thompson

of the Roads and Works departments, Otago, and to his Honor the Superintendent of Wellington, whose answers with printed Reports of similar investigations in those towns, will be found in Appendix IV. Also to E. J. Fitzgibbon, Esq., Townclerk, Melbourne, from whom no answer has yet been received.

We have also consulted Blue Books of New Zealand statistics, and of Nelson Provincial statistics—a copy of the English Health Act, 1848—and various medical works in the library of the Chairman of this Commission, Dr. Cusack. We regret that we had no opportunity of consulting further tables of English, European, and Australian statistics so as to show a more complete comparison of the public health in Nelson, with that of other places; but we did not deem it necessary to delay sending in our report until such could be obtained.

#### HEALTH OF THE CITY.

Opinions obtained as to the health of the City and the influence of the present drainage and sewerage, and want of drainage and sewerage, on that state of health, have been conflicting.

Dr. IRVINE is of opinion that the present sewerage is certainly calculated to exercise an injurious influence on the health of the town, and also that "the ill-smell from the mudflat, arises of course from feces, &c., being exposed to sea and air on the wide expanse of the harbor at low water."

Dr. SEALY in answer to the question, "Is the health of Nelson injuriously affected by the present sewers as now used?" answers No; but thinks that if more sewers are built the health of the town will be injuriously affected. [Dr. Sealy's letter, See Appendix II.]

Dr. SQUIRES believes that the present manner of keeping the refuse is prejudicial to health, and considers that the drainage and sewage should not be carried off together; and also says "you have only to go down the Haven Road when the tide is out, when you will find the effects of throwing out the comparatively small amount of sewage quite appreciable now—what would it be if the whole town were drained on to it?" [See Appendix II.]

Dr. VICKERMAN is of opinion that "the health of the town is injuriously affected and refers to cases of choleraic diarrhoea, and of typhoid fever met within his practice," in Toi-Toi Valley and Haven Road, which are more particularly exposed to the miasmata of the mudflat, and says further, "In either locality the olfactory nerves of any person walking along at night, when the tide is out and the sea breeze blowing, will be quite sufficiently afflicted to convince him that the drains already in use and converted into sewers depositing their matter on the mudflat, exert a very deleterious effect," \* \* \* and after referring to "the open privies and full cesspools in the more densely populated parts of the city," says farther: "In my practice, I have found a great want of tone in the systems of the young and also adult population of Nelson." [See Appendix II.]

On the other hand the Chairman of the Commission, Dr. Cusack, has had occasion to remark that the mortality following surgical operations is less than in England, and the convalescence more rapid, and that many cases of continued fever are removed from the West Coast to Nelson for the sake of the speedy recovery which almost invariably follows.

Dr. WILLIAMS says that "though the present sewers may not as yet exercise any appreciable bad effect upon the health of the inhabitants, it is nevertheless quite certain that if the town became densely peopled and the sewage be allowed to find its way as it does now, the health of the inhabitants must be injuriously

affected by it," and farther "with respect to the present system of collecting sewage in cesspools I consider it the very worst that can be practised, for apart from the fact of these accumulations contaminating the atmosphere of which annual warnings are given us in the form of dysentery and low fever, it is only a wonder from the porous nature of the soil and the consequent almost unavoidable pollution of the drinking water in the town wells, that the inhabitants have not before this been visited with some terrible epidemic." [See Appendix II.]

Mr. SHERRATT is of opinion that a worse nuisance than the sewer is that the spring-tides bring up dead animals, &c., &c., to the edge of the mud flat behind Bridge-street, where they remain and rot: Also the inhabitants throw out refuse, &c.: Also the soil itself when disturbed has a bad smell. [See Mr. Sherratt's evidence, Appendix I.]

Mr. J. SCOTT, builder, has never observed any bad smell about the mouth of the sewer, but testifies to the bad smell of the swamp-earth at the head of the mud flat near his establishment: Also states that some of the cellars in the town are too deep to be drained into the sewer, and are therefore filled with water in floods, and are offensive. [See Mr. Scott's evidence, Appendix I.]

Mr. PHILLIPS' (Otago Dining Rooms) evidence is similar to that of the last witnesses. [See Mr. Phillips' evidence, Appendix I.]

Mr. STRONG has not found the beach offensive, except sometimes at the farther side of the Saltwater Bridge, where people throw rubbish, &c., into the tideway; has never observed any bad smell which he could attribute to the effects of the present Trafalgar-street sewer; has noticed very bad smell from the "Old Baths" fellmonger's establishment on the mud flat. [See Mr. Strong's evidence, Appendix I.]

BERRY & WARNER, laborers employed by the Board of Works to clean drains, and who have recently been cleaning out the open drains on the mud flat, into which the present sewer discharges, testify to the absence of offensive smells about this drain—"nothing seems to stop on its banks." The worst drain they have cleaned is that in Hardy-street West. [See Appendix I.]

Mr. DREW has observed no bad smells from the present sewer, but in the late floods "water from the sewers came back into my yard": Also has had occasion to call the Inspector of Nuisances to cesspools in Trafalgar-street "overflowing and soaking the neighboring ground." [See Mr. Drew's evidence, Appendix I.]

Mr. WEBB considers that "the town is not now suffering from the working of the present sewer," but observes "the sewer from the Trafalgar occasions a bad smell; several people have been sick." [See Mr. Webb's evidence, Appendix I.]

Mr. CLEMENTS is of opinion that solid sewage is now deposited on the mud flat, and observes that in heavy rains the cesspools of the privies behind the south side of Bridge-street, west of Trafalgar-street, "overflow and cause an awful stench": Also that in floods many of the cellars in Trafalgar-street get filled by water backing up the sewer, and become very offensive. [See Mr. Clements' evidence, Appendix I.]

Mr. OSMAN gives similar evidence on this last point. See Appendix I.]

Mr. WATTS, Inspector of Nuisances, observes "what I consider is the greatest nuisance is the waste, foul water, soap-suds, dish-water, &c., &c., which are in many places thrown into the yard in most houses in the town. Many of the privies are in a bad state and cannot be made better. In the lower part of Bridge-street and Hardy-street, if a privy

were cleaned out to-day and drained to-morrow it would be full again." \* \* \* \* \* Also, "I find that the present supply of water is generally bad in the lower part of the town; bad from percolation from the privy." \* \* \* \* \* Also, "ashes and kitchen refuse, rags, old shoes, &c., &c., are left in backyards to rot and stink; in many places the rubbish is never carried away." \* \* \* \* \* Also, "there is offensive stagnant water in the water-course passing through the premises of Messrs. Rout, Richardson, and Harley along Hardy-street: Also a great nuisance is created by the water coming down Vanguard-street and remaining in a stagnant pool at the back of the 'Postboy.'"—[See Mr. Watt's evidence, Appendix I.]

Mr. MACKAY, of Drumduan, observes, "When I visit Nelson I am nearly poisoned from the effluvia which meets my nose in certain parts of some of its leading streets."—[See Mr. Mackay's letter, Appendix III.]

Some of the members of the Commission have visited the end of the sewer and the course of the ditch across the mud flat, which carries off its discharge, and have found scarcely any offensive smell perceptible, beyond that of ordinary black swamp-mud; and they are also of opinion that the smells spoken of by some of the witnesses as perceptible along the Haven road arise from mud at low water, from dead animals, from offal, rubbish, &c., &c., thrown over the wall of the road, and from the refuse at the fellmonger's establishment on the mud flat, but not from excrementitious deposit from the sewer.

Turning from opinion to figures, we have compiled the following statements. In the subjoined table the population of Nelson for each of the years 1864, 1865, and 1866, is calculated for the 31st March of each of those years, starting from that given by the census for 1864, and correcting for the difference in births and deaths during the intervening time:—

MORTALITY IN EUROPE.

AVERAGE DEATH-RATE PER THOUSAND.	
	1851. 1865.
All England ... ..	22
English Towns... ..	24.1
London ... ..	24.44 23.39
Hull ... ..	25 27.27
Leeds ... ..	28 30.95
Bristol ... ..	28 23.52
Manchester ... ..	31 33.02
Liverpool ... ..	33 36.42
Salisbury (formerly very unhealthy) ... ..	15
Glasgow ... ..	32.89
Edinburgh ... ..	28.10
—	
France and Belgium ...	22
Austria ... ..	32
Italy ... ..	31
Norway ... ..	17

COMPARATIVE STATISTICS. \*

MORTALITY IN THE DIFFERENT PROVINCES OF NEW ZEALAND, CALCULATED FROM THE STATISTICS OF NEW ZEALAND, FOR 1865.

(It is to be observed that in this year Nelson was visited by scarlet fever. The deaths from this visitation amounted in all to 19.)

PROVINCE.	DEATH-RATE per 1000.
Marlborough ... ..	9.14
Hawke's Bay ... ..	9.14
Southland ... ..	9.22
Canterbury ... ..	10.98
Otago ... ..	11.22
Nelson ... ..	14.44
Wellington ... ..	16.33
Auckland ... ..	18.97
*Taranaki ... ..	21.66

In estimating the value of these figures it is to be remembered that average rates deduced from so small a population are much less trustworthy than those deduced from such a population as that of London or Liverpool; that, for instance, the mere accident, so to speak, of two or three cases of indiscreet exposure, over exertion or excess bringing on acute and fatal inflammation; or again, if infectious disease being brought into any country place and causing three or four deaths would completely alter the whole death-rate—perhaps reverse the comparison drawn. Thus in the year 1864 the zymotic death-rate for the Waimeas and Suburban Districts is 2.19 per 1000, as against 1.59 for Nelson,—on referring to the column for the number of deaths we find only eight deaths from zymotic disease; as against seven in Nelson City. On referring to the Registrar's books we find that the occurrence of six deaths from diphtheria (out of the eight that year in the country district) sufficed to give so comparatively large a ratio.

Besides the total death-rate for each year, the death-rate corrected for accidental and judicial deaths has been shown, because the number of these deaths in the colony is out of all proportion greater than in old countries. Thus in Nelson in the year 1866 one-tenth of the whole number of deaths was due to these causes. On the other hand it is to be remembered that the proportion of old people in the population is very much smaller than in England or in Europe, a correction telling in the opposite sense, when drawing comparisons as to healthiness.

On examining these figures we find the Nelson Province, in 1865, stood sixth amongst the nine Provinces of New Zealand—Wellington, Auckland, and Taranaki being worse, the other five considerably better; and that the mortality of the Province was more than half as much again as that of the neighboring Province of Marlborough, while that of Nelson City was nearly treble, or taking the mortality of Nelson City for the following year (in which scarlet fever had disappeared) it is nearly double.

Again we observe that the total death-rate of the City is from once and one-fourth to twice-an-a-half as great as that of the adjacent country; and the death-rate for zymotic diseases only was very much larger in 1865 and 1866, but in 1864 one-fourth smaller, than that of the adjacent country.

After mature consideration of all these opinions and facts, we hold that there is nothing in the present state of the health of Nelson to justify immediate alarm; yet that, looking to the extraordinarily salubrious climate of New Zealand, to the small proportion of old people in its population,—to the absence, or almost entire absence of extreme poverty, of great crowding, or of haunts of crime and profligacy,—and looking to its rank in health statistics as compared to the other provinces of New Zealand, and even to that of old countries, the health of Nelson is not so good as it should be; that by proper precautions and regulations, it should be brought up to be more nearly on a par with the country districts, and certainly to equal the very healthiest districts of London, which are stated to be as low as 12 per 1000.

\* See also Table on next page.

\* In 1865 New Plymouth was still a crowded garrison town.

COMPARATIVE TABLE of DEATH-RATE per 1000 in NELSON, and in the SUBURBAN and WAIMEA DISTRICTS, for the years 1864, 1865, and 1866.

Year.	Population.	Zymotic Deaths.†	Other Deaths.	Ditto corrected for accident.	Total Death-rate.	Ditto corrected for accident.	Zymotic death-rate.†
1864.	NELSON, 4427. ... ..	7	56	51	14.23	13.01	1.58
	WAIMEAS, 3661. ... ..	8	34	32	11.47	10.93	2.19
1865.	NELSON, 4575. ... ..	45	75	69	26.2	24.92	9.6
	WAIMEAS, 3766. ... ..	17	35	31	13.8	12.6	4.51
1866.	NELSON, 4682, ... ..	11	69	61	17.0	15.16	2.35
	WAIMEAS, 3823 ... ..	3	24	21	7.06	6.27	.78
Average of 64-5-6.	NELSON, ... ..	...	...	...	19.14	...	4.51
	WAIMEAS, ... ..	...	...	...	9.27	...	2.49
Average of 64, 66, omitting fever yrs.	NELSON, ... ..	...	...	...	15.61	...	1.96
	WAIMEAS, ... ..	...	...	...	9.27	...	1.49
1861.	VICTORIA (Australia) ...	...	...	...	19.45	...	...
1862.	Ditto ditto ... ..	...	...	...	18.20	...	...
1861.	MELBOURNE and Suburbs	...	...	...	25.78	...	7.97
1862.	Ditto ditto ... ..	...	...	...	23.34	...	...
Average of 5 years	{ HOBART TOWN (remarkably large proportion of old people) ... ..	...	...	...	23.	...	...
1861.	{ Country of VICTORIA, including Provincial towns ... ..	...	...	...	17.24	...	...
1862.	{ Ditto ditto ... ..	...	...	...	16.43	...	...
Average of 10 yrs.	LIVERPOOL ... ..	...	...	...	36.0	...	7.45
	{ LONDON (average of week ending March 2) ... ..	...	...	...	...	...	3.74
	{ SIXTEEN of the HEALTHIEST DISTRICTS of ENGLAND ... ..	...	...	...	16.8	...	...

† Zymotic diseases may be said, in general terms, to include all the so called "preventive diseases," being such as are caused or intensified by decaying vegetable and animal matters, and the gases they give off polluting air and water.

CAUSES OF THE HEALTH OF NELSON BEING LESS GOOD THAN IT OUGHT TO BE.

We are of opinion that the causes of the health of Nelson being less good than it ought to be, are, "the pollution of the town wells by soakage from cesspools, and from slops, &c., thrown out in backyards,—the noxious exhalations from over-flowing cesspools, from large heaps of rotting manure, from rubbish, slops, scraps of food, offal, &c., &c., thrown out in backyards, waste town lots, and such places,—vapors from damp or flooded cellars, and from swampy soil, and from rain-water and flood-water, and decaying vegetation, lying in hollows having no natural drainage; and that the present sewer has little or no appreciable ill effect on the health of the inhabitants,

owing to the very small number of the water-closets discharging into it; but that if sewers were extended throughout the town, and closets generally discharged into them, a very perceptible deposit would take place on the mud flats, and about the wharfs, and prove most detrimental to the health of the town. *Vide* especially the evidence of Mr. Cross, Pilot, [See Appendix I] who thinks that in such a case no sewer would carry away all its contents so as not to be brought back by the flood-tide, unless it were constructed at least as far as the pilotage lights, at such a level as to discharge its contents at half obb [See also Memorandum of Provincial Engineer, Appendix V.]

As a minor cause amongst those affecting the health of Nelson, we may mention the immense

quantity of dust resulting from the very inferior material with which the streets are mended. This is a very preventible evil, as by the use of harder material, and by watering the streets.

CHOICE OF MEANS TO IMPROVE THE HEALTH OF THE TOWN, OR TO OBTAIN FUTURE UNHEALTHINESS.

First and foremost amongst the means of improving the health of the town, stands an ample supply of pure water, which all sanitary experience has shown to be absolutely essential to the good health of cities. As we are informed that the works now in course of construction will supply this want, we do not dwell on it farther in this place. Amongst the means of improving the cleanliness, and thereby the health of the city, we have considered a more extended system of sewerage, scavenging, and the so-called earth-closet system. We assume at once that the present system of cesspools, tainting dangerously both air and water, is no longer to be tolerated.

REMOVAL OF SOLID SEWAGE BY SEWERS, OR BY SCAVENGING, OR NIGHT CARTS.

The principal part of the City of Nelson stands so low with regard to the sea-level, that any attempt to carry off solid sewage or excrement, by a system of sewers would necessarily be enormously expensive, and probably prove very unsatisfactory. The solid sewage now preserved in cesspools, if discharged by the present sewer, or even if delivered into the Maitai, would, we believe, coat the edges of the mudflat, and the piles of wharfs and piers, with an offensive slime, deleterious to the public health; on the other hand, to carry a brick sewer, or an iron pipe down to the pilotage lights, or to the Arrow Rock, would involve an expense not to be contemplated, say £9000 [See Appendix V.]

Again, the levels are such that in a sewer constructed with such a fall as to cause the requisite flow, its contents on arriving at the Arrow Rock would be below the level of the sea; it would, therefore, be necessary to construct an intermediate reservoir, with pumping apparatus, to lift the sewage to such a height as to ensure the requisite fall, at an increased cost. [See Memorandum by Provincial Engineer, Appendix V.]

Being, then, of opinion that to discharge by the present sewer the night-soil out of the city would be most dangerous, and necessarily more and more dangerous as the town grows, while yet the cost of extending it in a thoroughly effective and sanitariously safe manner would prove far beyond the means of the city; and further, that such a sewer would waste manure which may be made a valuable source of revenue and of benefit to the country, we unhesitatingly condemn sewers as a means of removing the solid sewage of Nelson. The construction of sewers to carry off liquid sewage will be considered in a subsequent part of this report.

The getting rid of solid sewage by simply emptying cesspools, or portable closet-boxes into carts, and removing their contents to depôts, has also been considered, and unhesitatingly condemned as offensive, and dangerous to the public health, and as having been found to be, wherever hitherto tried, a very great and irritating nuisance, while the manure obtained is far inferior to that produced by the earth-closet system. Believing deodorization to be absolutely necessary for the public health and convenience, we confidently recommend the adaptation of the earth-closet system, as the cheapest, most convenient, and most effective in increasing the value of the manure produced.

EARTH CLOSETS RECOMMENDED.

The committee here invite inspection of Stanesby's Deodorizing Portable Tank-closet, which has been recently obtained from Melbourne by the Government, for its remarkable simplicity, convenience, compactness, and inexpensiveness. (They are informed that such an apparatus could be supplied here for about 30s., and that existing privies might be adapted to the system for £1 each.) It consists essentially of a chest, on lifting the lid of which one end is found to form an ordinary night-stool, the usual earthenware pan being replaced by a large iron pail coated with coal-tar or varnish; the other end, divided off by a partition, holds pulverized earth and a tin scoop, one scoopful of earth being the quantity necessary for deodorization for each time of using the closet. It is said that the deodorization is complete and instantaneous, and that the compost produced can be dried and used over and over again even unto seven times. It has been said ashes may also be used, but the deodorization is not so complete unless used in much larger quantities and quite dry. While earth absolutely destroys the bad smell, ashes appear only to smother it, and we fear that, if large quantities of ash-compost from earth-closets should come to be piled up in one place in a depôt, such a heap would be offensive and a nuisance. It is obvious, that when the cost of even the above-described simple apparatus cannot be borne, that a ruder adaptation of the same principle would almost equally well serve the purpose; as for instance, simply an iron pail under the privy seat, and a box full of earth, or even of fine dry ashes by the side, with a scoop or tin pot to bale it out with. While for those who object to handling the scoop, a modification of the scheme of the water-closet has been devised, whereby on moving a handle, sifted earth, instead of water, falls into the receptacle under the seat. This plan, however, requires extremely careful sifting of the earth. In any case, the expense of an earth-closet is much less than that of a water-closet communicating with a sewer.

We beg to call attention to the statements of a printed pamphlet on the earth-closet, received from Mr. Stanesby [see Appendix, IV.] This pamphlet states that the Borough Councils of St. Kilda, Prahran, Sandridge, and Emerald Hill, as well as many gentlemen in Melbourne and the suburbs, have adopted Stanesby's earth-closets.

The general adoption of this plan would necessitate an organized system of scavenging; that is, a scavenger under contract should be employed to go round the city, at such intervals as should suffice, to remove each full pail weekly, bringing at the same time a supply of fresh earth to those who need it; such scavenging to be combined with the ordinary scavenging for the removal of ashes, bones, scraps, rags, &c., &c., and to take place only before half-past eight in the morning. We see no objection, however, to householders who have a certain amount of ground attached to their dwellings, using this manure in their own ground, provided it be so dug in as to occasion no nuisance or unwholesome smells. This would be a matter for the Inspector of Nuisances to satisfy himself upon.

SUPPLY OF EARTH.

With regard to the supply of prepared earth for these closets, we observed in the *Wellington Independent* the following advertisement:—

"For earth closets, buckets, &c., &c., use Messrs. Oakes and Payton's charcoal dust, the best and cheapest deodorizer, delivered in Wellington at 4s. per bag, by Oakes and Payton, Hutt."

And, that the Earth-closet Company at Melbourne value the compost produced in the earth-closet at £5 per ton [see Appendix, IV]; and we have it in evidence, that Mr. Osman would undertake to cart it away for the manure, considering each load worth three loads of ordinary stable manure, and that one cart every morning would clear Nelson of such deposits, taking each house once weekly. [See Mr. Osman's evidence, Appendix, I.]

As regards the sale of this manure to farmers in the country, the evidence is very conflicting. [See letters of Messrs Barnicoat, Kelling, Mackay, and Martin, Appendix, III.]

We are, however, of opinion, that as its value becomes known, all the manure thus produced in Nelson would be used on the farms, gardens, and cultivations in the immediate vicinity, so that none would be left for the farmers.

We therefore consider that ultimately the sale of manure would cover, or nearly cover the expense of removal and supply of fresh earth to those who need it. The first expense of forming a depôt would remain, which will be considered in another part of this Report. [See under head "Scavenging."]

The introduction of the use of earth-closets as thus described, should be made compulsory in the city, within certain limits to be proclaimed; and also at the same time the cleaning out and filling up of all old cesspools, privy-pits, or holes in the ground used to receive nightsoil. This final cleaning out and filling up of cesspools should be done, we think, at the expense of householders, but the expense (if any) of the removal of earth-closet compost, and of other scavenging yet to be considered, should be recovered by a scavenging rate. We feel confident that this rate will be a smaller burden on householders than the expense of cleaning out the old-fashioned privy by the highly-paid labour of the nightman.

#### SCAVENGING

The next division of the subject is the getting rid of ordinary dry house-refuse, ashes, bones, rags, offal, scraps, dead animals, manure, sour grains, rubbish, now too often thrown out into the harbour or the Maitai, into backyards, or on to neighbouring sections, and left to rot indefinitely [see Evidence of Messrs. Watts, Phillips, Sherratt, and Scott, Appendix, L]; and we are of opinion that this practice should be strictly forbidden, and that it be made incumbent on each householder to provide a portable ash-bin for the reception of such dangerous rubbish; such bin to be removed periodically by the City Scavenger already spoken of, subject to the exception that a householder, possessed of a sufficient amount of garden or paddock attached to his dwelling, may bury the same, so as to satisfy the Inspector of Nuisances that no nuisance will arise therefrom. In no case should pig-sties be allowed within the proclaimed limits. Such rubbish, &c., should be carted away by the scavenger to a depôt. We think that, for convenience sake, and especially for the convenience of purchasers of manure, there ought to be not less than two of these depôts, one on each side of the town, for the reception of earth-closet compost, and ashes and rubbish.

In Appendix, V., will be found a suggestion of the Provincial Engineer for the construction of these depôts, in such a manner as to make least perceptible exhalations arising from the ashes and house-refuse, which it is supposed will not be completely inodorous as the earth-compost ought to be. We believe that it would be the best and wisest plan to provide for

the first cost of constructing these depôts, and of making the sewer-drains yet to be described, by a loan raised on debentures at a sinking-fund interest, thus spreading over many years the expense of a lasting benefit, which would be crushing if it fell on the community all at once, and perhaps indispose them to co-operate in carrying out plans now to them.

It now remains to consider the best way of getting rid of the liquid refuse, which now contributes so largely to taint both air and water in the town—soapsuds, dish-washings, house-slops, and such like; also of ordinary rainfalls and storm waters.

#### LIQUID SEWAGE.

We are of opinion that liquid sewage may be allowed to run into the existing sewers, and into sewers yet to be constructed, without detriment to the public health, especially as the water-works now being constructed will soon afford the means of constantly flushing the drains of the town.

We strongly recommend the construction of sewers, or of glazed earthenware drain pipes, with branch drain pipes from each back yard, in all the more closely built-upon parts of the town, and of pitched side channels to serve the same purpose where the population is more scattered. Detailed suggestions on this head will be found in the Provincial Engineer's Memorandum [see Appendix, V.]

No house drain should be allowed, if possible, to pass under the house; nor any sink be allowed, under any circumstances, within a dwelling-house; and all sinks should be properly trapped to prevent the entrance of solid matters into the drains, and the exit of unwholesome gases from them. The cost to be borne, as now, by the householder, but the work done under the supervision, and to the satisfaction of the Inspector.

In time it may become necessary to remove the outfall of the present main sewer to a more distant point, but at present we are of opinion that this is not necessary, provided the discharge of all solid sewage from water-closets, privies, or any other source, be prevented, and the sewer periodically flushed, and the present outfall-ditch across the mud-flat kept straight and well cleaned out.

For a valuable suggestion for altering the present course of the river Maitai at its mouth, and bringing it to flow in a curved line to the Haven Road, and for prolonging the main sewer till it falls into this new river channel, [see Provincial Engineer's Memorandum, Appendix, V.]

#### WATER CLOSETS TO BE ABOLISHED.

We are, therefore, all of opinion, that the water-closets already existing (very few in number) should be done away with, and the owners compensated for their lost outlay at the public expense.

#### DRAINAGE OR FILLING UP OF SWAMPY SPOTS.

We also consider it necessary, on sanitary considerations, that all low-lying spots on which water lies after rainfall, disappearing only by evaporation, should be drained, if capable of drainage; and if not capable, then such places, and all swampy spots of ground, such as that near Halifax-street, near the out-fall of the sewer, should be so raised by deposit of earth or gravel as to prevent the stagnation of water on them, and the rise from them of noxious emanations, the product of decaying vegetable matter. All vegetable growth should be previously cut down, and burned or removed.

WASTE TOWN SECTIONS WITHIN PROCLAIMED LIMITS  
TO BE CLEARED.

Also, on all low-lying unoccupied town sections within the proclaimed limits, all long growth of shrubs, flax, raupo, rushes, tussock, or other rank vegetation, should be kept down—periodically cut down, and burnt or removed—so as to lay the ground open to sun and air, and prevent it from being a source of damp exhalation, and from being eligible for an impromptu depôt for filth of any sort. Such draining, covering, filling-up, or cleaning from vegetable growth to be at the expense of, or recoverable from, the landowner or his agent.

CONSIDERATIONS AS TO FILLING UP SURFACE WELLS  
IN THE CITY.

We have considered whether all surface wells within the proclaimed limits ought not to be filled up after the establishment of the water-works, and although we hesitate to recommend so stringent a law as applicable to all householders, we yet deem it a question deserving most serious consideration, whenever a Health Act shall be framed, whether all who cater for the public stomach (as for instance bakers, brewers, publicans, sodawater and lemonade manufacturers, &c.), should not be obliged by law to use water free from all suspicion of being possibly tainted by sewage matter, and we desire here to express our earnest hope that no householder will be so foolish or reckless as, for the sake of effecting such a small saving as his water-rate, to use water which can by any possibility be tainted with sewage matter, and contain the seeds of disease which may prove fatal not only to himself, but to his family and neighbours.

All existing properties should be altered, in accordance with the provisions of the Health Act contemplated in making these recommendations, and all new properties in like manner fitted with the appliances we have recommended for existing houses and town lots, and that under the inspection of an officer of the Board of Works, or of the Board of Health.

VENTILATION OF FLOORS OF HOUSES.

We farther recommend that, in such Health Act, clauses be inserted providing that all houses, which in future may be built or rebuilt within the proclaimed limits, should have their ground-floor a sufficient height above the crown of the street, and that provision should be made for free access of air underneath the house to prevent the evil consequences of rotting timbers and damp soil; and that all cellars be constructed with full provision for drainage, or if the levels do not admit of drainage, then that the cellar be constructed of brick laid in cement, so as to be waterproof, and safe from all drainage from the surrounding soil; also that in cases of neglect, the occupier of any house, the cellar of which may contain stagnant water, shall be obliged to empty and clean such cellar, on receiving notice from the Inspector of Nuisances or Health Officer.

No bedroom, or living room, should be constructed without a window to open; and we lay such stress on good ventilation, that we think a clause might be introduced into any future Building Act or Health Act to render this imperative.

LIMITS.

Mention having been frequently made in this Report of proclamation of certain limits in the city within which the provisions of the contemplated Act shall be operative, we deem it well to suggest that these limits, in the first instance, might be:—From mouth of Maitai, following river to east side of Tas-

man-street; Tasman-street, Manuka, and Examiner-streets; the Waimea-road, including both sides, as far as Snow's Hill; also, Vanguard and St. Vincent-streets, both sides, as far as Parere-street; and Washington-valley, as far as Russell-street; and the Haven-road, as far as the old Custom-house; to be altered or enlarged from time to time as found requisite.

But although we recommend the application of the provisions of the Act to be extended, in the first instance, to so small a part of the city, we hope that very many residents outside these limits, and in the country districts,\* will, of their own free-will see fit to adopt most of the sanitary provisions set forth in this Report.

MACHINERY.

In considering the machinery necessary for the effective carrying out of these recommendations, we have taken note of the plan of establishing a local Board of Health, with an Inspector of Nuisances under its orders. After full consideration of this and of other plans, we have however come to the conclusion that pending the expected establishment of a municipality, it will for the present suffice that his Honour the Superintendent appoint a duly qualified medical man as Health Officer, to advise the Government, and to co-operate with the Board of Works; and that full powers be conferred on the Inspector of Nuisances for the effective carrying out of all provisions of the Act. We lay great stress on this last recommendation. We suggest also that in the future Health Act, contemplated throughout this Report, special powers might be conferred on the Inspector, to be used only in great emergency, to be certified by the Health Officer.

We believe that, if pure water be amply supplied and universally used, and an Act embodying the sanitary provisions we have recommended be carried out by a diligent Board of Works aided by the advice of a competent medical man, by the vigilance and supervision of a good Inspector, and by the hearty co-operation of a public alive to the inestimable value of its own health, that Nelson may soon be made as healthy a town as any in her Majesty's dominions.

In order to show at one view the various recommendations made in this Report, we subjoin the following brief recapitulation:—

RECAPITULATION.

SOLID SEWAGE AND REFUSE.

We suggest that an Act be passed to render operative the following recommendations: We recommend that no solid sewage be allowed to be discharged by the sewers, and that all water-closets now discharging into the sewers already existing be abolished, compensation being made to the owners of them at the public expense.

That all existing cesspools and privy-pits be cleaned, filled up, and finally abolished.

That a system of earth-closets be gradually introduced, every facility being afforded to the public in making this change by the establishing of a public scavenger, who shall contract to empty the earth-closet boxes or pails, and to supply fresh earth, if needed, periodically, say once a week; such scavenger

\* For it has been brought before us in the course of this inquiry, that sometimes, even in the country, heaps of decaying, fermenting animal or vegetable matter, pools of slops, or stinking water, or plots of filth-saturated ground, exist close to the dwelling-house, the inmates of which are thereby living in the midst of danger, as great as that of the dwellers in the worst places in Nelson.

ger to be paid out of a scavenging rate. Such contracting scavenger to remove all such deodorized earth-composts, to depôts provided in places convenient for the sale of it as manure, except that householders possessing gardens or paddocks be allowed to use it on their own ground, providing it be so dug in as to cause no nuisance, as shewn to the satisfaction of the Inspector of Nuisances.

That all ashes, stable and other manure, offal, refuse, animal or vegetable matters, &c., be put into portable bins or boxes, to be removed periodically by the town scavenger to the before-mentioned depôts; and a penalty be imposed on all persons throwing such matters into back-yards, town lots, or into the rivers, or into the harbour; but, as before, householders to be allowed to use them to manure their own gardens or paddocks, but so as not to create any nuisance.

That no pig-sties be allowed within the city; that all low-lying swampy spots where water stagnates be drained or filled up, and all low-lying open spaces within proclaimed limits kept clear of all long growth of vegetation at expense of owners.

#### LIQUID SEWAGE.

Sewers, or drain-pipes, or open side-channels, according to the density of population, to be extended as rapidly as possible, and all liquid house refuse and rainfall to be carried off by them. A branch drain to be constructed to each back-yard. All sinks and drains to be properly trapped, and no sink allowed within a house.

Main drains to be provided for by loan on debentures. House drains at expense of owner.

#### HOUSES.

All new houses, and all houses rebuilt, to have ground floor a sufficient height above the crown of the street (if formed), and to have free access of air underneath, and all bedrooms and living-rooms to have at least one window to open.

Cellars to have drainage provided, all else to be so built in brick and cement as to be waterproof.

Cellars containing stagnant water to be emptied and cleaned on order of Inspector.

As a sanitary precaution, we recommend frequent whitewashing of premises.

#### MACHINERY.

That a competent medical man be appointed as a Health Officer to advise the Government, and to cooperate with the Board of Works in all matters affecting the public health, and that ample powers be given to the Inspector of Nuisances both to carry out the provisions of the Health Act contemplated in this Report, to visit periodically fellmongers' establishments, breweries, public stables, and cow-houses, and also special powers to act according to the orders of the Health Officer in case of any great emergency.

S. A. CUSACK, Chairman.

C. HUNTER BROWN, Hon. Sec.

D. ROUGH,

ROBERT BURN.

JOHN BLACKETT, Provincial Engineer.

Nelson, June 28, 1867.

## APPENDIX.

## ORAL EVIDENCE.

Mr. SHERRATT (Blacksmith, Trafalgar-street): I have observed nuisance at culvert end, but it seemed to have arisen from emptying a cart-load of soil at end of sewer. I have observed bad smell at other times, nothing much. I had two of my boys taken with fever beginning of last Summer. A worse nuisance than that was dead cats and dogs, and spoiled bacon thrown out on the flat just beyond his shop. I do not think the stuff from sewer comes on that part of the flat. People throw stuff there, or spring-tides bring it up and leave it aground. I have a well puddled and bricked; water was very bad, is better now. The first few feet of soil smelt very bad, "Nasty stench water, I call it."

Mr. J. SCOTT (Builder, Trafalgar-street): I have never observed nuisance about mouth of sewer. I sank a well near my mill, soil smelt very badly, but think it was only vegetable matter putrified. At Mr. Sherratt's well much rubbish of all sorts had been thrown out for years past.

I could not use the water of my well for the engine on account of the deposit it left on the boiler, which I take to be vegetable matter. If the sewer carried more, would anticipate a bad smell in S.W. winds. If all town closets emptied into it, I think it would depreciate my property.

The soil in my acre is river-drift of sandy stuff for about one foot deep, beneath that several feet of stinking swamp soil. At the well, six feet of loose spongy blue and black slimy clay. Should think on the swamp acre next mine this sort of soil comes to the surface.

Very bad smell comes from the strip of *raupo* swamp near Mr. Harley's house, in Summer time.

Some cellars are too deep for the present sewer. Bank of New Zealand, Mr. Everett's, Mr. Jervis', Mr. Scaife's, and others. I think it would be desirable that an Act should compel people to have their basement floor raised fourteen inches, or two steps at least above the level of the street. The ground floor of new houses should not be less than three feet six inches over the crown of the sewer, in a street eighty feet broad.

Mr. STRONG (Haven-road): I have not found the beach offensive, except sometimes at the further side of the Saltwater bridge, where people throw in rubbish, &c.

I have never observed any bad smell which I could attribute to the effect of the present Trafalgar-street sewer. I have noticed very bad smells from the old Baths, the fellmongers' establishment on the mud-flat.

If the whole of the sewage of the town were to be deposited on the mud-flat, I should not myself be afraid of bad consequences. I think everything would be carried away to the sea.

I should not be afraid if all the sewage of Nelson were delivered into the Maitai. I think it would be carried to sea.

W. H. BERRY (labourer employed by the Board of Works): I have been much employed cleaning different drains and ditches of the town. I have only noticed one particularly offensive, the Hardy-street ditch, between Trafalgar-street and Waimea-street, and down Waimea-street. I think it is owing to some nuisance which comes from the brewery, it is very low, and water lays dead—that makes the smell worse.

I am cleaning out the ditch into which Trafalgar-street sewer empties; it is not offensive up to the point to which we have cleaned, which is perhaps 150 feet from the mouth of the culvert. The ditch is filled up chiefly with gravel—a little sediment—only in a very few places any mud or slime. The tides flow up to the culvert, except the lowest neaps. When the tide turns there is an outward rush strong enough to take off anything inclined to be light. I have been into the culvert itself to take a measurement. I went from Bridge-street nearly two chains downwards. I found in the sewer a slight heaviness of air because the tide was rising, only two or three inches of mud in the bottom. I was nearly up to my loins in water. I was in once before to replace a brick fallen out, only two or three inches of mud then. If ten or twenty times as much filth came down that culvert, I think the water coming through would sweep everything clean through the culvert; and if the drain I am working in were kept clean, it would carry off a great deal of filth at ebb tide. I don't know about the stuff of all the closets of Nelson. I believe the Maitai would carry off everything; if the culvert were brought down to the lower part of the river, it would be carried away with a rush at the turn of the tide.

The highest spring-tides come up the culvert as far as Bonnington's, in Trafalgar-street.

R. WARNER (mate of last witness): The worst drain I have cleaned is that in Hardy-street, passing near Harley's, owing, I think, to brewery drains, from pigsties, stables, &c., &c. The silt of the drain below the Trafalgar-street culvert is not offensive. If all the Nelson water-closets emptied into the culvert, the drain might carry all away, but much more water must be supplied through the culvert. I think what the tide backs up, the fresh water carries away at ebb tide. Nothing seems to stop on the banks. From the end of the present drain, everything is washed away down by the Haven-road, by ebb tide.

Mr. PHILLIPS (Otago Dining Rooms): The only nuisance near me is the mud-flat at times; the tide brings up a nuisance now and then—sheep's heads

and plucks, dead dogs and cats—and leaves them there. Only about four tides at springs reach the flat at the back of my place. Never noticed any sewage matter. Never noticed any nuisance arising at mouth of present Trafalgar-street culvert, and I pass it very often, mostly every day. Don't believe it is a nuisance. Believe if all Nelson drained its closets into the sewer, it would be a nuisance; but not if a catch reservoir were made at the mouth of the sewer, and let off at ebb-tide.

Mr. DREW: I have a regular water-closet communicating with the main sewer; the branch drain is made of arched bricks; it carries off the contents of the water-closet and the kitchen drainage. I have observed no bad smells. I think most of the residents in Trafalgar-street have adopted the same plan, *i.e.*, of branch drain. Not above half-a-dozen have got regular water-closets. The only inconvenience we have had was in the late flood, when the water from the sewer came back into the yard. I consider the action of the main sewer and branch drain quite satisfactory.

Trafalgar and Hardy-streets had to pay £1,400, and part of interest on it.

The fitting of a branch drain from a backyard to the main sewer may average £10 per house; in my case it cost much more; from the sewer to the closet my branch drain is about fifty yards long.

I had once to take the Inspector of Nuisances to my next door neighbour, to compel him to remedy the nuisance of his cesspool. I have known that they overflow, and soak all the ground round.

Mr. CROSS (Harbour-Master and Pilot): If the sewage were discharged into the Maitai, I think it would not be carried right away, but partially left on the mudflats, and the breeze would bring back odours. If carried as far as Green Point, I still think the sharp bend and eddies, and the back-water, would cause stuff to linger about the wharves, just as I have known drowned men carried in under the wharves, and hang about there.

If carried out to about, or a little beyond, the pilotage lights, I think then it would get clear away. I do not think the flood-tide would carry it back. When a cask, or such like, has been lost thereabouts, I have often known it picked up on the Waimea Sands; that is where to look for it. If the sewer were carried out to half-ebb, I think that would be safe.

The nearest point of deep water to the end of the present sewer, is about half-a-mile, almost as far as the coal-hulk.

I think the mud-flats are growing, from the immense quantities of silt brought down by the Maitai in floods. If a passage were cut through the Boulder Bank, I think you would have a heavy sea come in, and spoil landing at the wharves. I do think the passage would fill up again. Below the Lighthouse I do not think the beach travels. Further east it does.

Mr. WEBB (Trafalgar-street): I know the existing drain—Trafalgar-street; as a drain, it works satisfactorily. If more privies than at the present were emptied into the drain, and the channel not kept perfectly free across the mud-flat, it would be a nuisance. If carried down to the Arrow Rock, all privies might be emptied into it.

I see great difficulties in the earth-closet system. People prefer water-closets, especially where access to the back-yard is only through the front; difficulty in getting people to use them properly; objections to carrying the stuff through the house, where there is no other access to the back. I should recommend the removal of solid sewage by flushed drains

not by earth-closets, on account of objections in men's minds, and because sewers would be needed at any rate, for removal of liquid refuse, as, for instance, especially from breweries, now very offensive.

I consider the town is not now suffering from the working of the present sewer. The sewer from the Trafalgar occasions a bad smell; several people have been sick; but when a good supply of water is available, that would cease.

I think if the present system were extended, and water supplied, no deposits on the mud-flat would take place. If our population were four or tenfold, the sewer might be carried down to the Arrow Rock. I don't think the sewer system more desirable, but more practicable, cheaper, and less opposed to men's prejudices.

Mr. CLEMENTS (Trafalgar-street): Sewage should be removed by earth-closets, not by sewers. I say solid sewage is deposited on the mud-flat. If night-soil were carried through drains, even with increased water supply, it would be carried back by the tide on to the mud-flat. If carried to the mouth of the harbour, it might be carried up the Waimea, or deposited on the Boulder-bank. In any case, it would be a waste of valuable manure. I believe there is no difficulty about applying it, no more than in carrying a pail of ashes through a house; and it is the most magnificent manure for the garden or farm imaginable.

At Christchurch, the night-soil is not deodorized at all, therefore the system is a nuisance there.

At Wellington, they adopt simply two pails; one under the seat for excrement; the other for dry earth, with a scoop, with which to throw a scoopfull over the excrement each time of using. They pay a contractor 1s. per closet per week for supplying of earth, (if needed in addition to sifted ashes, which answer well), and removal of compost. They have a good Inspector of Nuisances, who takes pains, and shows people how to use it.

The closets behind Wimsett's, in heavy rains, now overflow, and cause an awful stench when the same comes out, similarly in Toi-toi Valley.

A cellar in Trafalgar-street (behind Webster's and Murrell's), dug by Messrs. Edwards and Co., but never built over, gets filled when the Trafalgar-street drain gets flooded in heavy rains, and the liquid lasts for a month, and the stench is very bad. So the cellars of Messrs. Jervis, Trimble, Disher, and Webster, get filled by water backing up the branch drains from the sewer, and stink.

Mr. OSMAN (Toi-toi Valley): I have much experience, carting, as to cost of removing deodorized night-soil, would enter into contract to cart it away. I think it would sell to pay for the cartage to a depot. We get 10s. per load for fresh stable manure. One load of night-soil and ashes, I should say, is worth three loads of stable manure. I think a couple of hours each morning would clear the town, to take each house once a week. It would only pay the farmers to take it to, say beyond Richmond, by loading their return carts with it; but I think none would reach there; people in the close vicinity of Nelson would use all the manure Nelson makes. I think it a great pity to waste all that good manure down sewers.

I think one cart going round each morning would serve all Nelson, taking each house once a week.

After the flood, Jervis' and Wakatu cellars, which had been flooded, stank dreadfully; an inch of slime was left on cellar, the casks were all slimy.

Mr. WATTS (Inspector of Nuisances): What I consider the greatest nuisance is the waste foul water, soap-suds, dish-water, &c., &c., which are in

many places thrown out into the yard in most houses in the town.

Many of the privies are in a bad state and cannot be made better in the lower parts of Bridge-street and Hardy-street; if a privy were cleaned out to-day, and it rained to-morrow, it would be full again.

I never met with any particular impediment in discharging my duty; it has only been doubted whether I could enter the premises.

I find that the present supply of water is generally bad in the lower parts of the town, bad from percolation from the privy. Night soil at present has been emptied into the river below the windmill. Very little is used for manuring purposes.

Mr. Whitney has used it raw on his acre, and has not found it answer, he won't use it now because it stiffens the soil. I have mixed it with earth myself, let it lie a year, and used it as manure, and found it excellent manure. I mean the soil from the privy-pit when full.

I have seen movable boxes used in several houses. My experience is not very favourable; much effluvia, much stench if the boxes are not lined. They are then a greater nuisance than the privy-pit the liquid drains through. People do not use ashes or earth to deodorize. Ashes, and kitchen refuse, rags, old shoes, are left in back yards to rot and stink; in many places it is never carried away. I do not see that I have any power to order the removal of such things unless there were a Scavenging Act.

I cannot say the manual cost of cleaning a privy properly. The general charge for cleaning the cess-pool under a privy is 25s. I have known it done for a pound. I don't know what the cost of removing ashes would be.

There is offensive stagnant water in the water-course passing through the premises of Messrs. Rout, Richardson, and Harley, along Hardy-street; also a great nuisance is created by the water coming down Vanguard-street and remaining in a stagnant pool at the back of the Postboy. At the back of Gloucester-street it was blocked up by the effects of the flood. I think it may be cleared.

Water lies badly between Trafalgar-street and Waimea-street; all slops lie there and stagnate.

There is a nuisance in the Government school privy. The gaul privies smell very badly.

I have power to destroy any pigsty within sixty feet of any house or road, and to suppress it, if a nuisance, at any distance. Not much nuisance with that now.

No particular nuisance about the mud-flat. The fellmonger's place is kept very creditably clean.

A great deal of ashes and rubbish are thrown over the Haven-road wall.

I have never noticed any peculiar smell due to the mud-flat, except what we call sea smell at low tide; unless whale-feed, dead fish, cattle, or something of that sort be washed up.

There are very bad smells sometimes at the Salt-water bridge, and all up the ditch behind the office of the Board of Works. I cannot say from whence it rises. I think the ditch should be cleaned and deepened.

#### FARMERS' LETTERS.

To the SECRETARY of the NELSON DRAINAGE COMMISSION.

SIR—I may reply to both your queries addressed to me in the same words—I do not think that manure of either kind would be taken from the town to the country in sufficient quantities to render the proceeds from its sale worthy of notice.

My reasons for arriving at this conclusion are partly of a general character—such as the costly nature of any attempt to force land by manuring, and that, as a rule, it is only done where wages are very low. It is much more true of this country than of England. "That it is the law of production from the land, that by increasing the labour, the produce is not increased in an equal degree." Our mode of renewing the strength of land, weakened by repeated cropping, is the laying it down in grass. In this way, land is at least as profitably occupied as by being cropped, and after a time its strength returns without expence to the occupier. Whether from the great evaporation in this climate, or other cause, manure produces much less effect here than at home, while the cost of applying it under similar circumstances is four times as great. The fact, therefore, that certain manures are sought after and profitably applied at home, affords in itself no ground for expecting a similar result in this country.

The country land does not immediately surround the town, but is situated at a long distance away. I will take my own farm, which is more conveniently situated than the average—say nine miles from Nelson. I should have to pay 15s. per ton for carriage from Nelson, but I put it at 10s., as its cost by a farmer's own carts. I cannot think that less than twenty loads per acre of either manure mentioned in your questions would be serviceable, which would involve an outlay of £10, besides the cost of purchase and of its application to the land, say £14 per acre in all. In the poor lands (like the generality), with previous gravel bottom, the benefit would probably not be felt after the second year. But in soil of any character, I cannot see how any sum at all approaching to that named is to be repaid by its increased production. But it will be said that the farmers' return carts will bring manure free, or nearly free of cost, except that of its purchase. I think a few loads, and only a few, would be brought in this way. Return carts are generally occupied more or less by other articles, which could not be conveniently carted along with manure, even though deodorized. Were a railway, however, constructed to the Waimea, where the cost of carriage would be very greatly reduced, I think it highly probable that the use of manure such as you describe, especially that in its most concentrated form, would become general and extensive. But I do not think that the present demand for town manure in the Waimea, even though obtainable for nothing, would be worth taking into consideration.

I am &c.,

Waimea, May 20.

J. W. BARNICOAT.

To the PROVINCIAL SECRETARY, Nelson.

SIR—On my return from up the country yesterday, I received a letter from Mr. C. Hunter Brown, Secretary to the Committee of Drainage of Nelson, inviting me to give answers in writing, to your office, on the following questions:—

1. "If the earth-closet system be adopted, will the sewage, mixed with earth, be saleable, and what will be the probable price of it?"

2. "If a similar system is adopted, without the admixture of dry earth, will this species of manure find a market, and at what price?"

In answer to both these questions, I wish to state, that I have had no practical experience with these species of manure, and therefore beg to decline giving an opinion as to the value of it.

With regard to the other question, whether there will be a market for it, I am of opinion that there



gest that the southern side of the river should be embanked from Collingwood Bridge to Auckland Point, in a curved line—the object of the curve being to cause the water to preserve a deep channel next the wall by constantly impinging on it.

Also, that a road should be formed along the edge of the bank, say one third of a chain wide to commence with.

The line of the present sewer could then be prolonged at an angle to its present course, striking and passing through the curved wall some fifteen chains further on. This would be a step towards reclaiming the land between the wall and the town sections, about twenty acres in extent. The cost of this work might be about £7000; but it does not appear to be really necessary in the present state of the question. The present channel beyond the outfall, should be, however, carefully and regularly cleared out.

4.—The Depots hereafter to be formed for the reception of the deodorized contents of privies, and other materials collected by the Scavenging cart, may possibly, even with the best management, and the greatest care, become to a certain degree a nuisance. I would throw out a suggestion whether such Depots might not be enclosed by walls, and roofed over and be provided with a tall ventilating shaft or chimney to carry off the effluvia—the draught in this might be improved by having a small fire kept burning, with a flue leading into the shaft, on the principle of colliery ventilation.

5.—The discharge of all sewage, both liquid and solid matter, say at the Arrow Rock, has been proposed. On economical and financial grounds this is objectionable, and to ensure the proper action of such a scheme, an artificial fall would be required. To secure this the use of engine power would be necessary, and the erection of a reservoir to store the sewage during the flow of the tide.

Such an arrangement would probably cost £12,000.

The cost of an ordinary sewer, including some necessary alterations in the Haven-road, without reservoir or pumping apparatus, would probably amount to £9000.

JOHN BLACKETT,  
Provincial Engineer.

Nelson, June, 1867.

#### LETTERS BY MEDICAL MEN, &c.

Hardy-street, Nelson,  
May 17th, 1867.

DEAR SIR,—I beg to reply to the letter which you, as Honorary Secretary to the Committee of Enquiry into the Drainage of Nelson, have addressed to me, desiring to have my opinion as to whether the health of the town is injuriously affected by the present sewers, and also to offer suggestions as to the present state of the drainage, and sewerage for the future.

1. I am not sufficiently informed of the mode in which the sewers have been constructed, or are in course of construction; but unless they be so contrived as to prevent the communication of emanations from them, they must be injurious.

2. Again, if drainage from the sewers have access to the wells, they who drink of that water will assuredly imbibe a mephitic beverage.

I have the honor to be,  
Dear Sir,

Your very obedient servant,  
C. E. COTTERELL, M.R.C.S.L.

To C. HUNTER BROWN, Esq.,  
Honorary Secretary to the Committee of Enquiry into the Drainage of Nelson.

Nelson, 20th May, 1867.

DEAR SIR,—In reply to your favor of the 13th instant, I beg to say that in my opinion the drainage of Nelson, as at present carried out, whereby the sewerage is spread over the mud-flat and gives rise to offensive emanations, is certainly calculated to exercise an injurious influence on the health of the town, especially of the contiguous parts of it.

As you have intimated a desire on the part of the Commission to receive any suggestions I may have to offer, which have a bearing on the subjects which they are directed to report upon, I will submit a few, pre-facing them by the remark that, not having under sanitary legislation a special subject of study, I do not presume to speak *ex cathedra*, but only to contribute a few thoughts which you will simply estimate at what, on consideration, they may seem to be worth. In the following suggestions I have kept in view what I conceive to be the chief difficulty in dealing with the subject, which is not to decide on what is in the abstract the most complete and perfect method of rendering the excretions of men and beasts innocuous to health; but to discover for the guidance of the authorities, which plan is most practicable, having due regard to the necessity of consulting economy, the habits and wishes of the population, and not losing sight of the indispensable requirement of framing such a measure as will stand a fair chance, by avoiding too great stringency, of passing the Provincial Council.

1. Drainage is so vast a benefit, even when carried out with imperfect arrangements; is so great an advance on the pre-existing system of every household getting rid of their filth in a hap-hazard manner, and has affected in so many instances at home a total change in the death-rate, that I hope the Committee will urge on the Government the necessity of extending the system to all densely populated parts of Nelson. Reserving for a moment the question as to whether the solid excrete should be suffered to enter the drainage sewers, it is evident that the most complete system of earth-closets cannot supersede sewers for the purpose of conveying away the liquids which are thrown out daily from every house, much of which contain vegetable and mineral matters, which soon enter into putrefactive decomposition. It seems desirable also that the surplus rainfall from the roofs of houses should be drained, when it can be, into surface or deep drains, for the dampness of the atmosphere which continues longer than it need do after rain from the wet soil around houses is certainly promotive of rheumatism and other complaints.

2. So important do I consider it that such thickly-peopled localities as Lower Bridge-street, Collingwood-street, and the Waimea Road as far as the College, should be supplied with sewers without unnecessary delay, that I think the Government could not do better than facilitate the construction by offering the districts a portion of the Provincial balance or loan at say, 5 per cent. for a term of years, as the facility of raising money may hasten the construction of sewers by several years.

3. If no better plan can be devised of getting rid of the contents of the main drains than letting them deluge the Mud-flat at all hours, with an increasing stream of offensive and deliterious matters, I should certainly advise a prohibition of cess-pools, &c., being connected with the sewers; but it appears to me that a very simple arrangement might be carried out, by which not only the evil at present complained of might be got rid of, but all the solid excrement and urine from closets might safely be permitted to be carried off by the sewers. I will explain the idea.

4. The ill smells from the mudflat arise of course from feces &c., being exposed to sea and air, on the wide expanse of the harbor at low water. But if the

Hardy-street, Nelson, N.Z.,

May 24, 1867.

DEAR SIR,—I beg to acknowledge the receipt of your letter of May 13th, asking my opinion on the present drainage of Nelson.

Your letter appears to me to contain two questions, and I will endeavor to reply to them separately.

1st. Is the health of Nelson injuriously affected by the present sewers, as now used?

No; for I do not think that the present sewer in Trafalgar-street can of itself do harm, as it is used by so few houses;—but if more sewers are built (as will no doubt be the case), unless some alteration is made regarding the place of outfall, or the disposing of the sewage, the health of the town will be injuriously affected.

2. What is the best mode of drainage and sewerage for the future?

This is, of course, a most difficult question to answer, and I cannot but think that the drainage and sewerage of Nelson should not be taken alone, but only as part of a more comprehensive scheme, which would include the reclaiming of the mudflat. It appears to me that it would be advisable to build sewers in all the main streets of Nelson, and that each house should be compelled to drain into them; but if the sewage from those drains is to be thrown out on the mudflat, as it is at present from the Trafalgar-street sewer, great mischief would accrue. To obviate this, the sewage must either be deodorised and utilised, or it must be carried out into the sea beyond, where the in-coming tide would wash it back.

Were a sea-wall built, so as to keep the tide from coming up beyond any given point (say in a line from Trafalgar-street-North to the Boulderbank), the sewage might either be conveyed to suitable tanks made on the reclaimed land, and there properly deodorised and made useful for manure, or it might be emptied over the sea-wall into the tide-way, at the ebb tide only.

The building a sea-wall would, I presume, be very expensive; but I cannot but think that the large amount of land that would be reclaimed by so doing would in the end amply repay for any present outlay. However, should this be deemed too expensive, or not a feasible plan, it would, I think, be necessary that the town sewage should be carried in a sewer down the Haven road to a tank of a suitable size built as near the Arrow Rock as convenient, and this to be emptied during the *strength* of the ebb tide.

For the Town, that is, Waimea-street from Bronte-street,—Trafalgar-street north, from Trafalgar square to Bridge-street,—Collingwood-street, from Bronte-street to Bridge-street,—Nile-street west and east, to Alton-street,—Hardy-street, from Tasman-street to Waimea-street,—and Bridge-street,—I think that a good system of sewerage would be best, having the sewers so made that as the town becomes larger and more houses built, fresh sewers might be added as necessary.

Beyond these limits a proper system of scavenging should be established. It might be that earth-closets would prove useful, but of these I have had no experience. I believe a system of scavenging is now carried out in the town of New Plymouth, so that some information on this head may be obtained from there.

I have written these few lines with a feeling of much diffidence, for I know that I am making sug-

gestions, and I will endeavor to reply to them separately.

1st. Is the health of Nelson injuriously affected by the present sewers, as now used?

No; for I do not think that the present sewer in Trafalgar-street can of itself do harm, as it is used by so few houses;—but if more sewers are built (as will no doubt be the case), unless some alteration is made regarding the place of outfall, or the disposing of the sewage, the health of the town will be injuriously affected.

2. What is the best mode of drainage and sewerage for the future?

This is, of course, a most difficult question to answer, and I cannot but think that the drainage and sewerage of Nelson should not be taken alone, but only as part of a more comprehensive scheme, which would include the reclaiming of the mudflat. It appears to me that it would be advisable to build sewers in all the main streets of Nelson, and that each house should be compelled to drain into them; but if the sewage from those drains is to be thrown out on the mudflat, as it is at present from the Trafalgar-street sewer, great mischief would accrue. To obviate this, the sewage must either be deodorised and utilised, or it must be carried out into the sea beyond, where the in-coming tide would wash it back.

Were a sea-wall built, so as to keep the tide from coming up beyond any given point (say in a line from Trafalgar-street-North to the Boulderbank), the sewage might either be conveyed to suitable tanks made on the reclaimed land, and there properly deodorised and made useful for manure, or it might be emptied over the sea-wall into the tide-way, at the ebb tide only.

The building a sea-wall would, I presume, be very expensive; but I cannot but think that the large amount of land that would be reclaimed by so doing would in the end amply repay for any present outlay. However, should this be deemed too expensive, or not a feasible plan, it would, I think, be necessary that the town sewage should be carried in a sewer down the Haven road to a tank of a suitable size built as near the Arrow Rock as convenient, and this to be emptied during the *strength* of the ebb tide.

For the Town, that is, Waimea-street from Bronte-street,—Trafalgar-street north, from Trafalgar square to Bridge-street,—Collingwood-street, from Bronte-street to Bridge-street,—Nile-street west and east, to Alton-street,—Hardy-street, from Tasman-street to Waimea-street,—and Bridge-street,—I think that a good system of sewerage would be best, having the sewers so made that as the town becomes larger and more houses built, fresh sewers might be added as necessary.

Beyond these limits a proper system of scavenging should be established. It might be that earth-closets would prove useful, but of these I have had no experience. I believe a system of scavenging is now carried out in the town of New Plymouth, so that some information on this head may be obtained from there.

I have written these few lines with a feeling of much diffidence, for I know that I am making sug-

5. For houses situated in insulated situations, and consequently far from a main drain, the earth-closet, or in the case of the working classes, the earth-box seems the best arrangement. I would suggest that its use be not in the first instance compulsory, but permissive, and that it be aided by some simple organisation on the part of the Board of Works. The Board might have some hundred of boxes, say five feet long, three feet wide, and three deep, made and supplied for an annual payment to each house. Once a fortnight the cart, in which four or six of these regulation boxes would exactly pack, would call to exchange a box of fresh earth for one that had become charged with excrementitious matter. People should also, I think, be allowed to deposit scavenger's material in the box, so that that expense would be saved to them. Doubtless market gardener's or farmers near town could be found who would gladly supply fresh earth in return for that which had become fertilised, so that the only expense to the Board would be the system of exchange, which a small rate would cover.

Though impracticable at present, I think it would be well to bear in mind as an ultimate object, to distribute the sewage water on the meadow and other land on the plan adopted on the Craigintinny meadows near Edinburgh, or Mr. Mechi's underground piping at Tiptree Farm. The almost incredible stimulus given to vegetation would probably recoup the outlay, the supply of water alone being very remunerative in irrigating land in countries liable as Nelson is to summer droughts.

I am dear Sir,

Yours truly,

F. W. IRVINE.

C. YUNTER BROWN, Esq.

gestions on a difficult subject, and at the same time one that properly belongs to a practical engineer.

I am, dear sir,

Your obedient servant,

W. B. SEALY.

To C. HUNTER BROWN, Esq.,  
Honorary Secretary to the Committee of En-  
quiry into the Drainage of Nelson.

Nelson, June 7, 1867.

DEAR SIR,—I am sorry that I have not been able to reply to yours of May 13 ere this.

You ask if I consider the health of Nelson is "injuriously affected by the present sewers, as now used." In the "present sewers" I believe you include all open closets and cesspools, as well as the sewer in Trafalgar-street. I certainly do believe the present manner of keeping the refuse is prejudicial to health. The General Board of Health, in its "Notification in respect to the Nuisances Removal and Contagious Diseases Prevention Act," published on October 5th, 1848, says, "The chief pre-disposing causes of every epidemic, and especially cholera, are damp, moisture, filth, animal and vegetable matter in a state of decomposition, and in general whatever produces atmospheric impurity; all of which has the effect of lowering the health and vigor of the system, and increasing the susceptibility to disease, particularly among the young, aged, and the feeble. The attacks of cholera are uniformly found to be most frequent and virulent in low-lying districts, on the banks of rivers, in the neighborhood of sewer-mouths, and wherever there are large collections of refuse, particularly among human dwellings."

In a proclamation issued for the protection of the population of the Russian Empire, in 1848, the important influence of this and similar causes has been recognised, and the practical recommendations founded thereon, are "to keep the person and dwelling house clean, to allow no sinks close to the house, and to prevent crowding wherever there are sick." Householders should be warned that the first means of safety lies in the removal of dung heaps, and solid and liquid filth of every description from beneath or about their houses and premises. Though persons long familiarised to the presence of such refuse may not perceive its offensiveness, nor believe in its noxious properties, yet all who desire to secure themselves from danger, should labor for the entire removal of filth, and the thorough cleansing of their premises.

Dr. Trench, the Medical Officer of Health for Liverpool, in his Annual Report for 1866, says:—"From July, 1863, to the end of 1866, the order for the conversion of privies into water-closets amounted to 3932 (2047 being issued during 1866) estimated to accommodate 50,000 persons; besides which the owners of more than 800 premises have voluntarily changed the middens into water-closets; and under the Sanitary Act privies supplying 1577 houses were converted. Dr. Trench admits that a system of sewerage, however complete, is not altogether unattended by a certain amount of sanitary evil, arising from the escape of deleterious gases; but he adds that measures have been taken to counteract the pernicious effects of the gaseous miasma, by the erection, since May, 1866, of 477 ventilating shafts, with a chamber for charcoal on Mr. Stenhouse's plan near the base, and an Archimedean air-extractor at the top.

I shall not attempt to point out the best way to drain Nelson; but I must say I consider that the drainage and sewage should not be carried off together; and that if it be decided to make use of the

ordure, it must be taken as far from the town as possible, and if on the contrary it is to be wasted, it should then be taken beyond the harbor, and only poured out at the commencement of the ebb tide. I have heard it argued that the salt water will counteract all bad effects from the pouring out of sewage on the mudflat. This is sheer nonsense; you have only to go down the Haven-road when the tide is out, when you will find the effects of the throwing out of the comparatively small amount of sewage quite appreciable now; what would it be if the whole town were drained on to it?

Earth-closets, where drains are impracticable, will be far preferable to the present open middens, enabling farmers and others to make use of that which otherwise is so prejudicial to health. Robert Bowie, Esq., in his "Report on the outbreak of cholera at Nordelph in Norfolk," says:—"One suggestion I offered will, I trust, be permanently acted on, namely, the regular employment of scavengers, a farmer in the neighborhood having offered to cart away all the refuse, and to pay for it at the rate of 3s. 6d. or 4s. 6d. a load; a price which, it is imagined, will render the process beneficial to the parishioners, and profitable to the agriculturist, as there can be no doubt that the regular and efficient cleansing of the village will greatly lessen the susceptibility of the inhabitants to disease, while the means will be acquired of rendering vegetation more abundant.

Trusting you will not attribute to any discourtesy my not having answered you sooner.

I am, Dear Sir,

Your most obedient servant,

WILLIAM W. SQUIRES, M.D.

To the Secretary of the Sanitary Commission.

SIR,—In answer to your enquiry of May 13, as to "whether the health of Nelson is injuriously affected by the present sewers, as now used?" I beg leave to state that it is, and form my judgment from experience gained in the pursuit of my profession. In those portions of the city more particularly exposed to the miasmata of sewage matter lying on the mudflat, viz., Toi-Toi Valley and the Haven road, I have lately met with the most severe forms of choleraic diarrhoea; in one case, in Toi-Toi Valley, where a strong man was living in a house situated by itself, well drained all round, and no other house within some chains of it in any direction, the symptoms were all those of Asiatic cholera. Along the Haven Road, in several cases, the choleraic diarrhoea was very severe, causing great and sudden prostration of strength. In both of these localities, though comparatively sparsely populated, I have found many cases of typhoid fever. In Toi-Toi Valley, the water supply is chiefly from a running brook; also, along the Haven road a great portion of the water-supply is from rain-water; and thus we must look to the vitiated state of the atmosphere as the reason for diseases of every type taking a severe form. In either locality, the olfactory nerves of any person walking along at night, when the tide is out and the sea-breeze blowing, will be quite sufficiently afflicted to convince him that the drains already in use, and converted into sewers depositing their matter on the mudflat, exert a very deleterious effect. This is further exemplified by the character of disease along the Wakapuaka road, where the same cause is brought to bear, by the tide bringing up sewage matter and depositing it on the mudflat, causing at certain times a fearful stench, much complained of by the inhabitants of that part, as far up as Mr. Wastney's. How the tide brings up and deposits impurities was well exemplified last year by the quantity of what is

popularly called "whale-feed," deposited all along the mud bordering the road, and poisoning the air while putrefying. With regard to the more densely populated part of the city, the system of open privies and full cesspools, prevents the senses being offended more particularly by the sewage on the mudflat, because its own impurities are so concentrated and pungent; but it stands to reason, that when the atmosphere is sensibly affected by it in those thinly-inhabited parts lying on either side of it, it must also have its quatum from the mudflat. I may say that, generally, in my practice, I have found a great want of tone in the systems of the young and also adult population in Nelson; slight ailments (looking at them from an English point of view) producing a rapid and great prostration of strength, that must have its origin in the noxious gases emanating from our excrementitious matter tainting both air and water, and though we are about obtaining a supply of good water, in its present state, it is worth a little consideration whether, as the water is to be collected into a reservoir in a narrow valley so close to the city, the gaseous exhalations from sewage matter, exposed on the mudflat or arising from cesspools, or from one huge central cesspool (as has been proposed to be made) might not be so wafted as to impregnate our supply of good water. One of the results of the late Cholera Commission in England was to demonstrate that "cisterns of water, though filled from a pure water supply, were rendered unfit for use by absorbing gases arising from impurities in their neighborhood."

The next enquiry, viz., "As to the present state of drainage in Nelson," can only be answered by stating that, with the exception of that in Trafalgar-street, and the new drain in Bridge-street, there is no drainage except the percolation through the soil, generally of a shingly character, into the wells; which fact, with the generally close position of the cesspools and privies to the wells needs no comment; where the drains have been constructed in the above-named localities, they reflect great credit on the Board of Works, if simply used as drains for the carrying away of waste water; but immediately they are applied to the purpose of sewers, carrying away cesspool and other refuse, we are bound to consider them as part only of a system, the outlet of which was to be by the Arrow Rock, as exemplified in the plans produced at the public meeting attended by Mr. Younger, the Secretary to the Board of Works; and therefore as being part only of a whole system, are naturally defective, and convert that system into a nuisance to the community at large, by depositing sewage matter on the mudflat contiguous to the city, and impregnating the air with its impurities.

This brings me to the third and last enquiry, as to "the best mode of drainage and sewerage for the future,"—matters of great importance to the health of the city. To consider this enquiry properly it must be divided into two parts, the first, that of the "best mode of drainage." The best plan, in my idea, would be to request the Board of Works to continue their present underground drains (without waiting for the requisition of the owners or occupiers of property) throughout all the leading thoroughfares on this side the Maitai river, comprising generally the flat portions of the city, with open gutters on either side of the roadway to receive the rainfall and convey it through gratings, with traps, into the main drain; the waste water of houses on either side should also be led by side underground drains into the main drain; a special rate on the property, whether built upon or not, to be levied, as is at present done in Trafalgar-street. In the more hilly portions of the city, open drains of sufficient width,

but of no great depth, so as not to interfere with traffic, should be constructed to carry the waste water and rainfall into the underground drains at convenient places; (this would, by giving a greater velocity to the water in the underground drains, tend to keep them clear); to these open drains other and smaller open drains should run from each place of abode, to carry away the waste water, which will be more plentiful than at present, when the new water supply is in operation. A special rate on property should be levied to cover the expense, which of course would be less than in having underground drains. By this system, combining underground drains, the best for populous thoroughfares, and open drains, where the nature of the locality and its more dispersed population, render them eligible; several open watercourses in very considerable thoroughfares, dangerous to passengers at night, would be obliterated.

The second part of the enquiry, as to the "sewerage," or, treating of it on the plan of earth-closets, or waterclosets, the scavengering of the city is a matter that to initiate will cost somewhat of money, and after it has been successfully adopted, good supervision to ensure its being carried on efficiently; but the money would, from the establishment of earth-closets, instead of having cesspools or sewers, converting the scavengered matters into manure, be returned after a time, and as its fertilising powers become recognised by the agricultural population, eventually give a profit. The calculations as to expense in detail in first starting the system, are more in the province of our able Provincial Engineer; but I think, on considering the matter, that the first expense of starting it would have to be borne by the Provincial Government. In the first place, it would be necessary that the depot or depots for obtaining the earth, and depositing that which has been used, should be placed somewhere out of the city, and in a position convenient for the farmers to obtain the soil converted into manure, consequently near the high road; this would perhaps involve the purchase of land; there would then be the expense of erecting chambers for drying the soil to be used in the earth-closets, and sheds for protecting the soil from the weather. Two depots would be required, one for the Wakapuaka district, taking the scavengering of that portion of the city called the "Wood"; and another for the Waimea Districts. These depots might be let at a rent to parties undertaking the contract for supplying the properly prepared earth to the closets, and for removing the waste matters: for which they should be charged some moderate sum, which together with the rent of premises, should be sufficient to pay interest on the capital expended, and provide a per centage to be put by as a sinking fund to liquidate the original sum provided by Government. A fixed and not too high a rate per ton should be charged by the contractors to farmers and others buying the manure to reimburse them their rent, &c., and give them a profit. But this, of course, would have to be arranged after the system had been put into working order by the Government, and there were data to go upon to put before intending contractors. The farmers would be more readily induced to bring the manure so acquired, if, at the first starting of the system by Government, payment was deferred till after the crops of the year had been gathered; the price for the manure to be made a first charge on the proceeds of the crops. There are other preliminary expenses which would have to be incurred; for instance, the providing of each abode with an earth-closet of as cheap a construction as possible, and two moveable boxes or pails for receiving and removing the deposits from each closet. Also the cleansing

out of present cesspools and filling them up with earth level to the surrounding surface. This involves the construction of two waggons, built on the principle of the scavenger's waggons of London, and the purchase of a large quantity of "Carbolic Acid" to disinfect the sewage matter to be moved. This has been proved in England not to affect the fertilizing properties of the night soil as manure, while it renders it innocuous to health. As the "carbolic acid" is manufactured in England and used in large quantities for disinfecting very considerable collections of sewage matter of towns, it cannot be of such a price as to preclude its being used here for this purpose. The sale at once of this disinfected ordure to agriculturists would recoup this expense, or the greater portion of it; and its effects on the land would encourage other farmers to buy the manure produced by the earth-closets and the scavenging of ash pits, manure heaps and sweeping of streets. To ensure the successful working of this or any plan of scavenging for the city, it is absolutely necessary that a Board of Health should be established; that two at least of its members should be members of the medical profession. That such Board should be composed of the members of the Commission now enquiring into this important matter, merely putting a medical man in the place of the Provincial Engineer, not that this gentleman is not admirably fitted to be of the Board, but that his peculiar duties calling upon him frequently to be months away from the city, would prevent his regular attendance at the meetings, which should be periodical and at no long intervals; and I would propose that the services of the Board should be gratuitously given for the common weal. It is usual in England that a Health Officer, a medical man, should be appointed to act under the Board, but the salary which would reimburse any of the profession in Nelson must necessarily be large to enable him to devote his time exclusively to the office, which to render effective he must do. I would propose that the office of Inspector of Nuisances should be given with a proportionate salary, say £200 per annum, to some one of intelligence and education, if possible, possessing an income not derived from business, who would thus be in a position to act without fear of or favor to any one; and that his responsibility should be transferred from the Board of Works to the Board of Health. The office of Inspector of Nuisances, as at present constituted, has proved of no benefit to the inhabitants; nuisances, stinking in the nostrils of every one else, appearing to have no effect on the senses of an officer especially appointed to have the nuisances abated. As a fitting person to hold the office under the Board of Health, I would suggest Mr. Clements, who took much trouble in getting up the public meeting, the result of which was the appointment of the present Commission, and who is happily possessed of means of livelihood independent of the salary that would be attached to the office of Inspector of Nuisances. While on the subject of the health of the city, I do not think it at all irrelevant to suggest that the present Commission should bring before the notice of his Honor the Superintendent and the Executive Government (and I think it quite competent for it to do so), the advisableness of inaugurating some plan for reclaiming the mudflat; it may doubtless be urged that the Provincial Funds are not sufficient to go to the expense, and that borrowing money is inexpedient. Might it not be done by inducing some company with foreign capital to embark in the work, by a liberal grant from the so reclaimed land, and still leave a good portion as Provincial Estate, either to be leased or sold as deemed most expedient? Its reclamation would be of vast benefit to the health of the city, and would add not a little to its attrac-

tiveness as a place of settlement to men of business. Moreover, it would be a means of lessening the silting up of the harbor, which is complained of sometimes.

I am, Sir,

Your most obedient servant,

FRANCIS L. VICKERMAN,  
Medical Officer of the Hospital, &c.

To C. HUNTER BROWN, Esq.,  
Honorary Secretary to the Commission of  
Enquiry into the Drainage of Nelson.

Nelson, May 20th, 1867.

DEAR SIR,—In reply to your communication of the 13th instant, concerning the drainage and sewerage of Nelson, requesting me to give an opinion on the subject, I may remark that although the main sewer and its tributary in Hardy-street, receiving at present, I believe, the sewage of only thirty or forty houses, may not as yet exercise any appreciably bad effect upon the health of the inhabitants, it is nevertheless quite certain that if the town become densely peopled, and the sewage be allowed to find its way as it does now at all states of the tide to the mudflat in various stages of decomposition, the health of the inhabitants must be very injuriously affected by it. Indeed, even now, in summer time, a most offensive odour may be detected along the beach road, when the air is moist and close proceeding from the mudflat, when left exposed by the ebb tide.

Whenever sewage is carried by water, unless the current be rapid and continuous, there will always be deposited upon the banks of such river or stream a putrescent slime or ooze of a very offensive and deleterious character.

I cannot help thinking that before any satisfactory system of drainage can be adopted it will be advisable to decide whether the sewage shall be utilised or not, because if utilized the question of allowing it to pass into the existing sewers or any extension of them is at once disposed of, for to be made use of it must be collected in a more concentrated form than would be possible under all circumstances and at all times from the sewers, moreover in a fluid state, unless for purposes of irrigation, it is very unmanageable; and companies at home who have endeavored to make it marketable have had their experiments brought to a sudden termination by indictments and law suits, the nuisance being so intolerable.

Liquid sewage can be carried by means of pumps and pipes to any distance, and grass land is not only particularly benefited by its application but possesses a singular power of disinfecting or deodorising it for sewage; water, if passed over a sufficient area of grass land, will run off, it is said, quite clear and without either taste or odour. The process of irrigation is carried on at Edinburgh, Carlyle, Croydon, and other places with great advantage to the land, and without any apparent bad effect upon the health of the people; but those who are unfortunate enough to live in the neighborhood of the works find their proximity anything but agreeable. Irrigation has been in operation on a large scale in the neighborhood of Edinburgh for two centuries, but the great expense of thus dealing with sewage would prohibit our attempting to dispose of it in that way here.

If the water-closet system were adopted, and the mouth of the main sewer were at the Arrow Rock, and the sewage could be pumped or allowed to pass into the sea at ebb-tide, it would rid us of the danger of its giving off its poisonous gases on the Mudflat, but whether, if we possessed the means, this is the best or wisest way of disposing of it, I am inclined to doubt, for it is far too valuable to the farmer and

grazier to be thrown away or wasted, containing as it does in abundance, certain ingredients essential to the successful rearing of young stock, not readily obtainable elsewhere. If the present drains, extended with an outlet at the entrance of the harbor, are to take the sewage it will be necessary to adopt some efficient system of flushing, and all gratings and openings carrying off rain or flood-water from the streets must be securely trapped; or ventilators, or air-shafts may be found necessary to carry noxious effluvia over head and away, for the gases of putrefaction are so insidious and penetrating, that even the best constructed water-traps have been found insufficient to prevent their ascent into the streets, the heated air of summer attracting them from the cooler depths of the sewers below; but these details and many others will of course be considered, and form part of the proposed system of drainage as heretofore intended, if it be ever fully carried out.

The existing drains are indispensable, and will probably be extended to all our main streets to take the rainfall and flood-waters, which will sweep away with them superficial impurities, which even in a town like ours are not inconsiderable; and I may, perhaps, remark in passing, that as these flood-waters are likely to do considerable damage, which will increase as the outskirts become more cleared and cultivated, I think *deep*, instead of open or superficial drainage should be encouraged to moderate this flow, as well as to improve the land through which such deep drainage would pass.

If you decide that the sewage is to be made available as a fertilising agent, as I trust you may (for any other means of disposing of it but by its application to land has been proved to be from one cause or another objectionable), I am of opinion that the earth-closet, for those who can afford the first outlay, and some inexpensive modification of its principle for others of smaller means will be the best system for adoption here. It would doubtless require very careful management and supervision, and a well organised system of scavenging for the town; but in the suburbs and country districts, I imagine the head of each family, after understanding its importance, might be easily taught the means of utilising the sewage on his property for the benefit of his own crops.

In connection with this subject, another essential sanitary condition may be mentioned—the absence of all animal and vegetable refuse and house liquids of every description from the neighborhood of the dwelling; everything of this description should be carried as far as possible from the house, and either carted away or thrown into a pit, and covered with earth every day. All sinks communicating with drains are highly objectionable in houses, as noxious gasses find their way through them, and are disseminated throughout the house when the doors are closed at night.

Animals of all kinds should be kept away from dwelling-houses, and their manure not allowed to accumulate. The ground about a house should be kept clean and dry; the closet and refuse-pits ought to be in as cool a place as possible, and in such a situation that the prevailing winds may blow any effluvia away from the direction of the dwelling.

With respect to the present system of collecting sewage in cesspools, I consider it the very worst that can be practised, for apart from the fact of those accumulations contaminating the atmosphere, of which annual warnings are given us in the form of dysentery and low fever, it is only a wonder from the porous nature of the soil and the consequent almost unavoidable pollution of the drinking water in the town wells that the inhabitants have not before this been visited with some terrible epidemic, for this

is of all others the most fruitful source of some of the most fatal forms of disease, this immunity could not continue if the town became more densely populated, and it is a subject for congratulation that the proposed supply of pure water to the town, when obtained, will obviate this danger for the future.

In conclusion, I may perhaps be allowed to state that the consequences of polluting rivers are not well understood. Indeed, some persons have an idea that it is advantageous, and that fish feed and flourish upon the sewage of towns. This is so contrary to the truth that I may state that Sanitary Commissioners at home, as the result of their investigations, have been taught to consider fish a good test of the purity of the waters they inhabit, for in many rivers where, before sewage was thrown into them, fish were abundant and of good flavor, they are now scarce and unpalatable, and shrimps and flounders taken near the mouths of different rivers, some receiving sewage and others not, vary so much in color, appearance, and flavor, as to make it difficult to believe they belong to the same families. To give a familiar illustration to what extent a river may be affected by sewage, I may instance the putrid fermentation of the Thames, in 1858, on which occasion but for an unusually large proportion of ozone in the atmosphere, which by oxidizing, neutralised the organic poison evolved in such alarming quantities from that river, London, it was believed would have been visited by some devastating disease.

With many apologies for trespassing upon your time and patience at such length, I wish you every success in your important duties. The subject you have to deal with is one of considerable difficulty, but as it affects the interests of all, I trust when the result of your investigation is made known, the inhabitants will be convinced of the necessity of making some change, and that the report of the Commissioners will lead to the willing adoption by the public of any measures that may be recommended by them to ensure a sound and practicable system of sanitary reform.

I am, dear Sir,

Your most obedient servant,

GEO. WILLIAMS.

To Secretary of the Nelson Sanitary Commission.

To C. HUNTER BROWN, Esq., &c., &c., &c.

SIR—I have the honour to acknowledge the receipt of your letter of the 13th ultimo, desiring information relative to sewerage, scavenging, earth-closets, &c. I have much pleasure in complying to the extent of my ability, and shall refer to the several subjects in order.

As to sewerage, removal of night-soil, &c.:—Melbourne has no sewerage. Many of the larger buildings, as the General Post-office, the Treasury, the Melbourne Club-house, and others, have drains which communicate with the River Yarra, and all the surface drainage of the city and suburbs finds its way to the river by means of the street gutters, or of open channels constructed for the purpose. A Government Board was constituted as long ago as 1853, for the double purpose of procuring a sufficient supply of water, and constructing sewers for the city. The former object has been effected at a cost of somewhat more than one million sterling, but, in respect to the latter, nothing more has been accomplished than the preparation, several years ago, of a series of plans. The carrying out of these has not been attempted, nor is this, I believe, a matter of regret, for, so far as I am informed they contemplated the construction of large egg-shaped drains to receive as well the soil from privies and water-closets,

as all other sewage matter, to conduct the whole into a large reservoir, whence the liquid should be pumped into the river, near its mouth, and the more solid residuum be removed for manure. This plan would have been very costly, and at the same time wasteful, as it would have subjected the refuse from privies, &c., to a process which would deprive it of almost all value as manure.

In the meantime, the distance between the inhabited portion of the city and the nearest market gardens or farm lands being several miles, and consequently so great as to discourage the cartage of liquid manure direct from the privies, the disposal of the night-soil of the city was, until very recently, a difficulty, as giving rise to a great nuisance. The soil was removed in close carts, by night, to a piece of land which, when originally reserved for the purpose, was a mile or more distant from habitations, but which, as population increased, became gradually less remote. On this land, called the "Manure Dépôt," the soil was shot out into shallow pits, which retained the more solid refuse, and permitted the liquid to flow away, through a gully, into a swamp to the west of the city, and extending to the Yarra, below Melbourne. This depot having been previously complained against, the City Council closed it, and as inconvenience then arose from want of a place of deposit for the refuse, a plan was adopted which, from its simplicity and success, induced the owners of land adjacent to the city to follow it, and thereby brought the manure into request, and relieved the Corporation from further necessity of providing for its disposal. The plan was to plough the surface of a portion of one of the parks which was in an unimproved and arid condition, and which was distant two miles from the General Post Office, and nearly a mile from habitations; this land was then dealt with as if with the intention of planting vines or constructing an orchard. Along the upper edge of the ploughed land a trench was dug about seven feet in breadth and nine inches deep, divided every twenty-two feet of its length by small partition walls of undisturbed earth about six or eight inches wide, for the purpose of confining the liquid soil; the bottom of the trench was then broken with the pick to the depth of about six inches. Into the several divisions of this trench the carts shot their contents at night, and, as they did so, a gang of labourers was employed digging out along the lower side of the trench earth to a depth of nine inches, and a breadth of seven feet as before, and throwing the earth so excavated over the soil as deposited, thereby at once covering it up and rendering it inodorous, and at the same time opening a parallel trench in readiness to have the floor of it broken with the pick, and prepared for use on the following night. A great prejudice was shown against this plan at the commencement, from fear that a nuisance would be created; but it was presently admitted that, even during the night-hours between 11, p.m., and 5, a.m., when the soil was being deposited, the effluvium was less than would be observed in passing an ordinary newly-manured field, and that, after the covering over of the soil with dry earth, but a faint odour could be perceived close along the leeward edge of the trench, and none whatever at a parallel distance of fifty yards off. The park to which this process was applied is nearly 100 acres in extent, and, at the ordinary rate of the supply of manure from the city, say forty cart-loads per night if all sent there, a period of two years would elapse before the whole surface would be gone over. Other parks of equal or greater extent then remained, which could be dealt with in the same manner. But long before a sixteenth of the original ground had been gone over,

the manure became in request around the city, and as the Corporation has at present no property in it, the work in the park was discontinued. The experiment has, in the meantime, served the excellent purpose of proving—that the pouring of the soil into underground sewers, is as unnecessary as it would be wasteful; that the suburban lands may be continually re-fertilized by its application; and that the cost of constructing sewers for its reception is unnecessary and undesirable. That which I believe to be now thought of as the best plan of underground sewerage for this city, is two main sewers from east to west, crossing the central valley of the city at right angles, so as to intercept the storm waters which occasionally flood the central street (Elizabeth-street); the sewers to converge and join the west of the city, and discharge into the lower Yarra, receiving in their course the smaller drains intended to carry off the waste and refuse water from houses, but to be as seldom as possible converted into discharge-pipes for water-closets, and not at all for privies

#### EARTH-CLOSETS.

With respect to these, I can give but little satisfactory information. It is, I apprehend, not necessary to describe their construction, from the simple contrivance of an iron bucket beneath the privy-seat and a box of dry earth and a scoop beside it, to the more elaborate patented mechanically fitted inventions, such as Draper's patent, which has a box fitted up at each side of the seat and filled with powdered earth, of which a quantity is liberated by cranks and valves attached to the seat each time this is sat upon or pressed down. If carefully and cleanly used, the pans not converted into urinals or receptacles for slops, and regularly emptied, and the hoppers always replenished with properly powdered earth, they work well, are almost inodorous, preserve in the soil those fertilizing properties which a water-closet would destroy, and enable the business of cleansing to be carried on by day, and therefore more conveniently and cheaply than it could be by night. But it can scarcely be expected that the inhabitants of the lower and worst parts of a city would so use such closets, or that the owners of property of that description would willingly incur the cost of fitting up such contrivances, or provide for their being properly attended to; nor is this the case only with the owners of the less valuable property, it is still more so with owners of the largest and best houses, who have had the upper floors fitted with closets having a never failing supply of water from the Yan Yean Waterworks, and consequently requiring far less attention. Therefore, although there is an earth-closet company here, which undertakes for a sum of £5 per annum to keep each earth-closet regularly emptied and supplied with earth, the number of closets in use in private houses is comparatively small, the greater number of buildings fitted with them being Government offices, the military barracks, the Industrial schools, &c., and we have two of them in the Town Hall, where, as in the Government establishments, so far as I can learn they work tolerably well.

#### SCAVENGING.

This is performed for the Corporation under a contract—let annually—the contractor's charge for the twelve months, which will expire on the 30th of this month, is £2,575. The specification adopted as that under which tenders for the ensuing twelve months are being invited, is somewhat more stringent than that previously in use, and therefore will probably entail a trifling increase of cost. You will observe that the contract only applies to the cleansing of streets, lanes, &c., and not to the removal of refuse from houses, yards, privies, and such like, for

at present the powers of the Corporation in such matters are limited to outside the building lines, except, indeed, as a Board of Health, in which character it has some more extended power, but under an Act too complex to be really workable. A new and better digested Act relating to the public health has passed all its stages in both Houses of our local Parliament, and only awaits the settlement of some small difference between the branches of the Legislature to become law. It gives power to contract for the cleansing of yards, privies, &c., as well as of streets and public places, and upon its coming in force it is intended by the City Council to include all these in one contract, and to extend the contract time, to, say five years, so as to justify the contractor in incurring the large pecuniary outlay necessary for the plant requisite to carry out so extensive an undertaking. The cost of the first five or ten years will doubtless be considerable, and will probably render necessary an increase in the rating of the city to an extent of perhaps twopence in the pound, but the saving to householders,

as well as the convenience of getting rid of refuse, and the comfort resulting from greater cleanliness, will cause the additional taxation to be cheerfully borne, and the increased value of the manure will, as is the case in England, eventually be a source of revenue to the Corporation.

I forward as a book parcel by this mail a copy of the specification recently adopted for street cleansing, and a copy of the new Health Bill, to which I have referred, and I have to assure you of the satisfaction which it will at all times afford me to furnish any similar information so far as may be in my power.

I am, &c.,

E. G. FITZGIBBON,

Town Clerk.

Town Hall, Melbourne, June 12.

P.S.—I greatly regret that this letter was not finished in time for the mail by the Rangitoto.

I may now add, that the accepted tender for the cleansing of the city for the ensuing twelve months is for the sum of £4,950.

June 26, 1867.