PROPOSED RE-ZONING OF MERCY HOSPITAL SITE

NEWINGTON AVENUE

DUNEDIN

Servicing and Infrastructure Scoping Report February 2012

terramark
setting new boundaries

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1.0 BACKGROUND

Mercy Hospital is proposing to undertake a private plan change to rezone its site at 72 Newington Avenue, Dunedin. It is currently situated in the Residential 1 zone of the Dunedin District Plan. Hospital facilities are not expressly permitted within this zone (or any other zone within the District Plan). Therefore any new or extension of the hospital facilities would be considered as non-complying activities, and resource consent is required.

Mercy Hospital has aspirations to further develop the Hospital site in the future. A master planning report (May 2011), prepared by Octa Associates, outlines a 5-10 year development plan which envisages being undertaken in 5 stages. The majority of the development work would involve infill and re-organisation of existing facilities within the existing building footprint.

Further development, which might include extension of existing buildings and/or new buildings and facilities, may be considered necessary beyond 10 years.

Terramark Ltd have been engaged to undertake a scoping report as it relates to the existing utility services, water and drainage networks and the potential effect a proposed zone change of the Mercy Hospital site might have on this existing infrastructure.

The scope of this report is limited to the existing 'off-site' infrastructure that is owned and/or administered by the respective power, telecommunications, water and drainage authorities.

2.0 PURPOSE

The purpose of this report is to provide an insight into the likely effect the proposed plan change will have on the existing service infrastructure and to investigate the following key issues:

- the capability/capacity of existing services to accommodate the Plan Change area
- the potential need for upgrades to existing service infrastructure resulting from the Plan Change
- service requirements to accommodate future growth likely to result from the Plan Change

3.0 CONSULTATION

Consultations with the respective utility service authorities was undertaken by way of email and/or interviews.

The questions emailed to both Delta Utility Services (electricity reticulation), and Chorus (telecommunications), together with their respective responses, have been reproduced as follows.

3.0.1 <u>Delta Utility Services</u>

Are there any known capacity issues or limitations with respect to the existing electricity network and supply for which future expansion of Hospital Services might further compromise? If so, what are they?

The existing transformer is 750kVA. The actual loading (based on MDI readings this morning (3 February 2012) is 421kVA. Assuming that any future capacity increase would not exceed 300kVA, there would be no issues. In addition the existing high voltage reticulation is underground to site; this would likely have sufficient capacity for any development within the limitations of the existing site.

How likely is it that upgrades would be required to the existing electricity network if expansion of Hospital facilities were to occur?

This would be dependent on the capacity required, however, impact would be negligible should an additional transformer be required.

What inputs would you consider necessary, in order for a meaningful assessment to be made, on the likely effects the proposed plan change would have on the existing electricity network and supply infrastructure?

I do not think any input is necessary on DELTA's part.

Refer Appendix A for existing reticulation maps.

3.0.2 Chorus

The same questions were put to Chorus with respect to the telecommunications network. Their response is as follows.

The site is fed via a 100 copper cable and 12 fibre cable from Burwood Avenue. 100 pair has approx 60 workers, 30 spares, and 10 intacts. 12 fibres has 3 working circuits at present.*

The fibre and copper connection to main cables in Highgate and were laid with a 100mm duct to site.

This would appear enough capacity for any future growth…. i.e.:
Spare capacity in 100.*
Spare capacity in fibre which could also get MUX installed if required.
Spare duct capacity back to Highgate… and then further back to MHL Exchange.

Refer Appendix B for existing reticulation map.

3.0.3 Dunedin City Council

The main discussion points to come out of my meeting with Council's Water and Waste Services Network Engineer, David Dewhirst, are summarised as follows:

1) Foul Sewer Network

- Under normal environmental conditions, there is no known capacity concerns in the network downstream of the Mercy Hospital.

- Water and Waste Water Department staff have carried out some modelling[1] of the downstream network based on a 1 in 10 year rain event. Due to infiltration, significant rain events can have a considerable adverse effect on the capacity of a foul sewer network. Findings (refer Appendix D) under the 1 in 10 year simulation parameters indicate there would likely be an issue with capacity in the vicinity of Duchess Avenue.
- The capacity of the downstream sewer network could be compromised if the Hospital's water usage were to increase significantly. By way of example, if future on-site additions were to include new laundry and/or kitchen facilities, both of which are high water use activities, then clearly there would be a proportional increase in the volume of grey water draining into the foul sewer network.
- In order to undertake a meaningful assessment of the likely impact the Plan Change will have on the foul sewer network, more information would need to be provided on the scope of future on-site activities.

  If further modelling determined that future activities on the site would compromise the capacity of the sewer network downstream, then solutions may include:

  1. Upgrade any identified problem portions of the sewer network, to increase capacity, or
  2. Install suitably sized attenuation tanks on-site, with monitoring equipment linked to the downstream network. This would allow waste water to be stored on-site for a pre-determined period of time, during peak rain/flow events before being released back into the pipe network as the downstream capacity allowed.

Based on the information contained in the 5-10 year Master Planning Report, it is unlikely that the proposed changes will have any more than a minor effect on the capacity of the downstream foul sewer network, unless the changes were to result in an increase in water usage.

2) Stormwater

- There are no known capacity issues in the downstream stormwater network, under normal environmental conditions.
- As with the foul sewer network, modelling has been undertaken based on a 1 in 10 year storm event. Findings (refer Appendix D) indicate there may be capacity problems in some sections of the downstream piped network, and more particularly in the vicinity of Bute Street and Duchess Avenue.

  A major influencing factor, when assessing the likely effect the Plan Change might have on the downstream stormwater network, would be the extent to which impervious surface areas on the site are increased as part of any future development work. The effect, for example, of extending the sealed car park area on-site would be to increase the volume and intensity of stormwater runoff into the downstream stormwater catchment.

[1] Mr Dewhirst noted that the modelling/simulation software is by no means an exact science, but rather serves as an indicative tool for identifying potential problem areas in a sewer system under certain conditions

If it was determined the increased runoff would compromise the capacity of the stormwater network, then, as with the foul sewer scenario, two solutions might include:

1. Upgrade any identified problem portions of the stormwater network to increase capacity, or
2. Install suitably sized stormwater attenuation facilities on-site to store the additional runoff during peak rainfall periods.

Based on the information contained in the 5-10 year Master Planning Report, it is unlikely the proposed changes will have any more than a minor effect on the capacity of the downstream stormwater network, unless the extent of impervious surfaces were to increase as a result of on-site development work.

3) Water Reticulation

- There are no known capacity issues in the existing water reticulation network that supplies Mercy Hospital.
- D.C.C. records indicate, on average, Mercy Hospital is only consuming approximately $40m^3$ (40,000 litres) of reticulated water per month.
- The volume of water consumed is unlikely to change dramatically as a result of the proposed changes in the 5-10 year Master Plan.

See Appendix C for existing water and waste water maps and index sheets.

4.0 CONCLUSIONS

Generally speaking, the proposed changes outlined in the 5-10 year Master Planning Report are unlikely to have any appreciable effects on the existing service infrastructure supplying the Mercy Hospital site.

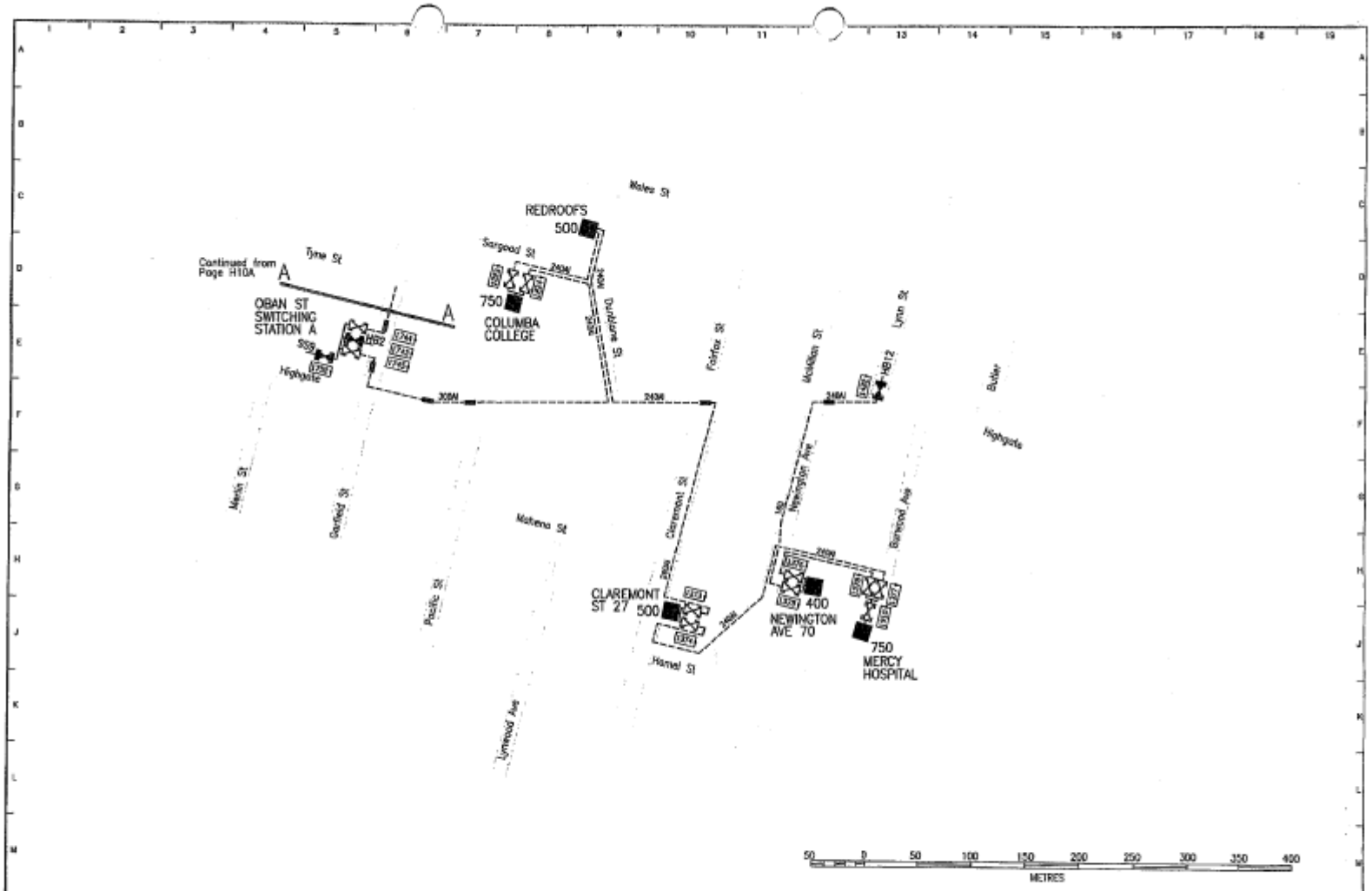
More specifically, both the power and telecommunications authorities have stated there is spare capacity in their respective networks, and both have indicated they would not expect any future growth within the constraints of the existing site, to result in capacity and/or capability problems for their network infrastructure.

The Dunedin City Council Water and Waste Services Department have advised that future growth on the site is likely to have an adverse effect on the foul sewer and water reticulation networks only if future growth were to result in a considerable increase in water consumption. Similarly, future growth on the site is likely to have an adverse effect on the downstream stormwater network only if the overall area of the site covered by impervious surfaces were to increase.

In any case, it seems there are a number of solutions available to remedy any capacity issues which might arise as a result of future growth on-site. The extent and nature of any required service infrastructure upgrades can realistically only be determined when the extent of any proposed growth/development is known and accurately quantified.

Appendix A

(Electricity Supply: Network Maps)



REVISION	A	B	C	D	E	F	G	H				DRAWN J G P	–
COMP. NO	2101	–	CTR 2181	–	CTR 3885	–	CTR 5804	–				TRACED C A S	91/07
DATE	01/99	08/03	12/04	02/05	03/06	07/08	11/10	01/11				CHECKED	
CHECKED	KTB	KTB	DLP	DLP	SJM	SJM	SJM					DES.CHG	

Aurora

HALFWAY BUSH No10 6.6kV FEEDER

DATE ISSUED 21 JAN 2011

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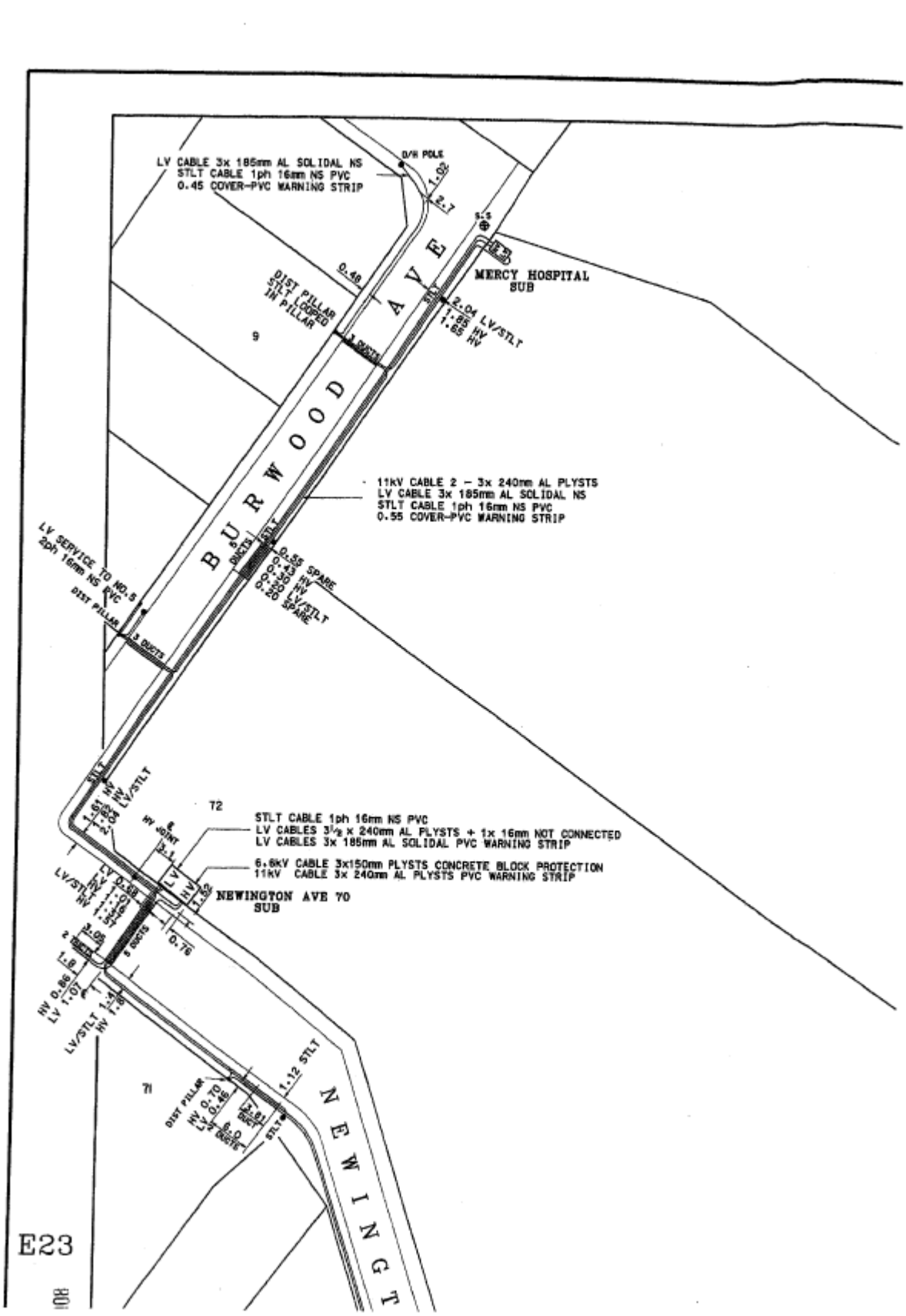
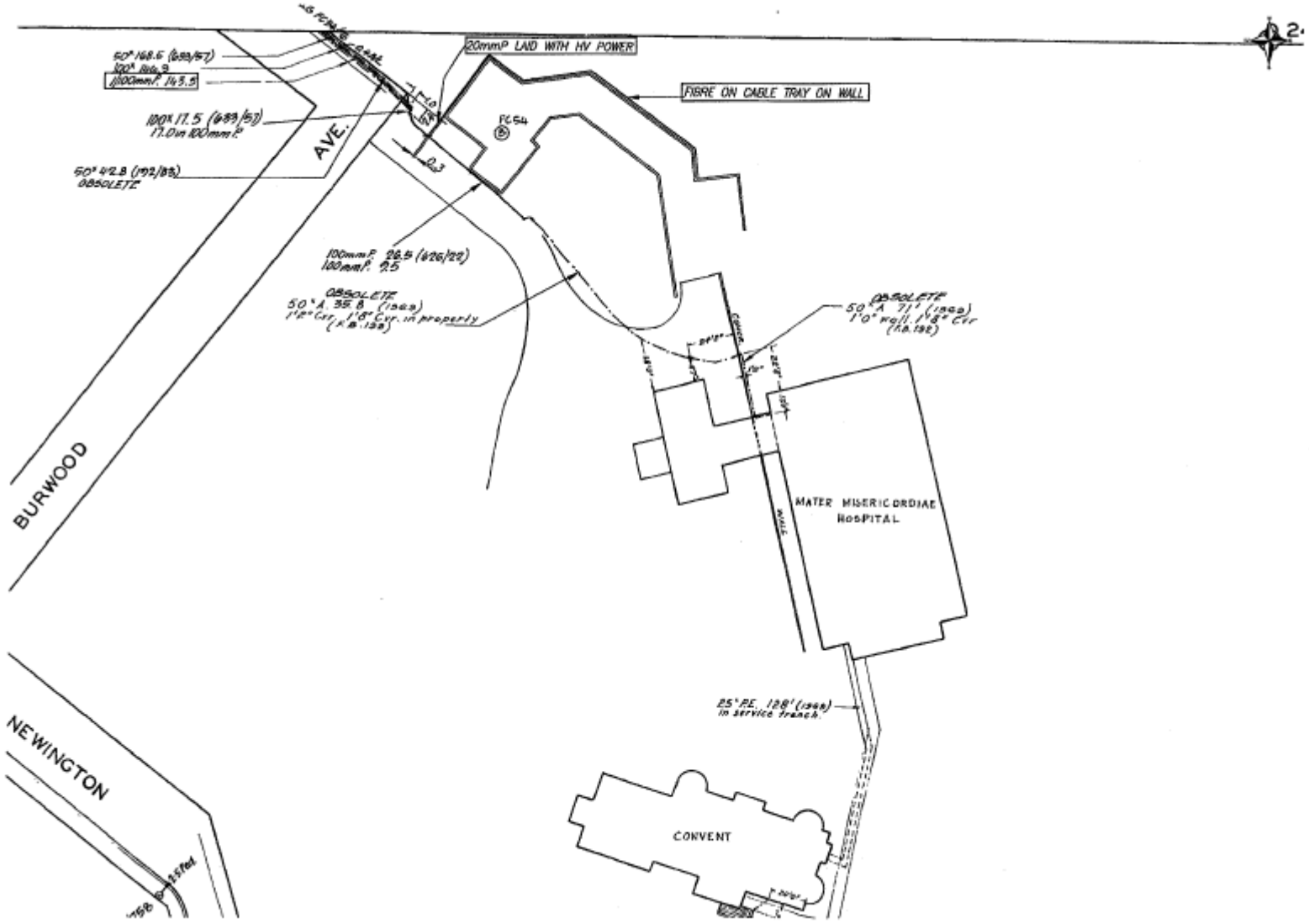

LV CABLE 3x 185mm AL SOLIDAL NS
STLT CABLE 1ph 16mm NS PVC
0.45 COVER-PVC WARNING STRIP
D/H POLE
MERCY HOSPITAL
SUB
DIST PILLAR
STLT LOOPED
IN PILLAR
9
BURWOOD AVE
11kV CABLE 2 - 3x 240mm AL PLYSTS
LV CABLE 3x 185mm AL SOLIDAL NS
STLT CABLE 1ph 16mm NS PVC
0.55 COVER-PVC WARNING STRIP
LV SERVICE TO NO.5
2ph 16mm NS PVC
DIST PILLAR
0.55 SPARE
LV/STLT SPARE
72
STLT CABLE 1ph 16mm NS PVC
LV CABLES 3 1/2 x 240mm AL PLYSTS + 1x 16mm NOT CONNECTED
LV CABLES 3x 185mm AL SOLIDAL PVC WARNING STRIP
6.6kV CABLE 3x150mm PLYSTS CONCRETE BLOCK PROTECTION
11kV CABLE 3x 240mm AL PLYSTS PVC WARNING STRIP
NEWINGTON AVE 70
SUB
71
NEWINGTON
E23

Appendix B

(Telecommunications Supply: Network Map)


20mm² LAND WITH HV POWER
FIBRE ON CABLE TRAY ON WALL
50² 168.6 (699/57)
100² 186.9
@100mm² 145.5
100² 17.5 (699/57)
17.0in 100mm²
50² 42.8 (192/83)
OBSOLETE
FC54
0.3
100mm² 26.5 (626/22)
100mm² 9.5
OBSOLETE
50² A 35.8 (1966)
1'12" Cvr. 1'8" Cvr. in property
(K.B. 138)
OBSOLETE
50² A 71.1 (1966)
1'0" wall, 1'8" Cvr
(K.B. 192)
AVE.
BURWOOD
NEWINGTON
MATER MISERICORDIAE
HOSPITAL
CONVENT
25² P.E. 128' (1966)
in service trench
2.

Appendix C

(Water & Waste Water Maps)

Dunedin City Council

Dunedin City Council

Type	GIS Symbol	GIS Symbol #	GIS Layer	Comments
Foul Sewer Standard Manhole		251	FS Node	STD manhole type in Hansen.
Foul Sewer Drop Manhole		254	FS Node	DROP manhole type in Hansen.
Foul Sewer Inspection Manhole/Chamber		257	FS Node	INSP manhole type in Hansen.
FS Isolation Drain Chamber		264	FS Node	SIDC manhole type in Hansen.
FS Standard Valve Chamber		266	FS Node	STDVC manhole type in Hansen.
FS Std Manhole & Air Relief Valve		265	FS Node	STDAV manhole type in Hansen.
Foul Sewer Pipe		201	FS Pipe	
Foul Sewer Vent Line		222	FS Pipe	
Foul Sewer Rising/Pumping Main		224	FS Pipe	
Foul Sewer Trunk Line		209	FS Pipe	
Foul Sewer Trunk Line - Rising/Pumping		220	FS Pipe	
Foul Sewer Virtual Pipe		219	FS Pipe	Dummy pipes used to maintain connectivity. In Hansen in Main Inventory with no pipe attributes except for "VIRTU" in the Mainline Type field.
Foul Sewer Pipe - Redundant		204	FS Misc Pipe	Original data captured from retic sheets is not in Hansen.
Foul Sewer Access Point		252	FS Node	
Foul Sewer Bend		307	FS Node	Used for angle bends without a structure for access.
Foul Sewer Endpoint		307	FS Node	The upper end of a pipe without a known structure.
Foul Sewer Junction		307	FS Node	A junction without a structure for access.
Foul Sewer Lamphole		259	FS Node	
Foul Sewer Inspection Opening		258	FS Node	
Foul Sewer Vent		262	FS Node	
Foul Sewer Outlet		261	FS Node	Enter angle in GIS.
Foul Sewer Unspecified Asset		268	FS Node	Used for miscellaneous or unknown assets.
Foul Sewer Treatment Plant		289	FS Node	A Polygon usually shows the outline of the Treatment Plant.
Foul Sewer Pump Station		280	FS Node	A Polygon usually shows the outline of the Pump Station.
Private Foul Sewer Pipe		208	Foul Drain Pipe	Default label of "PRIVATE".
Private FS Standard Manhole		251	Foul Drain Node	
Private FS Drop Manhole		254	Foul Drain Node	
Private FS Inspection Manhole/Chamber		257	Foul Drain Node	
Private FS Lamphole		259	Foul Drain Node	
Private FS Inspection Opening		258	Foul Drain Node	
Private FS Pump Station		280	Foul Drain Node	
Private FS Unspecified Asset		268	Foul Drain Node	
Private FS Node		307	Foul Drain Node	Bend/Endpoint/Junction
FS Redundant Asset	As FS	As FS	FS Misc Node	Code is for assets that were dead when captured. From now on redundant nodes and pipes will keep their Hansen numbers. The same foul sewer asset symbol is used, but is coloured black to indicate that it is redundant. The symbol is dependent on the asset
FS Proposed Asset	As FS	As FS	FS Misc Node	Proposed nodes do not need to be numbered since they will replaced. Instead the id field should contain a three letter Hansen code, e.g. FSL.
FS Pipe - Possible		232	FS Misc Pipe	
FS Pipe - Proposed or Subdivision		205	FS Misc Pipe	
Foul Sewer Pipe - Renewal		236	Foul Sewer Projects	Pipe type.
Foul Sewer Pipe - Capital		205	Foul Sewer Projects	Pipe type.
Foul Sewer Repair		277	FS Repair	Illustrates the point on an asset that a repair was made. The symbol number is not entered in GIS. The Hansen work order number should be entered when available.

Type	GIS Symbol	GIS Symbol #	GIS Layer	Comments
Stormwater Standard Manhole		251	SW Node	STD manhole type in Hansen.
Stormwater Drop Manhole		254	SW Node	DROP manhole type in Hansen.
Stormwater Inspection Manhole/Chamber		257	SW Node	INSP manhole type in Hansen.
Stormwater Pressure Manhole		263	SW Node	PRESSR manhole type in Hansen.
Stormwater Valve Chamber		266	SW Node	STDVC manhole type in Hansen.
Stormwater Pipe		202	SW Pipe	
Stormwater Rising/Pumping Main		221	SW Pipe	
Stormwater Trunk Line		223	SW Pipe	
Stormwater Trunk Line - Rising/Pumping		220	SW Pipe	None in system at this time
Stormwater Virtual Pipe		219	SW Pipe	Dummy pipes used to maintain connectivity. In Hansen in Main Inventory with no pipe attributes except for "VIRTU" in the Mainline Type field.
Stormwater Pipe - Redundant		203	SW Misc Pipe	Original data captured from retic sheets is not in Hansen.
DCC Open Channel/Watercourse		231	SW Pipe	Council owned watercourse.
Stormwater Inlet - Pipe		256	SW Node	Default type. Enter angle in GIS.
Stormwater Inlet - Insp. Chamber & Grating		255	SW Node	A mudtank that is directly attached to a stormwater pipe, but is not an inlet.
Stormwater Inlet - Mudtank		260	SW Node	A mudtank should only be considered an inlet if it is at the start of a stormwater line (rather than a mudtank line), and is not on road reserve.
Stormwater Inlet - Wingwall		269	SW Node	
Stormwater Access Point		252	SW Node	
Stormwater Bend		308	SW Node	Used for angle bends without a structure for access.
Stormwater Endpoint		308	SW Node	The upper end of a pipe without a known structure.
Stormwater Junction		308	SW Node	A junction without a structure for access.
Stormwater Lamphole		259	SW Node	
Stormwater Inspection Opening		258	SW Node	
Stormwater Sump		267	SW Node	
Stormwater Bubble Up Tank		253	SW Node	
Stormwater Outlet		261	SW Node	Enter angle in GIS.
Stormwater Unspecified Asset		268	SW Node	Used for miscellaneous or unknown assets.
Stormwater Pump Station		280	SW Node	A Polygon usually shows the outline of the Pump Station.
Piped Watercourse		213	SW Drain Pipe	Belongs to the property owner.
Open Watercourse		214	SW Drain Pipe	Belongs to the property owner.
Culvert		245	SW Drain Pipe	Culverts are basically watercourses that go from one side the road to the other. Roading asset.
Private Stormwater Pipe		207	SW Drain Pipe	Default label of "PRIVATE".
Private SW Standard Manhole		251	SW Drain Node	
Private SW Drop Manhole		254	SW Drain Node	
Private SW Inspection Manhole/Chamber		257	SW Drain Node	
Private SW Lamphole		259	SW Drain Node	
Private SW Inspection Opening		258	SW Drain Node	
Private SW Unspecified Asset		268	SW Drain Node	
Private SW Outlet		261	SW Drain Node	
Private SW Inlet - Pipe		256	SW Drain Node	
Private SW Inlet - Wingwall		269	SW Drain Node	

Private SW Inlet - Mudtank		260	SW Drain Node	
Private SW Bubble Up Tank		253	SW Drain Node	
Private SW Sump		267	SW Drain Node	
Private SW Node		308	SW Drain Node	Bend/Endpoint/Junction
Private SW Pump Station		280	SW Drain Node	
Mudtank Pipe		217	SW Mudtank Pipe	Roading asset.
Mudtank		260	SW Mudtank	Roading asset.
Bubble-up Mudtank		253	SW Mudtank	Roading asset.
SW Redundant Asset	As SW	As SW	SW Misc Node	Code is for assets that were dead when captured. From now on redundant nodes and pipes will keep their Hansen numbers. The same stormwater asset symbol is used, but is coloured black to indicate that it is redundant. The symbol is dependent on the asset
SW Proposed Asset	As SW	As SW	SW Misc Node	Proposed nodes do not need to be numbered since they will replaced. Instead the id field should contain a three letter Hansen code, e.g. SWM.
SW Pipe - Possible		233	SW Misc Pipe	
SW Pipe - Proposed or Subdivision		206	SW Misc Pipe	
Stormwater Pipe - Renewal		237	Stormwater Projects	Pipe type.
Stormwater Pipe - Capital		206	Stormwater Projects	Pipe type.
Stormwater Repair		277	SW Repair	Illustrates the point on an asset that a repair was made. The symbol number is not entered in GIS. The Hansen work order number should be entered when available.

Type	GIS Symbol	GIS Symbol #	GIS Layer	Comments
Water Valve - Air		270	Water Valve	
Water Valve - Open		275	Water Valve	Used for other types of valves, including Butterfly and Talbot (only entered when used to shut off a main instead of a service.)
Water Valve - Closed		272	Water Valve	Valves on scour lines are usually closed.
Water Valve - Sluice		313	Water Valve	
Water Valve - Gate		312	Water Valve	Gate (also known as Peet / P.V.)
Water Valve - Zone		279	Water Valve	In Hansen zone valves are distinguished from standard valves in the Valve Status field. **Valves are closed. Note: there is one zone valve in Stone Street that is sometimes open.**
Water Pressure Sustaining Valve	PS	285	Water Valve	Code is PSV.
Water Pressure Reducing Valve	PR	286	Water Valve	Code is PRV.
Water Pressure Valve	P	287	Water Valve	Used as general symbol for pressure valve when specific type not needed.
Water Reticulation Main		211	Water Main	RETIC main line type in Hansen.
Water Rider Main		239	Water Main	RIDER main line type in Hansen.
Water Scour Line		229	Water Main	Used to remove water from asset. Also known as drains and overflows.
Raw Water Supply/Distribution Main		228	Water Main	Transports raw water.
Water Trunk Main		210	Water Main	Transports treated water from reservoir or treatment plant to the reticulation system.
Water Virtual Pipe		219	Water Main	Dummy pipes used to maintain connectivity. In Hansen in Main Inventory with no pipe attributes except for "VIRTU" in the Mainline Type field.
Water Disused Pipe		235	Water Main	A pipe that is not currently being used, but might be again.
Redundant Pipe - still in ground		216	Water Misc Pipe	Copied from Water Pipe layer into Misc Pipe layer in GIS, symbol must be changed. Original data captured from retic sheets is not in Hansen.
Redundant Pipe - not in ground		246	Water Misc Pipe	Copied from Water Pipe layer into Misc Pipe layer in GIS, symbol must be changed. Original data captured from retic sheets is not in Hansen.
Water Standard Service/Lateral		215	Water Service Line	Service pipes take water from the main to the customer. They should be associated to the pipe from which they get water even if not directly connected to it. They do not have nodes.
Water Fire Service		226	Water Service Line	Enter NZFS (New Zealand Fire Service) in the Service Type field.
Water Critical Service		227	Water Service Line	Water must not be shut off without warning. Enter type in the Critical Service field.
Water Node		315	Water Node	Nodes are always at the end of a pipe (including all junctions.) When Adaptor/Kamlock on end state in Model # field.
Water Node - Manhole/Chamber		251	Water Node	Usually only on scour and overflow lines.
Water Node - Lamphole		259	Water Node	Usually only on scour and overflow lines.
Water Node - Reservoir Inlet		256	Water Node	Intakes are usually in Plant system, nodes only used when water comes from a Reservoir rather than a raw water source.

Water Node - Outlet		261	Water Node	At the end of scour and overflow pipes.
Water Node - Redundant	Various	Various	Water Redundant Node	Copied from Water Node layer into Water Redundant Node layer in GIS, symbol remains the same, and is changed to black.
Water Correlation/Listening Point		281	Water Fitting	Also known as listening points.
Water Break Pressure Tank		291	Water Fitting	A polygon may show the outline of the asset. Pipes should be broken at the tank but with a fitting point instead of a node.
Water Strainer		294	Water Fitting	
Water Swab Trap		295	Water Fitting	
Water Test Point		296	Water Fitting	A fitting attached to a DDC main where water is taken for testing.
Water T-Joint		297	Water Fitting	Used when the T-joint had been plugged or blanked off so that isno longer a node (unless it is now another sort of node, e.g. a reducer.)
Water Unspecified Asset		298	Water Fitting	Other or unknown assets.
Water Air Vent		299	Water Fitting	
Fire Hydrant		273	Water Fitting	Hydrant types are Standard, Ball (now illegal) and Flushing Point (for cleaning rather than fire fighting.)
Manifold Box		274	Water Meter	Manifold boxes on service pipes that do not contain a Meter.
Water Meter - With Manifold		276	Water Meter	Manifold boxes on service pipes that contain a Meter.
Water Meter - Without Manifold		283	Water Meter	Meters that are too big to go in a Manifold box. Includes PSM Meters.
Water Meter - Combination		300	Water Meter	Two meters that are used as one.
Toby		278	Water Meter	Tobies on service pipes.
Water Flow Meter		284	Water Meter	Flow meters on reticulation pipes.
Water Backflow Preventer - Check		301	Backflow Preventer	
Water Backflow Preventer - Double Check		309	Backflow Preventer	
Water Backflow Preventer - RPZ		271	Backflow Preventer	Reduce Pressure Zone valve.
Water Non-Return Valve		282	Backflow Preventer	

Water Tank - Restrictor		290	Water Tank	Tank belongs to the property owner, DCC is responsible to the restrictor.
Water Storage Tank (Treated)		292	Water Plant	Plant asset. The facility is at the centre of a structure polygon. Virtual pipes go from nodes at exit and entrance points to the facility (instead of a second node.)
Water Reservoir - Raw		293	Water Plant	Plant asset. The facility is at the centre of a structure polygon. Virtual pipes go from nodes at exit and entrance points to the facility (instead of a second node.)
Water Intake - Raw Water		256	Water Plant	
Water Pump Station		280	Water Plant	Plant asset. A polygon may show the outline of the asset. Pipes should be broken at the pump station but with a fitting point instead of a node.
Water Bore		288	Water Plant	Plant asset. The facility is at the centre of a structure polygon. Virtual pipes go from nodes at exit and entrance points to the facility (instead of a second node.)
Water Treatment Plant		289	Water Plant	Plant asset. The facility is at the centre of a facility polygon. Virtual pipes go from nodes at exit and entrance points to the facility (instead of a second node.)

Private Water Main		212	Water Private Pipe	Default label of "PRIVATE".
Private Water Service Line		225	Water Private Pipe	
Private Water Valve - Air		270	Water Private Fitting	
Private Water Valve - Open		275	Water Private Fitting	Used for other types of valves, including Sluice, Gate (Peet / P.V.), Butterfly and Talbot (only entered when used to shut off a main instead of a service.)
Private Water Valve - Closed		272	Water Private Fitting	Valves on scour lines are usually closed.
Private Water Pressure Valve		287	Water Private Fitting	Includes Pressure Reducing and Pressure Sustaining valves.
Private Fire Hydrant		273	Water Private Fitting	Hydrant types are Standard, Ball (now illegal) and Flushing Point (for cleaning rather than fire fighting.)
Private Water Tap		305	Water Private Fitting	
Private Water Check Valve		301	Water Private Fitting	
Private Water Double Check Valve		309	Water Private Fitting	
Private Water Pump Station		280	Water Private Fitting	
Water Unspecified Asset		298	Water Private Fitting	Types are Private Treatment Plant, Private Bore, Private Swab Trap, Private Strainer.
Private Water Treatment Plant		289	Water Private Fitting	

Private Water Bore		288	Water Private Fitting	
Private Water Storage Tank - Treated		292	Water Private Fitting	
Private Water Strainer		294	Water Private Fitting	
Depth of Cover		302	Water Depth of Cover	Default label with cover depth shown.
Water Zone Boundary		218	Zone Boundary	The symbol number is not entered in GIS.
Sampling Site		303	Sampling Sites	Water is taken from these sites (usually private property) for bacteriological testing. The symbol number is not entered in GIS.
Water Diagram Detail		304	Water Diagram	Hyperlink to a scanned image of a technical diagram. The symbol number is not entered in GIS.
Water Redundant Node	**Various**	**Various**	Water Misc Node	Code is for pipes that were dead when captured from retic sheet. From now on redundant nodes and pipes will keep their Hansen numbers.
Water Proposed Node	**Various**	**Various**	Water Misc Node	Proposed nodes do not need to be numbered since they will replaced.
Water Redundant Depth of Cover		314	Water X Depth of Cover	Default label with cover depth shown.
Water Pipe - Proposed or Subdivision		230	Water Misc Pipe	Proposed Council mains must have Proposed Nodes at both ends
Water Pipe - Possible		234	Water Misc Pipe	
Water Pipe - Renewal		238	Water Projects	
Water Pipe - Capital		230	Water Projects	
Water Repair		277	Water Repair	Illustrates the point on an asset that a repair was made. The symbol number is not entered in GIS. The Hansen work order number should be entered when availabe. Change to link to Work Order.

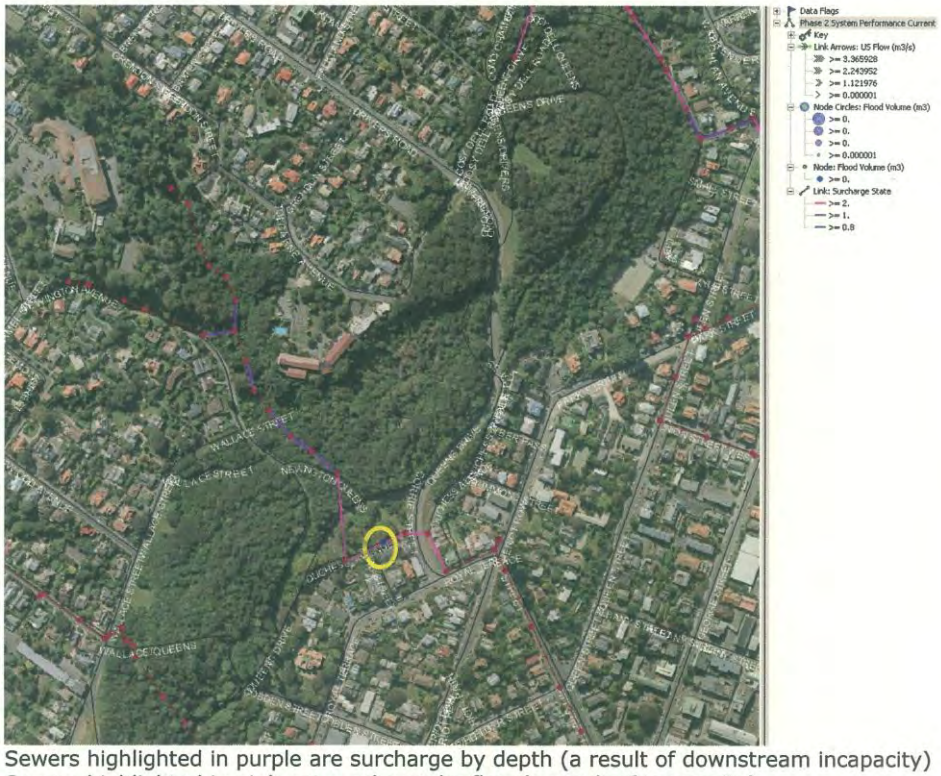
Type	GIS Symbol	GIS Symbol #	GIS Layer	Comments
Pipe Bridge		Polygon	W&WS Facility	Polygon Layer. For assets that are part of the pipe network but do not carry water/wastewater.
Duct		Polygon	W&WS Facility	Polygon Layer. For assets that are part of the pipe network but do not carry water/wastewater.
Plant Assets - Buildings, Tanks and Structures		Polygon	W&WS Facility	Polygon Layer.
Roads, Driveways, Parking Lots		Polygon	W&WS Facility	Polygon Layer.
Fence		240	W&WS Facility Line	Line Layer.
Gate		241	W&WS Facility Line	Line Layer.
Facility Boundary		242	W&WS Facility Line	Line Layer. Used to show the outline of facility locations.
Note		310	W&WS Note	Point Layer. For information considered important enough to be constantly displayed, e.g. Memorandums of Encumbrance and bends on water pipes.
Feature Line		243	W&WS Feature Line	Line Layer. Highlights non-asset features, e.g. substations.
Point of Interest		311	W&WS Point of Interest	Point Layer. Highlights non-asset features, e.g. businesses.
Miscellaneous Node		306	Miscellaneous Node	Any nodes that belong to Water and Waste but are not in Hansen, e.g. access manholes on ducts and pump station storage pipes.
Miscellaneous Line		244	Miscellaneous Line	Any lines that belong to Water and Waste but are not in Hansen, e.g. pilot cables and drains from valve pits.
Easement	Polygon	Polygon	Easement	Polygon Layer. Contains easements (private and Water and Waste), access ways and right of ways.

Appendix D

(Water & Waste Services Modelling Data)

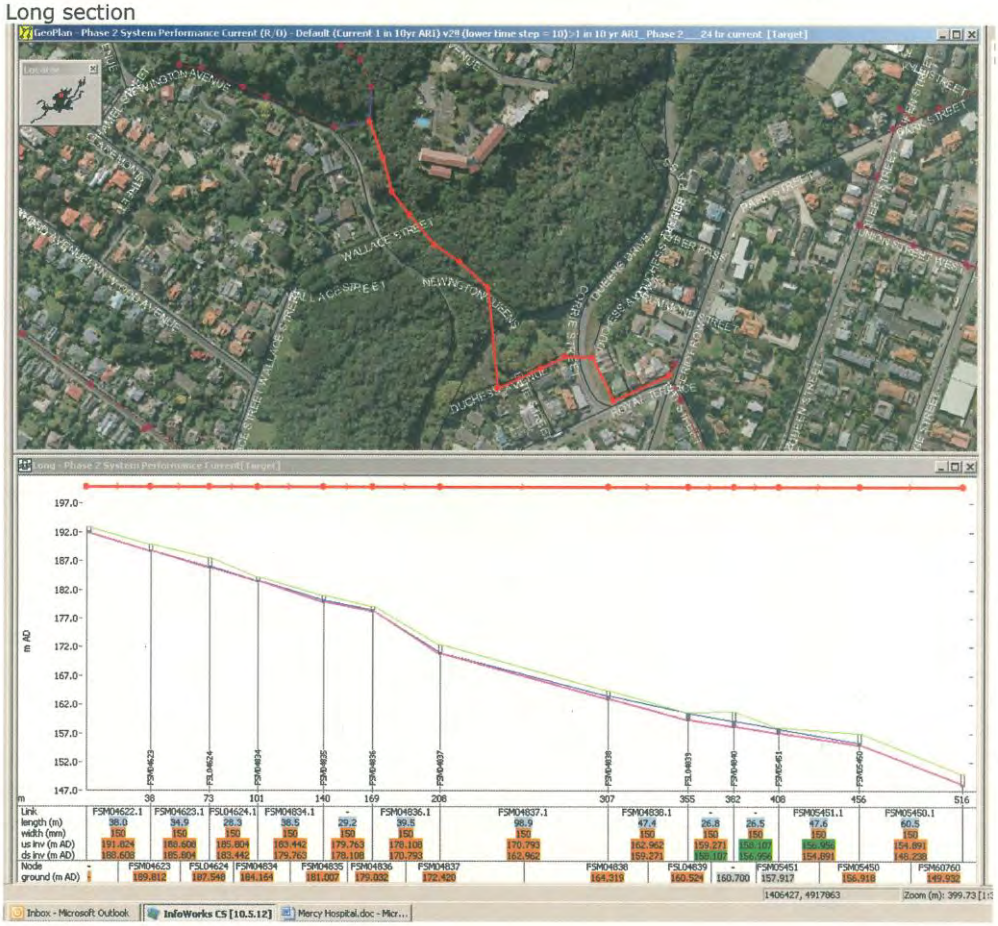
Mercy Hospital

Wastewater 2010 model
Note this area was roughly calibrated in Phase 1 and no detailed study currently covers it.
1 in 10 year simulation

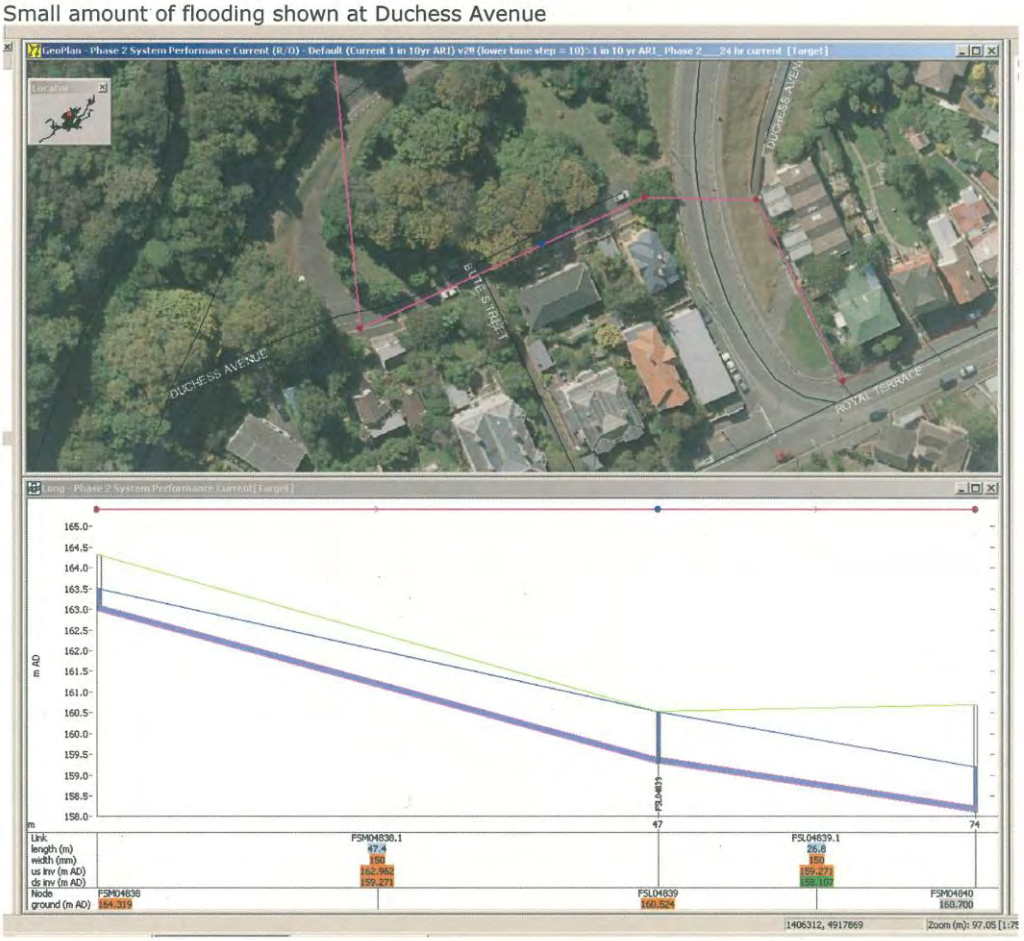


Sewers highlighted in purple are surcharge by depth (a result of downstream incapacity)
Sewers highlighted in pink are surcharge by flow (a result of incapacity)
Sewers in dark red are normal
Blue nodes (manholes) indicate flooding

Long section



Small amount of flooding shown at Duchess Avenue



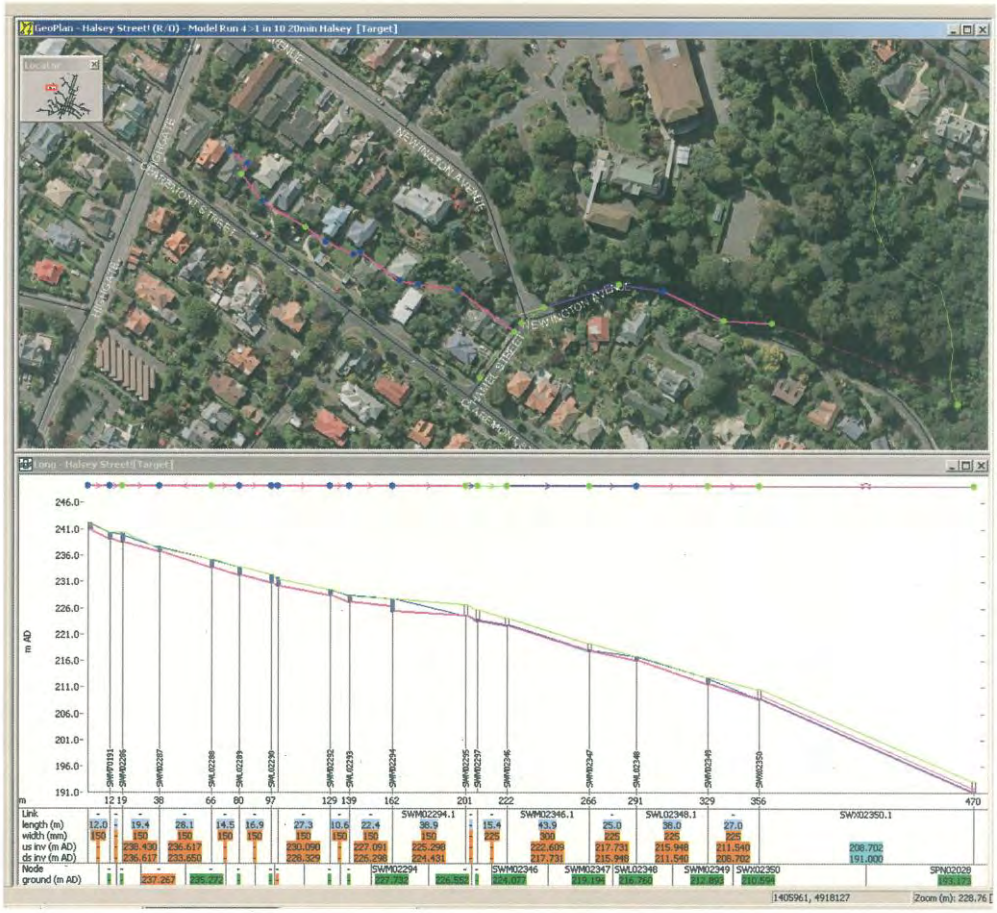
Surcharging is not an issue when the 150mm diameter changes to 225mm diameter at Pitt Street

Stormwater

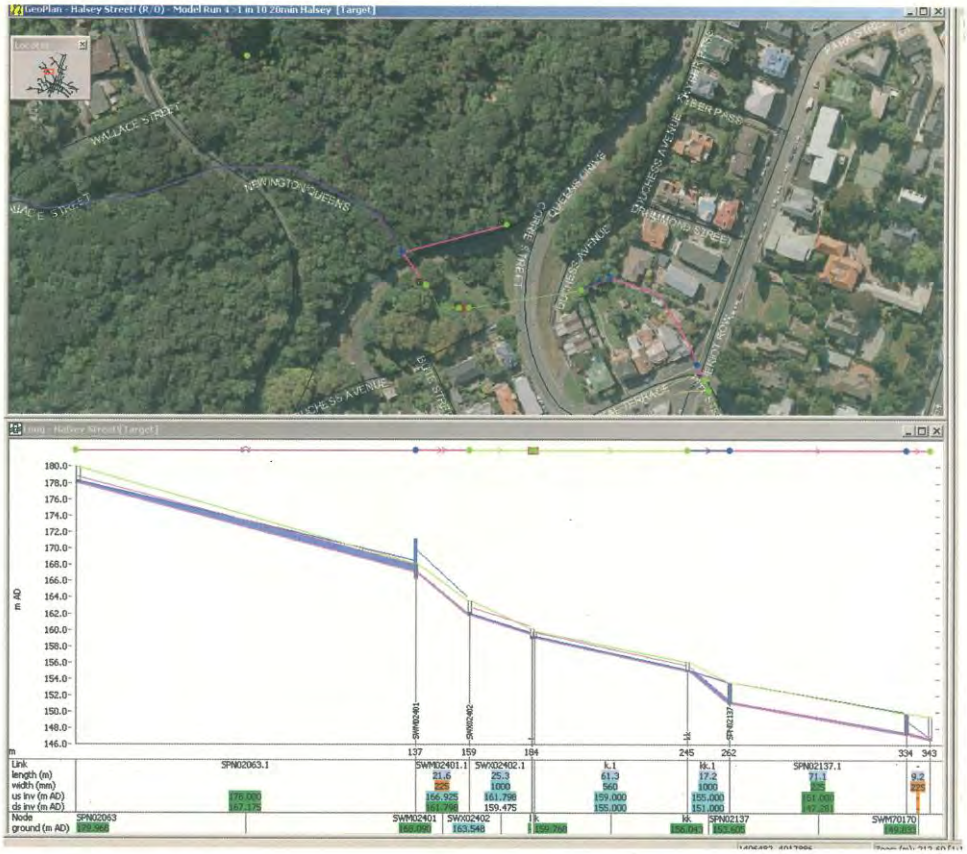
Location within the Halsey Street ICMP catchment
1 in 10 year 20 minute storm

Sewers highlighted in purple are surcharge by depth (a result of downstream incapacity)
Sewers highlighted in pink are surcharge by flow (a result of incapacity)
Sewers in green are normal
Sewers in dark purple are open channels
Blue nodes (manholes) indicate flooding

Flooding is shown in the model at Claremont Street



Flooding is shown in the model at Corrie Street / Royal Terrance / Pitt Street



Details from ICMP documents

Pitt Street - Key areas of predicted flooding during the 1 in 10 yr ARI event (model run 4). Manhole overflows result from the hydraulic constriction that affects the Bute Street intake screen. A section of DN225 pipework is shown in the GIS downstream of a larger pipe, this drop in hydraulic capacity results in manhole overflow, generating overland flow down Pitt Street and also creating a backwater effect resulting in flooding at the Bute Street location. Model confidence for this area is low.

Flood Hazard – Current and Future 1 in 100 yr ARI

The model shows that during a 1 in 100 yr ARI rainfall event, with MHWS tide conditions, York Place, St Andrew Street, Hanover Street, Leith Street and Harrow Street are predicted to have flooding across the full width of the road, with deep flooding (> 300 mm) predicted on parts of St Andrew Street, Hanover Street, and Harrow Street. High velocity overland flows are predicted on London Street, Pitt Street, York Place and Rattray Street, and in the Town Belt. A 'significant' flood hazard rating has been assigned to these locations. With the extreme climate change scenario applied (with a storm surge) the area of 'significant' flood hazard increases to encompass a large proportion of the lower catchment, predominantly the central city to the east of the railway. This is mainly due to tidal inundation.