



Department of Environment Land Water and
Planning
Fishermans Bend Baseline Utility Assessment
Final Report

November 2016

Acronyms

ACMA	Australian Communications and Media Authority (ACMA) is an Australian Government statutory authority within the Communications portfolio. The ACMA is tasked with ensuring media and communications works for all Australians. It does this through various legislation, regulations, standards and codes of practice.
AEMO	Australian Energy Market Operator
AHD	Australian Height Datum
ARI	Average Recurrence Interval. The average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration.
AR&R	Australian Rainfall and Runoff, a national guideline document, data and software suite that can be used for the estimation of design flood characteristics in Australia. It is published and supported by the Commonwealth of Australia.
BAU	Business as Usual
CCZ	Capital City Zone
CMP	Construction Management Plan
CoM	City of Melbourne
CoPP	City of Port Phillip
CRC	Cooperative Research Centre
CWW	City West Water
DBYD	Dial-Before-You-Dig - Free national referral service designed to prevent damage and disruption to the vast pipe and cable networks which provides Australia with essential services.
FBTS	Fishermans Bend Terminal Station
FTTP	Fibre-to-the Premises is a form of fibre-optic communication delivery, in which an optical fibre is run in an optical distribution network from a central equipment location all the way to the premises occupied by a subscriber
GSM	Global System for Mobile Communications is a standard developed by the European Telecommunications Standards Institute to describe the protocols for digital cellular networks used by mobile phones. It has become the de facto global standard for mobile communications.
4G	Fourth generation of GSM wireless mobile telecommunications technology.
5G	Fifth generation of GSM wireless mobile telecommunications technology.
HFC	Hybrid fiber-coaxial is a telecommunications industry term for a broadband network that combines optical fibre and coaxial cable.
ICT	Information and Communications Technology is an extended term for information technology (IT) which stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information.
IWM	Integrated Water Management
MWC	Melbourne Water Corporation

NBNCo	NBN Co Limited is an Australian government-owned corporation tasked to design, build and operate Australia's National Broadband Network.
RSS	Redevelopment Services Scheme
SEW	South East Water
SFP	Strategic Framework Plan
SMP	Sewer Mining Plant
SMS	Safety Management Study
VCAT	Victorian Civil and Administrative Tribunal
VPA	Victorian Planning Authority (formerly MPA)
WiFi	WiFi is a technology that allows electronic devices to connect to a wireless LAN (WLAN) network, using authorised radio bands.
WSAA	Water Services Association of Australia

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- Appendix E – APA and Viva Energy Guidelines to Planning and Development around High Pressure Gas and Fuel Transmission Pipelines

1. Introduction

GHD was engaged by the Fishermans Bend Taskforce (Taskforce) to complete an assessment of the baseline utility infrastructure requirements for the ultimate infrastructure requirements of Fishermans Bend in 2051.

Plans have been previously prepared for the four Capital City Zone precincts however, there had been no significant work on the expanded employment zone to date. The inclusion of the employment zone requires significant interaction with the service authorities to develop an understanding of the existing infrastructure, its capacity, and its suitability for the proposed development. This inclusion also necessitated a review of the existing plan for the original four precincts.

This assessment is intended to be used to assist with preparation of the Strategic Framework Plan and subsequently the Precinct Plans that are being prepared by the Taskforce.

1.1 Background

Previously, GHD completed several assessments of Utility Infrastructure at Fishermans Bend. The reports were:

- 2012 Assessment of Utility Infrastructure
- 2013 Infrastructure Plan
- 2015 Utility Infrastructure Update

Essentially the above three reports move from an initial assessment of the capacity of the existing infrastructure, to the preparation of a BAU servicing strategy and an integrated servicing strategy, and then back to a review of the initial assessment.

It is important to note that only the final report dealt with the employment precinct, and then only in a very limited way as the new precinct was announced while the final report was underway.

1.2 Holistic Planning for Utility Infrastructure

This project is the first of three projects that will establish a holistic infrastructure plan for the Fishermans Bend precinct for the first time. The three phases of assessment for utility infrastructure are:

- Baseline infrastructure plan (this assessment)
- Integrated Servicing Strategy. This will review the previous integrated strategy, and bring it to current conditions in terms of economics and also technology, and incorporate the employment precinct into a holistic plan
- Costing. The final brief will cost the various options

1.3 Overview of this Assessment

The scope of work for this assessment is to confirm the existing and future baseline utility infrastructure requirements for Fishermans Bend.

Five precincts make up the Fishermans Bend project area. The original four, residential and commercial precincts are Montague, Lorimer, Wirraway and Sandridge. The fifth precinct is the

Employment Precinct which is bound by the Port of Melbourne land to the north, Yarra River to the west, the Bolte Bridge to the east and the Westgate Freeway to the south.

The five precincts are indicatively shown in the figure below.

Figure 1 Fishermans Bend



The three key tasks that comprise this assessment are:

- Prepare **Existing Infrastructure Plans** that include all five (5) precincts
- Review and confirm the **Baseline Servicing Strategy** for the four (4) original precincts based on current regulatory, technological and planning arrangements and as a result of inclusion of the Employment Precinct
- Prepare **Baseline Infrastructure Plans** that outline future infrastructure required to support full build out of the precincts based on based on Growth Forecasts provided by the Taskforce (refer Appendix A)

1.3.1 Definition of 'Baseline'

The proposed baseline servicing approach in Fishermans Bend is not necessarily the standard or business as usual (BAU) approach adopted throughout Melbourne. Therefore, for the purpose of this assessment 'baseline' is defined as the 'baseline servicing approach that is intended for Fishermans Bend under the current planning and regulatory frameworks'.

1.4 Utility Stakeholders

Key contacts from Utility Stakeholder organisations consulted throughout this project are provided in Table 1.

Table 1 Key Contacts

Organisation	Key Contact	Email Address
South East Water	Pam Kerry	pam.kerry@sewl.com.au
CRC	Jamie Ewert	jamie.ewert@monash.edu
Melbourne Water	Leon Harvey	Leon.Harvey@melbournewater.com.au
CitiPower	Andrew Dinning	adinning@powercor.com.au

Organisation	Key Contact	Email Address
AusNet	Herman Debeer	Herman.debeer@ausnetservices.com.au
MultiNet	Elsie Zhao	Elsie.Zhao@ue.com.au
APA Group	Daniel Tucci	daniel.tucci@apa.com.au
	Mukhtiar Nanuan	Mukhtiar.Nanuan@apa.com.au
Australian Energy Market Operator	Philip Woodall	Philip.Woodall@aemo.com.au
Viva Energy	Creagh de Brabander	Creagh.de-Brabander@vivaenergy.com.au
NBNCo	Ian Lockyer	IanLockyer@nbco.com.au
Telstra	Peter Ogdin	Peter.ogdin@team.telstra.com
Optus	Vince Viceconte	Vince.Viceconte@optus.com.au
City of Port Phillip	Mark Thompson	mthomps@portphillip.vic.gov.au
	Sam Innes	Sam.Innes@portphillip.vic.gov.au
City of Melbourne	Barry Fox	barry.fox@melbourne.vic.gov.au
	Ralf Pfleiderer	ralf.pfleiderer@melbourne.vic.gov.au

1.5 Limitations and Assumptions

This report is subject to, and must be read in conjunction with, the assumptions and qualifications contained throughout the Report.

The following general assumptions apply:

- Location of existing services has been approximately determined by GHD based on Dial Before You Dig information and information provided by key stakeholders. The locations and depths of existing information cannot be confirmed as accurate.
- Assessment of the condition and capacity of existing infrastructure has been based on advice and data received from utility providers and authorities. This study has not included any site inspections or other reviews of existing infrastructure
- Infrastructure requirements have been assessed for ultimate development of the adopted development scenario
- Demands are assumed to be uniform across the precinct
- Individual lot scale infrastructure is not included in the plans
- In order to prepare the gas demand forecasts, the following was assumed:
 - High efficiency gas appliances
 - Average of 30 jobs per commercial property
 - 7 star rated home insulation
 - 80% of dwellings are high rise units and most will use reverse cycle electric heating or community heating (central boiler)

- 75% of new dwellings connected to gas supply
 - Each dwelling uses 28 GJ per annum
 - Each commercial property uses 185 GJ per annum
- In order to prepare power demand forecasts, the following was assumed:
 - Maximum demand calculations have been undertaken based upon AS 3000 Tables C1 and C2 to determine residential and commercial loads.
 - The figures provided in the documentation are based upon growth projections (i.e. adding to the existing demand)
 - A diversity factor of 0.8 has been used

2. Growth & Demand forecasts

2.1 Growth Forecasts

In order to understand the likely infrastructure demands of a future community in Fishermans Bend, an informed projection of population and employment is required.

The Fishermans Bend Taskforce prepared growth forecasts for dwellings, employment and population for each of the five (5) precincts. The Growth Forecast information is summarised in Table 2.

Table 2 Growth Forecasts to 2051 by Precinct

Precinct	Dwellings	Population	Jobs
Montague	12,250	22,050	13,475
Lorimer Street	10,150	18,270	6,090
Sandridge	8,800	17,600	15,840
Wirraway	8,800	21,120	4,400
Employment Precinct	0	0	20,000
Total (rounded)	40,000	80,000	60,000

2.2 Demand Forecasts – Gas and Electricity

Based on the Growth Forecasts outlined in Section 2.1, GHD prepared demand estimates for sewer, gas and power, to assist stakeholders to assess the impact of full buildout on their networks.

The demand forecasts are outlined in the tables below:

Table 3 Gas Demand Forecasts

Precinct	Dwellings	Jobs	# Commercial Properties	GJ/annum		
				Domestic	Commercial	Total
Montague	12,250	13,475	449	343,000	83,096	426,096
Lorimer Street	10,150	6,090	203	284,200	37,555	321,755
Sandridge	8,800	15,840	528	246,400	97,680	344,080
Wirraway	8,800	4,400	147	246,400	27,133	273,533
Employment Precinct	-	20,000	667	-	123,333	123,333
Total	40,000	60,000	1,994	1,120,000	368,798	1,488,798

Table 4 Electricity Demand Forecasts

Precinct	Dwellings	Population	Jobs	Electricity Demand (MVA)
Montague	12,250	22,050	13,475	94
Lorimer Street	10,150	18,270	6,090	75
Sandridge	8,800	17,600	15,840	72
Wirraway	8,800	21,120	4,400	62
Employment Precinct	0	0	20,000	5
Total	40,000	80,000	60,000	236

2.3 Demand Forecasts – Sewer and Water

At this stage SEW has retained the population forecasts and rate of growth adopted for the Fishermans Bend IWM Options Evaluation study (GHD, 2015). This Fishermans Bend IWM Options Evaluation study (GHD, 2015) adopted VPA’s Ultimate Development Scenario as the design basis for water and sewer servicing within Fishermans Bend.

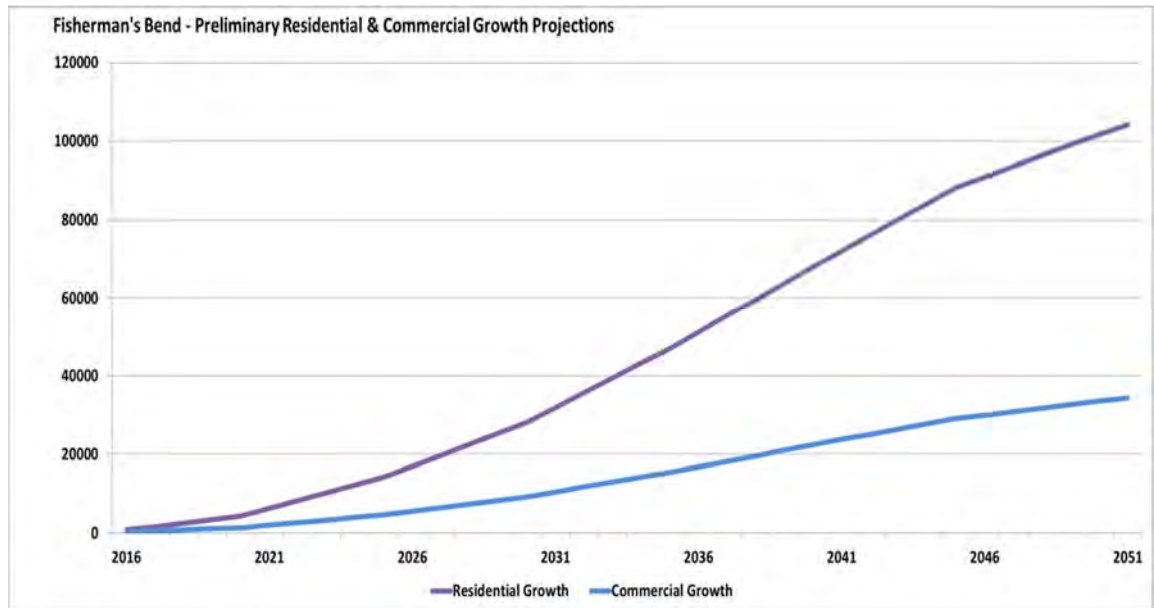
The population estimates adopted were developed for the four initial precincts within Fishermans Bend (excluding the Employment Precinct). SEW does not believe it is necessary to make an additional allowance for the projected increase in the employment population within the Employment Precinct due to the conservative nature of the adopted population scenario in the IWM work to date (VPA’s Ultimate Development Scenario).

VPA’s Ultimate Development Scenario was assumed to include 120,000 residents and 61,050 employees.¹ These population estimates were based on a draft population forecast of between 44,132 – 52,080 dwellings for 2051, and 60,000 dwellings at ultimate development (i.e. approximate 120,000 residents assuming that there is an average 2.0 persons/dwelling).

Figure 2 illustrates the estimated rate of residential and commercial growth based on discussions with the VPA during the delivery of the Fishermans Bend IWM Options Evaluation study (GHD, 2015).

¹ Note that 61,050 employees is an assumed population at ultimate development, which was derived by scaling up the 40,700 stated in the SFP by 50%.

Figure 2 Projected Rate of Growth



2.3.1 Future Sewage Generation Loads

Table 5 summarises the sewage generation rates assumed to determine the impact of the adopted development scenario from the Fishermans Bend IWM Options Evaluation Study (GHD 2015).

Table 5 Sewage Generation Rates

Scenario	Residential (L/p/d)	Non-residential (L/p/d)	Total (L/s)
Average Dry Weather Flow (ADWF)	175	86	304

2.3.2 Future Water Demands

Table 6 summarises the demands estimated for the Baseline strategy for potable and alternative water sources. The alternative water sources include Class A recycled water from a local sewer mining facility and rainwater from on-site rainwater tanks.

Table 6 Water Demands

Water Supply Type	Peak hour demand (L/s)	Peak day demand (L/s)	Peak day demand (ML/day)
Baseline - potable	588	263	22.7
Baseline – alternative water	402	238	20.6

The assumptions adopted for the development of the demand figures in the table above are outlined in Appendix A and are consistent with those adopted by SEW for the Fishermans Bend Integrated Water Management Strategy Options Assessment (GHD, 2015).

3. Stormwater Drainage & Flooding

3.1 Authorities Consulted

The regional drainage network in Fishermans Bend is managed by Melbourne Water (MWC). City of Melbourne (CoM) and City of Port Phillip (CoPP) are responsible for local drainage infrastructure, typically servicing catchments less than 60 Ha within their municipalities.

3.2 Status of Background Studies

The baseline strategy has been developed based on the following studies:

- Fishermans Bend IWM Options Evaluation study, GHD on behalf of SEW and MWC, 2015
- Fishermans Bend RSS, GHD for MWC, ongoing.

3.3 Existing conditions

The Fishermans Bend growth area is located within a relatively low lying area adjacent to the Yarra River, near to where it discharges into Port Phillip Bay, with ground levels generally varying from 1m AHD to 4m AHD.

Significant parts of the growth area are therefore vulnerable to inundation in tidal events, particularly towards the east within the Montague Precinct. This problem is further exacerbated by the effects of climate change and sea level rise.

The Existing Infrastructure Plan for drainage is contained in Appendix B.

3.4 Baseline Drainage Servicing Approach

3.4.1 Drainage

The design criteria for the drainage is as follows:

- 5 year ARI - no surface flooding in roads or private realm
- 100 year ARI - no surface flooding within property boundaries
- 100 year ARI - designated overland flow paths (inclusive of minor and/or major thoroughfares) meet a low safety risk in roads category where practical

In accordance with the MWC Flood Mapping Projects, Guidelines and Technical Specifications (MWC, 2014) a low safety risk in roads is defined as having a velocity times depth ≤ 0.40 cumecs/m with a depth ≤ 0.40 m. In addition, flooding is defined as a depth greater than 50 mm depth.

It is further understood that both CoM and CoPP have aspirations for no surface flooding in roads or private realm for a 20-year ARI event as this will reduce ongoing maintenance issues caused by flood events less than the 20 year ARI.

3.4.2 Rainwater tanks

Based on guidance received from VPA in relation to the intent of the Strategic Framework Plan (SFP) requirements, it is understood that the rainwater tanks need to capture the first 101 mm (equivalent to the total rainfall from a 5 year 72 hour storm event) from the building roof and any podium hardstand, and retain a minimum of 50% of this volume. It is assumed that given the tanks are typically drawn down reasonably fast (i.e. within 24-48 hours) there is no requirement to separate the retention and detention elements of a rainwater tank.

For illustrative purposes, the average size that a building scale rainwater tank would need to be is 278 kL, with 50% for reuse (139 kL) and 50% for slow release (139 kL). The average size of 278 kL is based on:

- An average building roof area of 1903 sqm.
- An average contributing podium area of 853 sqm (representing 70% of the podium, based on the land use assumptions derived by GHD in collaboration with VPA).

In practice, the size of the rainwater tanks will vary from site to site.

For the baseline drainage plan it is assumed that the rainwater tanks will be slow release. These tanks are designed to primarily detain flood peaks with an orifice (leaky tank) half way up the tank. These tanks perform two functions, namely:

- Provide rainwater to the building scale third pipe network (primary supply) – bottom 50% of tank (139 kL on average)
- Have the ability to slowly release water to the Yarra River and Port Phillip Bay (after the flood peak has receded) – top 50% of the tank (139 kL on average)

3.4.3 Climate Change

The design requirements accommodate potential effects of climate change. The revised approach by AR&R has been adopted for estimating the potential effects of climate change on rainfall in the baseline drainage plan.

The following tide levels presented in Table 7 have been used.

Table 7 Tide levels

Event (ARI)	Tide level with no climate change (mAHD)	Tide level with climate change in 2100 (mAHD)
5	1.10	1.90
20	1.25	2.05
100	1.60	2.40

3.5 Level of service and flood mitigation

At present two levels of service are being considered for the baseline drainage plan. These two levels of service are outlined in Table 8.

The expected / normal level of service represents the design requirements outlined in Section 3.4. It is likely that significant drainage infrastructure will be required to achieve that level of service for Fishermans Bend and that the costs associated with providing that infrastructure may not be acceptable.

The lower level of service has therefore been identified, which provides a lower cost alternative.

At present the level of service that should be adopted for the baseline drainage plan has not been decided. It may potentially be a combination of, or fall between, the two levels of service identified in Table 8.

Table 8 Model scenarios for developing the baseline drainage plan

Level of service	Flood protection provided	Types of flood mitigation to be used
Lower level of service	Flood protection requirements* only to be met for rainfall events. Effects of tidal flooding to be managed separately, and possibly on a broader regional basis (ie minimum floor levels, access and egress, flood warnings etc).	Rainwater tanks, pipe capacity upgrades.
Expected / normal level of service	Flood protection requirements* to be met for rainfall and tidal events.	Rainwater tanks, levees, pipe capacity upgrades, pumping and raised roads for providing safe access and egress.
* See Section 3.4 for requirements.		

3.6 Ongoing work

Work is currently ongoing to prepare the baseline drainage plan. This work is expected to include:

- Completion of the hydraulic modelling for the two levels of service, including indicative drainage plans.
- Preparation of cost estimates for the two levels of service.

The current expectation is that this work will be completed in October 2016.

3.7 Conclusion

The Baseline Servicing Approach for the Fishermans Bend precinct differs from the BAU approach for provision of drainage infrastructure and flood management throughout the rest of Melbourne.

The approach will include rainwater tanks for all new development across Fishermans Bend, as well as flood mitigation measures. The level of service and associated flood mitigation measures are yet to be confirmed by MWC.

Amongst other factors, the impacts of tidal flooding, appetite for acceptance of flooding, climate change, the required level of service, requirement for rainwater tanks and existing topographical constraints underpin the Baseline Servicing Strategy.

The Baseline Servicing Strategy may result in greater costs being applied to developers compared to other parts of Melbourne however the funding model for the Baseline Servicing Approach is yet to be confirmed.

Acceptance of greater risk is considered a more adaptive response to flooding, as measures to eliminate or reduce flooding are typically very costly and only allow for a modelled storm / tidal event based on assumptions related to climate change.

It is likely that the Baseline Servicing Approach will need to be considered in the context of the Public Realm and Public Open Space areas, particularly in the context of overland flow and stormwater retention.

CoPP is considering storage of flood waters and how they can manage stormwater in their municipality in a smarter way. They are constrained by the impact of sea level at their drainage outfalls and their downstream position in the broader catchments, resulting in them having to deal with overland flow entering from other neighbouring municipalities.

CoPP and CoM have indicated that they intend to respond to the overarching drainage and flood management strategy that is being developed by MWC. In the short term, their drainage planning will be based around standard renewal and will not account for the projected growth in Fishermans Bend due to uncertainty around the timing and type of redevelopment and the fact that there are areas of higher flood risk in their municipalities at present.

4. Water Supply and Sewerage

4.1 Authorities Consulted

Melbourne Water Corporation (MWC) is the responsible authority for the trunk water supply and sewerage transfer network in Fishermans Bend.

South East Water Corporation (SEW) is the water retailer responsible for the water and sewer distribution and reticulation networks in Fishermans Bend.

City West Water (CWW) is the responsible authority for the water and sewer distribution and reticulation networks to the north and west of Fishermans Bend.

The Existing Infrastructure Plan for sewer and water is contained in Appendix B.

4.2 Status of Background Studies

The baseline strategy has been developed based on the following studies:

- Fishermans Bend IWM Options Evaluation study, GHD on behalf of SEW & MWC, 2015
- Fishermans Bend Sewer Mining Plant Concept Design, GHD on behalf of SEW, 2016

SEW is currently exploring:

- The potential feasibility of a pressure sewer network
- More detailed feasibility to enable board and treasury approval for the sewer mining plant and alternative pipe network business case

Further refinements to the baseline strategy may occur as a result of these concurrent studies.

4.3 Baseline Water Servicing Approach

4.3.1 Potable Water

The Fishermans Bend IWM Options Evaluation Study (GHD 2015) identified that there is no requirement for the Punt Rd potable water pumping station, transfer main and storage as previously explored in the Fisherman Bend Infrastructure Plan (GHD, 2013), on the basis that the sewer mining plant proceeds.

As identified within the Fishermans Bend IWM Options Evaluation Study (GHD 2015), 14.6 km of potable reticulation and distribution upgrades are likely to be required to service Fishermans Bend.

SEW is also investigating the feasibility of proactively renewing mains to a minimum potable water main size of 225 mm as per the CBD and in accordance with the WSAA code to ensure there is sufficient water for firefighting purposes without requiring onsite storage. No allowance has been made for minimum size 225mm water mains prior to development.

If sewer mining does not proceed at Fisherman Bend, then a potable water pump station and transfer main from Punt Rd main will be required early in the renewal development phase. Preliminary MWC modelling indicates further major transfer system augmentation may be required in the Preston zone to service growth by 2050 in the inner South East area of Melbourne. The scope of works is yet to be determined.

The extent of potable water main upgrades cannot be confirmed at this stage.

4.3.2 Alternative Water

As identified within the Fishermans Bend IWM Options Evaluation Study (GHD 2015), under the preferred scenario, 29.3 km of new recycled water reticulation and distribution mains are required. At this stage the location and extent of the proposed recycled water network cannot be confirmed.

The Fishermans Bend IWM Options Evaluation Study (GHD 2015) also recommended a preferred servicing scenario (Scenario 3), which involves a local sewer mining plant (SMP) to provide Class A recycled water throughout Fishermans Bend.

4.3.3 Sewer Mining Plant

A concept design for the sewer mining plant (SMP) was developed by GHD on behalf of SEW (GHD, 2016). At this stage the SMP has a nominal throughput of 18.5 ML/D, which would satisfy 90% of the peak day demand. The SMP would also comprise recycled water storages with capacity to store one day of peak day demand (i.e. 20.6 ML).

The SMP would be constructed in three equal stages to maximise potential for common standby/spare equipment, and maximise redundant capacity when one process unit/train is out of operation.

The current concept for the SMP includes the following unit processes:

- Inlet works (screening and grit removal)
- Salsnes filter (MBR pre-treatment and particulate organics removal)
- MBR
- UF filtration
- UV disinfection
- Chlorine disinfection
- Recycled water storage

The following construction sequence was proposed to satisfy this staging requirement:

- Infrastructure delivered in three (3) trains with some integration e.g. single inlet works, sharing reactor walls and standby pumpsets and blowers.
- Major civil works completed in Stage 1 including buildings, reactor concrete, inlet works and major piping. Due to the nature of the facility it is not considered practical to stage construction of the MBR reactor tanks
- Major electrical works completed in Stage 1
- Mechanical and control works completed in Stage 1 to include standby equipment. Additional mechanical and control works built for capacity each stage thereafter

A process flow diagram and architectural impression of the sewer mining plant facility is included in Appendix C.

Sewage Extraction and Transfer System

Sewage for the SMP would be sourced from the Hobson Bay Main Sewer (HBMS), via a new manhole to be constructed by MWC. This would provide facilities to enable sewage extraction and transfer to the SMP. The system would comprise:

- New access chamber HBM002A on the Hobsons Bay Main Sewer
- Diversion pipework at the offtake location

- Extraction pump wet well
- Extraction pump valve chamber
- Transfer pipeline

An aerial image showing the indicative location of the extraction system and transfer infrastructure is included in Appendix D.

4.4 Baseline Sewerage Servicing Approach

4.4.1 Reticulation Network

As identified within the Fishermans Bend IWM Options Evaluation Study (GHD 2015), under the preferred scenario (Scenario 3), 12.6 km of new sewer mains are required.

SEW is currently exploring the potential feasibility of a pressure sewer network at Fishermans Bend. At this stage the location and extent of sewer upgrades cannot be confirmed.

4.4.2 Trunk Network

MWC was consulted to confirm the impact of the adopted development scenario on its trunk infrastructure. The key MWC infrastructure affected by the increased loads from Fishermans Bend includes the Melbourne Main Sewer (MMS) and HBMS. In addition, downstream infrastructure such as Brooklyn Pump Station, Hoppers Crossing Pump Station and Western Treatment Plant would be affected.

MWC advised that upgrade of the HBMS is included in MWC's 20 Year Capital Plan. The project is driven by asset condition, but may also address capacity constraints in the system. MWC advised that any future renewal works for the HBMS would take into account growth, including the Fishermans Bend development. Therefore, future plans to upgrade this critical asset would ensure there is sufficient hydraulic capacity to cater for increased sewage loads.

The MMS runs from the Yarra River to Fennell Reserve and through to Swallow Street, where it connects to the HBMS. MWC recently completed the MMS replacement to address hydraulic constraints in the sewerage system. The new sewer has approximately three times the capacity of the original brick-lined sewer, and MWC advised that it has sufficient capacity to cater for the increased sewage loads from the Fishermans Bend development.

MWC also advised that its infrastructure downstream of the HBMS (i.e. Brooklyn pump station etc) has either sufficient existing capacity to cater for the increased sewage loads from Fishermans Bend, or there are planned upgrades that would address any constraints in the near future (i.e. upgrade of the activated sludge plant at Western Treatment Plant).

4.5 Conclusion

The Baseline Servicing Approach for the Fishermans Bend precinct differs from the BAU approach for provision of water infrastructure throughout the rest of Melbourne.

This approach is underpinned by the benefits of generating a recycled water source locally to eliminate the need to upgrade the trunk water infrastructure that could include a Punt Rd potable water pumping station, transfer main and storage.

The cost associated with water supply infrastructure required in Fishermans Bend would be funded through SEW's standard contribution arrangement. There is not likely to be a significantly greater attributable cost to developers as a result of the Baseline Servicing Approach.

The Baseline Servicing Approach for the Fishermans Bend precinct may differ from the BAU approach for provision of sewerage infrastructure throughout the rest of Melbourne. This will be confirmed following completion of SEW's assessments currently underway.

The alternate Baseline Servicing Approach being considered is to have pressure sewers across the precinct. This approach is being driven by the poor ground conditions and resultant high costs for a gravity sewerage network.

The cost associated with sewerage infrastructure required in Fishermans Bend would be funded through SEW's standard contribution arrangement. There is not likely to be a significantly greater attributable cost to developers as a result of the Baseline Servicing Approach.

In relation to the trunk infrastructure, the Fishermans Bend development would not trigger any upgrades to the MWC headworks in excess of their existing future planned capital works program.

5. Electricity

5.1 Authorities Consulted

AusNet Services is the responsible authority for the transmission supply of electricity to a bulk supply point (220 kV / 66 kV terminal station) in Fishermans Bend.

CitiPower receives electricity from AusNet's 220/66kV Terminal Station at 66kV and transmits this to its zone substations and high voltage customers via its sub-transmission network at 66kV. Residential, industrial and commercial customer properties in the five precincts are then supplied from CitiPower's zone substations, via its distribution network, generally at lower voltages.

The Australian Energy Market Operator (AEMO) is responsible for the planning of the Victorian transmission network. AEMO works closely with infrastructure investors and customers to make decisions on when and where new transmission network infrastructure should be built.

5.2 Existing Infrastructure

The existing AusNet transmission electricity assets within Fishermans Bend include:

- 220kV overhead transmission lines to the Fishermans Bend Terminal Station
- Fishermans Bend Terminal Station (FBTS) converts overhead electrical energy from 220 kV to 66 kV

The existing CitiPower medium voltage and distribution electricity assets within Fishermans Bend include:

- 66kV overhead lines and underground cables to the zone substations
- Existing zone substations
- 11kV, 6.6 kV and low voltage (415 and 240V) overhead and underground distribution network

The FBTS is located at the eastern end of the Employment Precinct and supplies the CitiPower zone substations that in turn distribute power to the five precincts. AusNet requires that the proposed development does not encroach on transformer access routes to the FBTS. Two of the 220/66 kV transformers at FBTS together with a 220 kV circuit breaker and some 66 kV circuit breakers will be replaced in circa 2020 to replace aged assets with increased failure rates. These upgrade works are likely to take three years to complete and will cost in the order of \$54 million. In addition, a project is proposed to replace an additional 220/66 kV transformer at FBTS and associated circuit breakers in 2028 at a cost of \$19 million.

The Existing Infrastructure Plan for the electricity network is contained in Appendix B.

The existing loadings and capacities for each of the five precincts are listed in the table below.

Table 9 Current Capacity by Precinct

Precinct	Area Supplied by:	Predicted Demand	Capacity Rating	Present Loading
Montague	Montague Zone Substation	94 MVA	19 MVA	11 MVA
Lorimer	Fishermans Bend, Montague and West Gate Zone Substations	75 MVA	68 MVA	50 MVA
Sandridge	Montague and Port Melbourne Zone Substations	72 MVA	45 MVA	27 MVA
Wirraway	Port Melbourne Zone Substation	62 MVA	28 MVA	19 MVA
Employment	Fishermans Bend Zone Substation	5 MVA	127 MVA	50 MVA

5.3 Baseline Servicing Approach

Additional electrical infrastructure will be required to meet to expected future demand.

The most likely approach that AusNet will adopt if there was significant increase in demand would be to replace one or more existing 220/66kV transformers with larger capacity transformers (there are currently 150 MVA at FBTS and AusNet could upgrade them to 225 MVA). It is unlikely that the 220 kV Transmission Lines will need to be replaced based solely on the additional demand at Fishermans Bend. The funding for any upgrading of the FBTS would be by AusNet and recovered through their network tariff charges.

The baseline servicing approach for CitiPower is twofold:

- When upgrading or replacing existing infrastructure to meet future demand, safety or reliability requirements the works would be funded by CitiPower through their tariff scheme. The expenditure for upgrades are reviewed every several years by the economic regulator, the Australian Energy Regulator, who will approve a certain level of expenditure for particular large projects or types of upgrades.
- Supplies to new properties or undergrounding of electricity infrastructure would be funded by an external party such a property developer, property owner or local council. The trigger to enable this work to occur would be connection agreement in the case of a new supply and a written agreement and contract with an external party for any undergrounding works.

Options previously discussed with CitiPower in 2015 to meet the additional load (and visual amenity objectives of the redevelopment of the precincts) included the following:

- Upgrade the electricity distribution network from 6.6 to 11 kV
- Upgrade all existing zone substations to 11 kV
- Develop a new zone substation, in addition to or as a replacement for existing zone substations in the precincts. This would be in response to a change in load centre across Fishermans bend and could potentially be developed within a new residential or commercial building.
- Conversion of all overhead power lines to an 11 kV underground power network

One option that could be considered to reduce the costs associated with the undergrounding of medium voltage (6.6 and 11kV) and distribution network would be to for the contractor responsible for upgrading the streetscapes to install electrical conduits. This would enable CitiPower to install power cables in the conduits at a later stage. However, this would require

close consultation during design and construction with CitiPower and inspections prior to practical completion by the contractor.

5.4 Conclusion

The Baseline Servicing Approach for the Fishermans Bend precinct is consistent with the BAU approach for provision of power infrastructure throughout the rest of Melbourne.

Planned upgrades to meet demand, safety or reliability requirements are funded by CitiPower and AusNet through their tariff schemes.

New connections for new builds or redevelopments in the area would be funded by the applicants for those developments, and it is likely that any new connection assets would be undergrounded from the outset. Undergrounding or relocation of any existing overhead powerlines that form part of the distribution or sub-transmission network would be funded by the party requesting the change. CoPP believes that undergrounding of power is essential as part of the anticipated streetscape upgrade process.

Significant costs and considerable technical and maintenance issues are likely to be prohibitive to undergrounding of AusNet's transmission powerline in the north of Fishermans Bend.

There are many uncertainties that exist in the power sector relating to the impact that technology will have on the way power is generated and distributed. Innovations such as electric cars, alternative power generation options such as solar and wind, distribution alternatives such as micro-grids and rapid advancements in battery storage technology are all likely to have a significant impact on the power sector as they become more widespread. As a result, the Baseline Servicing Strategy that is anticipated at present may need to adapt as disruptive technologies have an increasingly greater impact on the sector.

6. Gas and Fuel

6.1 Authorities Consulted

APA GasNet owns and operates gas transmission pipelines. Gas is depressurised at city gates and field regulators to appropriate pressures to distribute gas to final users by distribution companies.

Zinfra is responsible for managing the gas distribution assets in Fishermans Bend on behalf of United Energy and MultiNet Gas, the asset owners.

Viva Energy Australia (Viva Energy) supplies around a quarter of all Australia's petroleum products. Viva Energy owns and/or operates around 260 km of licensed pipelines that are used for conveying oil products in and around the greater Melbourne area, including three major pipelines.

6.2 Existing Infrastructure

The existing gas assets within Fishermans Bend include:

- APA's 750 mm diameter West Melbourne to Brooklyn (PL108 T33) transmission pipeline (Montague, Sandridge, Wirraway and Employment Precincts)
- APA's 750mm diameter Dandenong to West Melbourne (PL36 T16) transmission pipeline (Montague Precinct)
- APA's 150mm diameter Port Melbourne to Symex Holdings (PL164 T89) transmission pipeline (Montague and Sandridge Precincts)
- The existing gas distribution network in Fishermans Bend consists of low, medium and high pressure gas mains. The Lorimer, Montague and Wirraway Precincts have some coverage of high pressure gas mains. The Sandridge Precinct has extensive high pressure gas coverage. There is also transmission pressure gas to the now decommissioned Symex cogeneration plant.

APA's pipeline assets located within the Victorian Transmission System have been classified as 'Vital Critical Infrastructure' under the Emergency Management Act, 2013.

The principal fuel asset within Fishermans bend is:

- Viva's Westernport-Altona-Geelong (WAG) pipeline that crosses through the Wirraway Precinct, along the same alignment as APA's 750 mm diameter gas transmission pipeline

The Existing Infrastructure Plan for Gas and Fuel is contained in Appendix B.

6.3 Baseline Servicing Approach

6.3.1 Capacity for future development

MultiNet assessed the estimated demands and provided commentary, summarised in Table 10. They indicated there was a general requirement to upgrade the capacity of supply regulators, high pressure field regulators, district regulators and the associated custody transfer meters to all of the proposed zones.

Table 10 MultiNet Anticipated Capacity

Precinct	Anticipated Capacity
Montague	Subject to no mains removal, loss of connectivity or downsizing of existing high pressure gas infrastructure, Multinet has confirmed that there is sufficient capacity over the period of 2017 to 2021 to cater for any expected growth.
Lorimer	This Precinct requires mains extensions (potentially some large diameter mains) along with interconnection to the other proposed precincts over the period of 2017 to 2021. Any requests for metering pressures greater than 4kPa will not be possible with the existing gas infrastructure.
Sandridge	This Precinct requires mains extensions (potentially some large diameter mains) along with interconnection to the other proposed precincts over the period of 2017 to 2021. Any requests for metering pressures greater than 4kPa will not be possible with the existing gas infrastructure.
Wirraway	This Precinct is currently supplied via low pressure mains. Depending on the rate of development in the area, Multinet can confirm that there is sufficient capacity over the period of 2017 to 2021.
Employment	This Precinct requires mains extensions (potentially some large diameter mains) along with interconnection to the other proposed precincts over the period of 2017 to 2021.

In addition to the above summary, MultiNet made the following comments regarding capacity and works required to support growth:

- Scheduling of upgrades works for the area has yet to be confirmed.
- Fishermans Bend was previously assessed as industrial with zero growth in gas demand. The rezoning to CCZ changes this situation.
- Growth will be assessed based on submitted development proposals
- MultiNet manages a 5-year capital works window in accordance with regulatory requirements

APA do not have any plans for installation of a new gas transmission pipeline in this area. The 'remaining life' of the gas transmission pipelines as per AS2885 is 42 years remaining.

6.3.2 Funding Arrangements

There are two types of tariff arrangements for gas customers depending on the volume of gas required. Customers such as residential developers usually fall into the category of a Tv customer. Td customers have an extremely high peak hourly load (10,000MJ/hour) or annual volume required (10TJ/annum). Cost for gas is less expensive for Td customers but they are liable for greater capital costs in financing extensions and network augmentation.

MultiNet noted that in line with regulatory requirements gas project funding is determined in several ways. Where a connection request is made for commercial and residential sites, future gas distribution revenues for the site are calculated and offset against the construction costs

associated with the gas assets. Where a shortfall occurs, it is the responsibility of the applicant / developer to finance the deficit in order for the project to proceed.

Extensions and network augmentation would be economically assessed in accordance with Table 11.

Table 11 Gas Tariff Arrangements

	Tariff (volume) Tv	Tariff (demand) Td
Financing of Extensions	Economic Feasibility Tested	Almost invariably fully chargeable to applicant. Proposal analysed to check if any non-chargeable network benefit would be realised
Financing of Network Augmentation	Funded by MultiNet (specific case dependent)	Economic Feasibility Tested (Any revenue shortfall required to establish an economic proposal is generally chargeable to applicant unless some augmentation component is incorporated to allow for other non-Td future development)

Where a request is made for installation of a gas connection to a building or site for the purposes of enabling future connection, with one of the below characteristics, the full construction cost is passed on to the applicant / developer:

- No connection load information
- Tariff D
- Non-standard installation request

If any upgrade works to APA's network were required, they would be funded privately by APA VTS Australia (Operations) Pty Ltd.

6.3.3 Protection Requirements

Pipeline protection (if required) eg slabbing over pipelines, is normally financed by the applicant / developer that triggers the need for protection works. When there are multiple developers and staging of development the cost sharing is complicated and difficult to administer.

MultiNet Gas has indicated that the following buffer zones / easement requirements should be considered in the context of future development in Fishermans Bend:

- Buffer zones may be established as a result of associated Risk Assessments
- Easements will be subject to review upon submission of plans. Any proposed title, boundary, road changes could result in the need to either extinguish or grant new easements for MultiNet
- In the event a license / lease is required, the terms and conditions along with any ongoing costs will be passed onto the applicant / developer
- It is likely that Environmental Reports and Impact Studies will be required prior to the commencement of any works due to the likely contaminated land in areas that are / were industrial use

MultiNet has assets within Fishermans Bend that are subject to the Gas Safety Act 1997 and the Pipelines Act 2005. This will have a particular impact on planning for sensitive uses such as schools, hospitals and aged care facilities that will need special consideration.

The Pipeline Measurement Length (hazardous zone) for APA's 750mm diameter transmission pipelines is 450 metres and for APA's 150mm diameter transmission pipeline the length is 77 metres. The Pipeline Measurement Length is applied to either side of the transmission pipelines.

APA notes that risk mitigation measures will be required where land use classification changes as part of the area development. For example, as part of the pipeline integrity assessment underway, installation of a protective concrete slab over the transmission pipeline is being considered in Douglas Street and Ferrars Street due to a new Primary School and public park being constructed in Montague. The cost of protection works is attributable to the developer / applicant who triggered the works.

MutiNet and APA reiterated their preference for being involved in early planning. It is APA's objective to protect human life and infrastructure whilst ensuring future land use, subdivision and development does not inhibit the potential of an existing high pressure transmission pipeline system to be able to provide capacity required to meet the needs for natural gas in Victoria. In particular, they believe it's important for their involvement in early discussions regarding:

- Supply into areas
- Timing
- Reticulation or suitability of assets
- Identification of key local infrastructure requiring larger than normal supply (eg Co Gen / Tri Gen facilities)

APA recommends that high density residential development or other "sensitive" land use facilities (eg schools, hospitals, aged care facilities, preschools etc) are located beyond the Pipeline Measurement Length (hazardous zone). This separation or "measurement length" clearly defines the region that would be affected by the worst case scenario pipeline failure and identifies the distance where development should be carefully designed and considered by the planning authority in relation to gas transmission pipelines.

Redevelopment within the vicinity of high pressure gas pipelines must be in accordance with the following legislation:

- APA VTS Australia's Guidelines (Appendix 1)
- AS2885, Part 1, Clause 4.3.4 - Primary Location Classification (Appendix 2)
- AS2885, Part 1, Clause 4.7.4 – Change of Location Class (Appendix 3)

MultiNet and APA recommend that a Safety Management Study (SMS) as required by the Gas Safety Act be conducted as soon as possible at a precinct scale to assess the impacts of proposed development on the fuel and gas pipelines and develop controls to mitigate the constraints and risks to development within the Pipeline Measurement Length (hazardous zone).

APA has developed 'Guidelines to Planning and Development around High Pressure Gas Transmission Pipelines', contained in Appendix E.

The technical regulator, Energy Safe Victoria (ESV) and the applicable Australian Standard, AS2885 Pipelines – Gas and Liquid Petroleum, impose obligations on pipeline licensees to maintain appropriate safety risk levels of pipelines despite changes in the surrounding environment and population.

Within three metres (either side) of the edge of a gas transmission pipeline, the following constraints must be adhered to:

- No structure will be permitted within three (3) metres of a pipeline asset without prior written approval
- Line of sight along the pipeline ROW must be maintained
- Three (3) metre minimum clearance between the pipeline and any vegetation greater than 0.5m in height must be maintained at all times

APA notes that for all developments adjacent to the pipeline or in the near vicinity, construction methodology and proposed plant and equipment to be utilised during construction for any proposed works will be required prior to construction for assessment and approval by APA prior to future construction works. This would be best implemented through the mandatory requirement of a Construction Management Plan (CMP). This CMP requirement and approval of the CMP by APA has been utilised in numerous other PSP developments throughout Melbourne and should be applied accordingly.

6.4 Viva Fuel Pipeline

Upgrade works to Viva Energy assets within Fishermans Bend are not anticipated, however protection measures need to be considered.

Pipeline protection (eg slabbing over pipelines) if required, is normally financed by the applicant / developer that triggers the need for protection works. When there are multiple developers and staging of development the cost sharing is complicated and difficult to administer.

Viva Energy has indicated that the following buffer zones / easement requirements should be considered in the context of future development in Fishermans Bend:

- Buffer zones may be established as a result of associated Risk Assessments
- Easements will be subject to review upon submission of plans. Any proposed title, boundary, road changes could result in the need to either extinguish or grant new easements
- In the event a license / lease is required, the terms and conditions along with any ongoing costs will be passed onto the applicant / developer

The Pipeline Measurement Length (hazardous zone) for Viva Energy's 600mm diameter WAG pipelines is 150 metres. The Pipeline Measurement Length is applied to either side of the pipeline.

Viva Energy notes that risk mitigation measures will be required where land use classification changes as part of the area development.

Viva Energy has assets within Fishermans Bend that are subject to the Pipelines Act 2005 and Pipeline Regulations 2007. This will have a particular impact on planning for sensitive uses such as schools, hospitals and aged care facilities that will need special consideration.

Viva Energy recommends that high density residential development or other 'sensitive' land use facilities (eg schools, hospitals, aged care facilities, preschools etc) are located beyond the hazardous zone. This hazardous zone is defined as the region that would be affected by the worst case scenario pipeline failure and identifies the zone where development should be carefully designed and considered by the planning authority in relation to high pressure pipelines.

Redevelopment within the vicinity of high pressure pipelines must be in accordance with the following legislation:

- AS2885, Part 1, Clause 4.3.4 - Primary Location Classification (Appendix 2)
- AS2885, Part 1, Clause 4.7.4 – Change of Location Class (Appendix 3)

Viva Energy recommend that a Safety Management Study (SMS) as required by the Pipelines Act and AS2885 be conducted as soon as possible at a precinct scale to assess the impacts of proposed development on the fuel and gas pipelines and develop controls to mitigate the constraints and risks to development within the hazardous zone.

The Pipelines regulator, Energy Safe Victoria (ESV) and the applicable Australian Standard, AS2885 impose obligations on pipeline licensees to maintain appropriate safety risk levels of pipelines despite changes in the surrounding environment and population.

Viva Energy notes that for all developments adjacent to the pipeline or in the near vicinity, construction methodology and proposed plant and equipment to be utilised during construction for any proposed works will be required prior to construction for assessment and approval by Viva energy.

Viva Energy notes that the following issues arise from the absence of regulation in the Victorian Planning Provisions for land use and development around licenced pipelines:

- Developers are rarely aware of the importance of ensuring that their design and construction process accounts for the presence of the pipeline until late in the planning process when pipeline licensees are notified by the responsible authority. This typically adds significant time and cost to projects.
- There is no guidance as to the appropriate use, development or design requirements for developments located near licensed pipelines. Licensed pipelines carry hazardous and/or volatile material, and are closely and carefully managed by licensees to ensure that any safety risks are appropriately identified and managed. There needs to be similar oversight of any changes in the density, design and type of land use around licensed pipelines, and the manner in which those changes occur. Any proposed developments around licensed pipelines should be required to design their developments in consultation with ESV and/or pipeline licensees to ensure that the design does not restrict access of pipeline licensees to maintain pipelines or increase safety risks.
- There is a risk that planning applications may proceed potentially with little awareness of the precautions that should be taken when working around a licenced pipeline. This could affect the access or maintenance of pipelines and may result in an increased risk to people, property and the environment

6.5 Conclusion

The Baseline Servicing Approach for the Fishermans Bend precinct is consistent with the BAU approach for provision of gas infrastructure throughout the rest of Melbourne.

Planned upgrades to meet demand, safety or reliability requirements are funded based on MultiNet's standard tariff and funding arrangements.

MultiNet, APA and Viva Energy are united in recommending that a SMS as required by the Gas Safety Act and Pipelines Act be conducted as soon as possible at a precinct scale. This SMS would assess the impacts of proposed development on the fuel and gas pipelines and develop controls to mitigate the constraints and risks to development within the Pipeline Measurement Length (hazardous zone). The constraints and protection measures that are likely to be attributable to developers who plan to redevelop sites within the hazardous zone may be significant in terms of cost, time and urban form impacts and need to be well understood early in the planning and development process.

APA and Viva Energy would like to be consulted much earlier in the planning application process, particularly for developments proposed within the pipeline measurement lengths

(hazardous zones) to allow important pipeline safety policies and regulations to be taken into account as part of the planning approval process.

APA and Viva Energy recommend that the pipeline measurement lengths (hazardous zones) be incorporated into the Development Contributions Plan Overlay under clause 45.06 of the local planning scheme that is being prepared by the Victorian Planning Authority due to the significant implications of developing sites within the vicinity of high pressure gas transmission assets.

APA and Viva Energy further recommend that the land within the pipeline measurement length (hazardous zones) be classified as a sensitive use under Australian Standard AS-2885.

Viva Energy believes that further consultation is required to determine appropriate land use planning controls for land in the vicinity of licenced pipelines. For example, one strategy might be to include a schedule or overlay in areas affected by pipelines that:

- Establishes the pipeline owners / authorities as referral bodies for all planning applications within the Pipeline Measurement Length
- Triggers the requirement for a planning permit
- Sets out the design and construction requirements that will need to be addressed as part of the planning permit application

Requires the applicant to work with the relevant pipeline licensee / ESV to satisfy the requirements of the Pipelines Act and Australian Standard 2885-2012

7. Telecommunications

7.1 Authorities Consulted

The existing precincts are currently serviced by Optus, Telstra and NBNCo fixed line infrastructure. Wireless service providers covering this area have not been actively consulted as part of these discussions.

7.2 Existing Infrastructure

Based on responses at the Sector Discussions, DBYD and provided information, the area has an existing in ground pit and conduit system reticulating throughout the precincts.

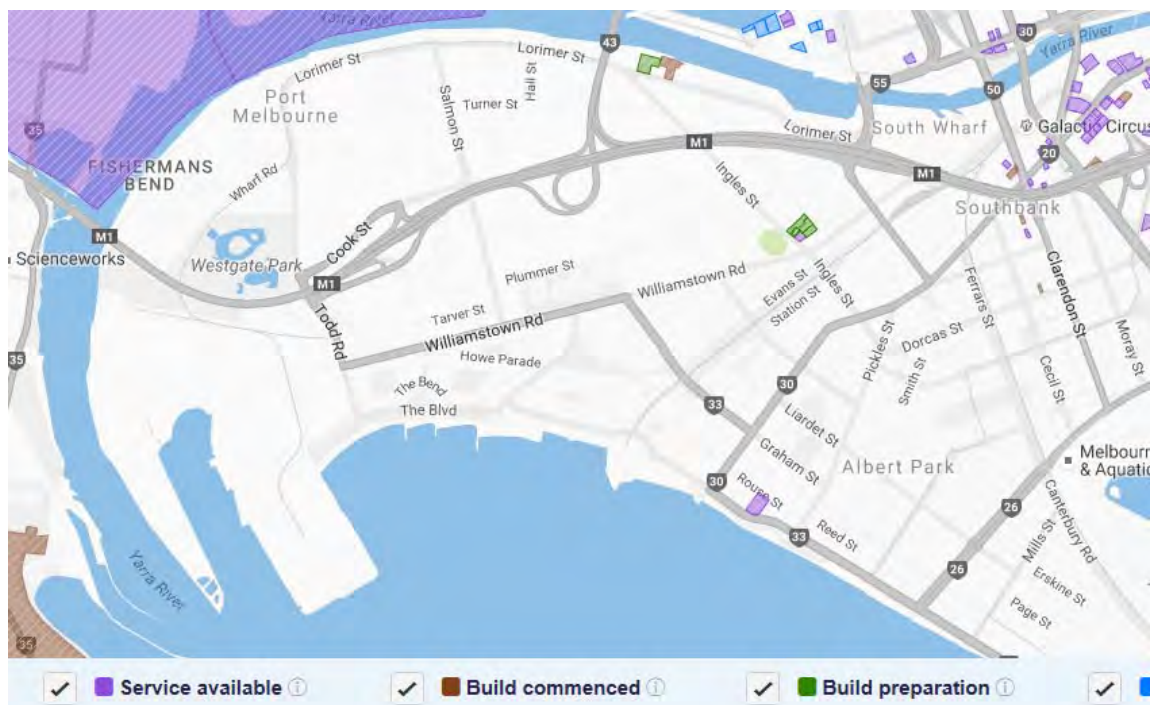
Telstra notes their existing infrastructure is likely to be inadequate and will not have the capacity for the expected population growth. Conversion of an industrial area into a large population centre will require more conduit infrastructure. Conduit requirements will be recognised by Telstra and provisioning must occur in a timely manner to suit development. It was suggested by Telstra that materials used in large portions of this system contain asbestos. Asbestos conduits are generally covered by at least 450mm of earth and are only a problem when improper techniques are employed to cut or remove them. There are procedures for ensuring pit and conduit removal and adjustment is carried out in a safe manner.

There is a need for careful consideration regarding provisions of in-ground infrastructure to ensure that it is not over capitalised as witnessed by Telstra at a number of sites – with some underground conduits empty and unused in large service tunnels. It is customary to provide additional conduits over and above what is immediately required to allow for growth and to allow for replacement of faulty or damaged cables.

The Existing Infrastructure Plan for Telecommunications is contained in Appendix B.

The current NBNCo rollout map (obtained from the NBNCo website) indicates that in the Port Melbourne areas there has been only a small number of NBNCo installations.

Figure 3 NBN Rollout Map (as at September 2016)



The coverage maps from the main wireless service providers (obtained from the various wireless service providers websites) indicate that currently the Port Melbourne area has approximately 100% 4G coverage.

Figure 4 Vodafone Wireless Coverage Map (as at September 2016)

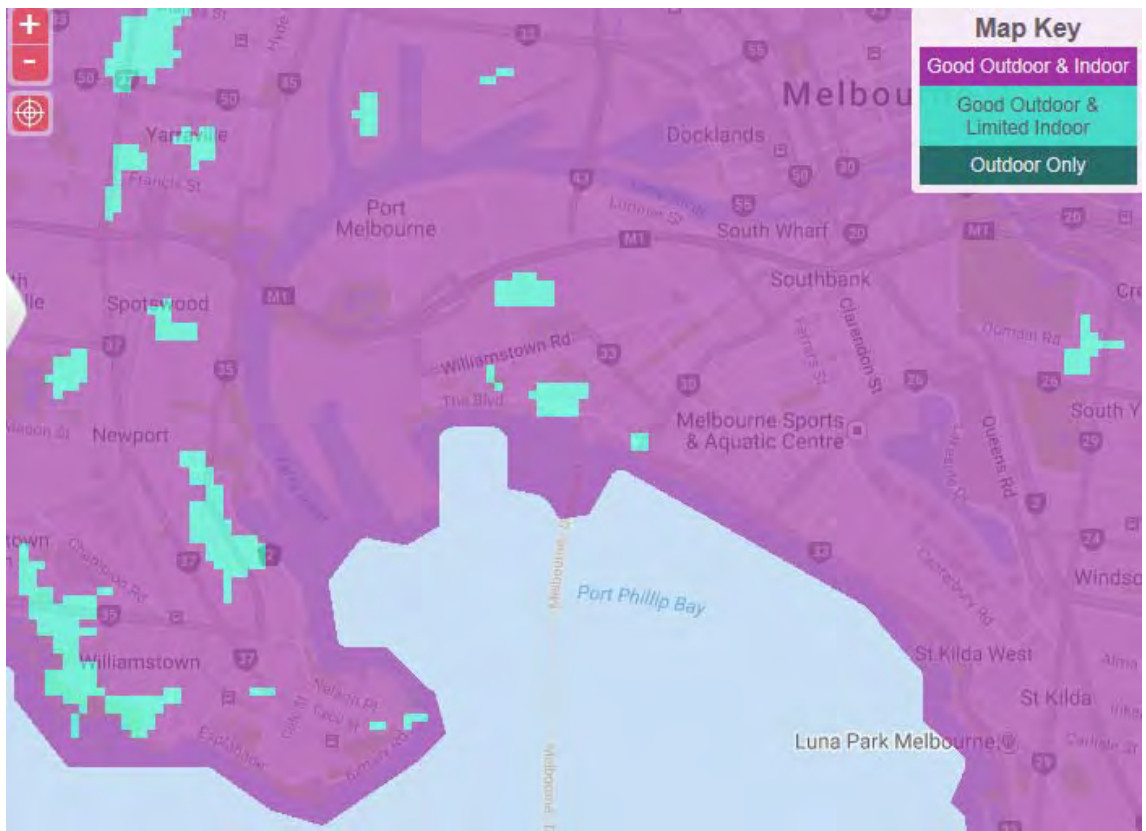


Figure 5 Optus Wireless Coverage Map (as at September 2016)

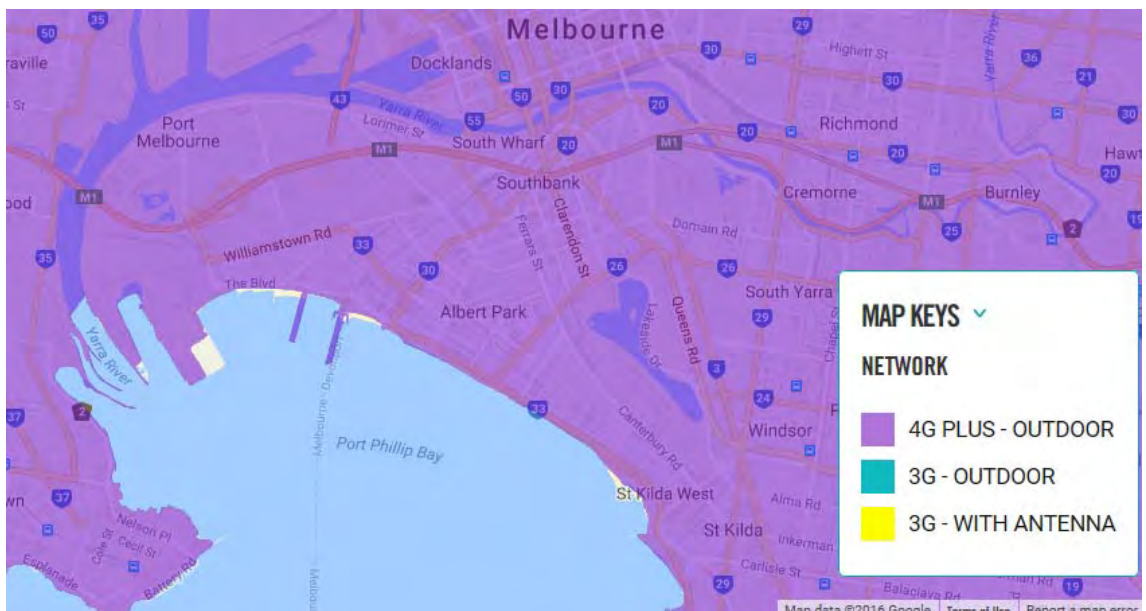
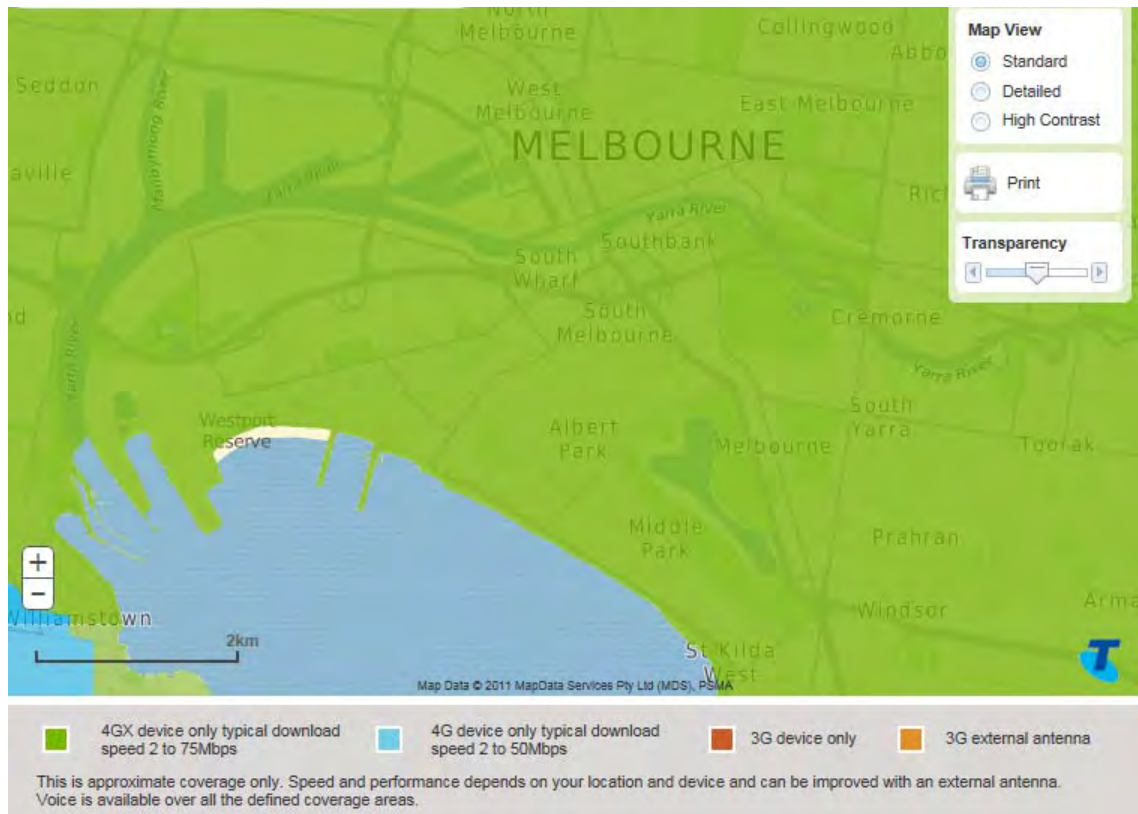


Figure 6 Telstra Wireless Coverage Map (as at September 2016)



7.3 Baseline Servicing Approach

7.3.1 Fixed Line Telecommunication Services

The BAU approach for fixed line telecommunication services is through an application process. For single dwellings, the Owner/Developer contacts Telstra to arrange for pre-provisioning works that include the conduits and lead in cabling to the property. For large multi-dwelling developments, Developers submit an application to NBNCo (or Telstra) for the FTTP (fibre to the premise) provision for fixed line services. Developers are responsible for providing fibre-ready pit and pipe infrastructure within their developments and the lead in conduits (reference: Communications Alliance, Industry Guideline G645:2011).

NBNCo publishes data on their planned rollout on their public website. They have stated “while we are eager to collaborate with you wherever possible we are not able to give you any further details on future works planned at this time”.

The Fisherman’s Bend Precinct is an NBNCo rollout area and contains NBN infrastructure. Any new dwelling or business will be eligible to receive the NBN network via the New Developments rollout.

The fixed line service providers appear to be reactive in terms of provisioning of infrastructure. This appears to be due to fixed line service providers’ reducing exposure to capitalising of new infrastructure or upgrading existing infrastructure (pits and conduits) which may not be used. Advances in technology allows smaller cabling, which have greater capacities, to be installed in the existing infrastructure.

7.3.2 Wireless Services

For wireless service providers, the baseline approach is generally through the provision of coverage to service the area based upon the current wireless technology (4G at present). It is

expected that when the new wireless technologies (5G and beyond) are adopted these will be rolled out by the wireless services providers to service this area.

Infrastructure to support future wireless rollouts should be addressed as part of the development plan and opportunities explored to integrate with other services.

There are two basic types of wireless services available at present although satellite and aircraft based systems are under development. The two are:

- GSM (mobile phone) carriers
- WiFi.

Both wireless services are supported locally via sets of terrestrial transmitters. Both technologies require denser antennae installations to service greater numbers of users and to deal with higher traffic levels. These systems are typically private sector owned although NBN is permitted to install GSM towers.

GSM Towers connect to the backhaul network over fibre optic cables and require a mains power connection. Typically, a tower comprises one or two equipment racks together with supporting services located inside a 9 m² structure with external antennae. In urban areas these are commonly located in leased spaces on the roofs of commercial privately owned premises. In the suburbs, standalone towers are installed. A small rental is normally paid. Access and containment is required for power and communications cables to these locations. Each service provider would require a tower every 500 m to 1000 m in a densely populated area.

There are three GSM service carriers in Melbourne although they do sometimes operate under service sharing arrangements. The three are:

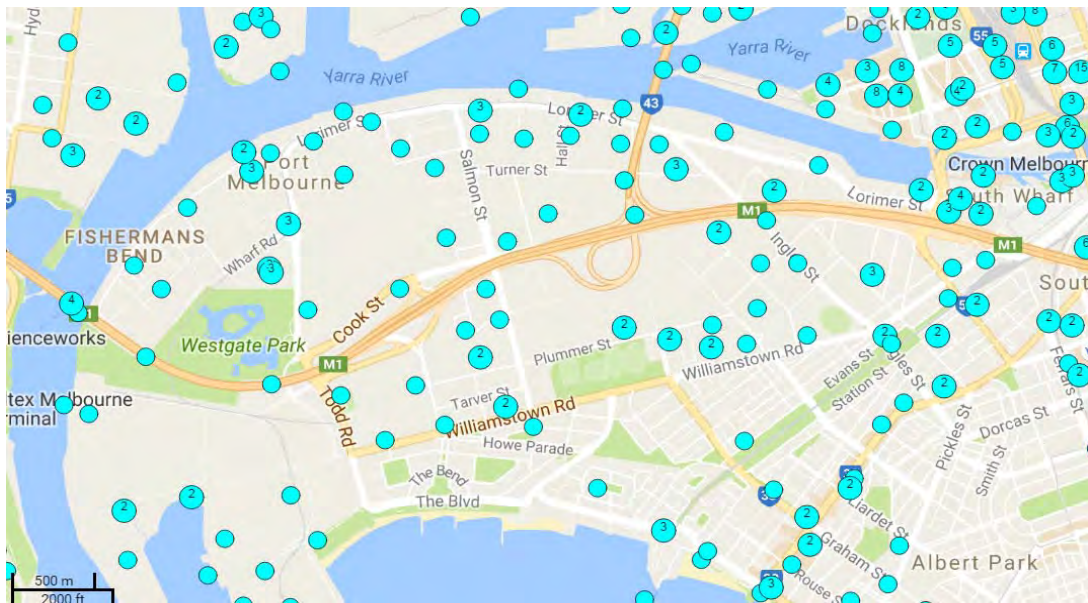
- Telstra
- Vodafone Hutchison
- Optus Mobile

All three operators include Fisherman's Bend in their "full coverage" maps.

Building interiors can be equipped with Distributed Antenna Systems (DAS) to supplement signal strength and bandwidth if licenced by one or more of the approved carriers.

The Australian Government (*ACMA Australian Communications and Media Authority*) hosts a register of radio communications licences located in Fisherman's Bend. The site is interactive and the licensee can be determined for each location along with technical details of the installation. (http://web.acma.gov.au/pls/radcom/site_proximity.main_page)

Figure 7 ACMA Registered GSM Wireless Antennae Map (as at September 2016)



WiFi service is not freely available across Melbourne at present. A number of individual companies, councils and agencies do offer free localised WiFi hotspots around Melbourne, for example at federation Square and Vic Market.

Several global cities and precincts do provide a wide area free public WiFi service. Examples include:

- Adelaide and Perth, Australia
- Paris, France
- Hong Kong
- Auckland, New Zealand
- Florence, Italy and many others.

The Victorian Government has launched a pilot of free public Wi-Fi in central Ballarat and central Bendigo, aimed at developing tourism, education, social inclusion, encouraging new business models, and creating a consistent Wi-Fi experience for residents and visitors.

Telstra is deploying a national WiFi network in conjunction with local councils (Telstra Air ©).

WiFi antennae are typically lower powered than GSM systems and as such individually have shorter range requiring more installations. There are several options under development including antennae located inside purpose designed street light poles. Building mounted options exist as well.

An opportunity exists for a Municipal wireless network (a city-wide or precinct-wide) wireless network to be installed at Fishermans Bend. This would be done by providing municipal broadband via Wi-Fi to large parts or all of the area by deploying a wireless mesh network. The typical deployment design uses hundreds of wireless access points deployed outdoors, often on poles. The operator of the network acts as a wireless internet service provider. The operator could be municipal or from the private sector.

7.3.3 NBNCo Services

NBNCo has a three year plan for the national roll out of services, and from information obtained from the NBNCo website, it appears that NBNCo plan to initiate infrastructure construction works in the Fishermans Bend area around 2017/18.

Table 12 NBN Rollout for Fishermans Bend

State	Region	Areas where construction scheduled to commence before end Sep 2018	Estimated number of premises within areas	Anticipated technology	Expected time of first site to commence construction
VIC	Port Melbourne	Albert Park Middle Park Port Melbourne South Melbourne Southbank	13800	HFC	H1-2017
VIC	Port Melbourne	Port Melbourne South Wharf	3700	FTTN	H1-2018

It may be prudent to discuss the timing of this planned rollout to avoid possibility of damage and abortive costs being incurred. It may make sense to advise NBN to delay the rollout in this precinct until the Fishermans Bend plans are more concrete.

Responses in relation to the future servicing and planning information from the other fixed line service providers are yet to be received.

Discussions held with the fixed line service providers highlighted the difficulty in predicting the capacity requirements and potential infrastructure requirements. Advances in wireless technologies could quite possibly render fixed line services redundant given the past experience with mobile phone technology.

7.4 Developing and Promoting New Technology Opportunities

An opportunity presents to formalise a variety of ideas, challenges, opportunities and uses where technology and digital systems can be employed as an innovative and intelligent approach to minimise problems.

Technology is a tool that can help the Fisherman's Bend Taskforce to address future challenges and meet the service needs of future residents and visitors. Technology alone is not a solution to urban challenges but an enabler. Technology is continuously changing with its own intrinsic limitations but nevertheless provides multiple benefits. Digital technologies or information and communication technologies (ICT) can automate operations and functions, and provide access to real-time information that can lead to immediate benefits and actions. This could aid in controlling risks and threats, keeping down costs and resource consumption, improving the quality and performance of public services, and communicating effectively with the people.

Opportunities could include:

- Dynamic street markings and signage responsive to cyclists, pedestrians and road traffic.
- Embedding technology to provide real time navigation, parking and usage support.

- Designing for autonomous and electric vehicle use. Support for drones.
- Use of street lighting and furniture to support wireless technology.
- Support for cargo cycles.
- Monitoring and presentation of air quality, insulation, utilities consumption and other parameters.
- Below ground waste collection or smart bins.
- Point to point wireless broadband instead of fibre or cabled links.

Installation of common/shared telecommunications infrastructure in anticipation of development may be appropriate. This would comprise ducts with hauling pits throughout the area on both sides of the street and have multiple designated road crossing points at strategic locations. This would require a “duct agreement” with an access process and a service level agreement with minimum response time to be drawn up and agreed by all telecommunications providers.

There is a trend for additional service diversity to be provided in the form of dual duct and pit access to be provided for each building.

7.5 Conclusion

The Baseline Servicing Approach for the Fishermans Bend precinct is consistent with the BAU approach for provision of telecommunications infrastructure throughout the rest of Melbourne.

The telecommunications industry is likely to experience significant technological change and disruption in the timeframe considered as part of this assessment and as a consequence, there are many opportunities for innovation in this sector.

It will be beneficial if enabling technology is embedded in the Fishermans Bend development in a flexible and scalable way. This flexibility will allow technology to be upgraded and improved over time in response to the changes in the challenges that will inevitably arise. The ‘Internet of Things’ revolution is creating innovative and interoperable ways to drive efficiencies across all of the public and private spaces.

Given aspirations for Fishermans Bend to offer world’s best practice for telecommunications and precinct wide WiFi to support a knowledge economy, a pit and conduit system will be required to support fibre optic cable links to all potential antennae locations. This will enable any and all service providers to provide varying degrees of service with technology independence.

This pit and pipe infrastructure will typically be the NBN system for the GSM networks and could possibly host a private system should an authority such as City of Melbourne wish to provide a full coverage WiFi system as is occurring in several cities locally and overseas. The alternative would be a common/shared Telecommunications infrastructure described previously. The NBN network is an open access network specifically for the provision of fixed broadband services. It is a mixed technology network. It is most likely that other service providers will provide their own infrastructure to support mobile phone services.

The earlier a service provider strategy is developed the better to ensure appropriate planning is incorporated early.

8. Recommendations

Further investigations are required to define the infrastructure requirements in greater detail and how they might be staged and integrated within Fishermans Bend along with the governance, ownership and commercial arrangements for delivery of the plan. To that end, a number of next steps have been defined for the broad categories of design and development, implementation and governance.

It is recommended that further engagement with authorities is undertaken to:

- Rationalise street network
- Develop fully dimensioned typical street cross sections for the various road / laneways that incorporate existing and proposed utility assets
- Develop typical cross sections for critical trunk / transmission assets (particularly gas and fuel) to standardise development adjacent to these sensitive assets to protect the integrity of these assets and to provide guidance to developers regarding the limitations to development in the vicinity of critical utility assets
- CoPP has advised that they have commenced preparation of streetscape upgrade Design and Technical Standards to establish proposed street profiles in Fishermans Bend, beginning with the Montague Precinct. Further work is required to coordinate common trenching/ underground utility locations with tree planting and WSUD. This will guide species selection and early establishment of trees to achieve the streetscape character and vision for each neighbourhood.
- Incorporate offsets, clearances, pipeline measurement lengths and other requirements into the master plan to limit the risk of amendments to the master plan at a later stage of planning or design
- Develop hypothetical servicing strategies based on assumed demands and staging

Engagement could be via additional workshops or individual meetings.

It is further recommended that the following activities are undertaken:

- Review current zoning to consider appropriate land uses near sensitive infrastructure such as gas and fuel pipelines and other transmission and distribution assets.
- Understand Land Ownership and likely impact on staging of redevelopment
- Review mandatory referral authorities under the planning scheme to incorporate all affected stakeholders, for example Viva / APA