Mirvac

Preliminary Site Investigation
Concept Plan Modification

TX Australia Site - 15 Richmond Avenue, Willoughby

2 April 2020

57864/128678 (Rev 2)

JBS&G Australia Pty Ltd

www.jbsg.com.au

Mirvac

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Abbreviations

Term	Definition
AEC	Areas of Potential Environmental Concern
AHD	Australian Height Datum
ASS	Acid Sulfate Soils
AST	Aboveground Storage Tank
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CLM Act	Contaminated Land Management Act 1997
COPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
DA	Development Application
DCP	Development Control Plan
DD	Due Diligence
DP	Deposited Plan
DPI	Department of Primary Industries
EPA	NSW Environment Protection Authority
JBS&G	JBS&G Australia Pty Ltd
LEP	Local Environmental Plan
LOR	Limit of Reporting
MGA	Map Grid of Australia
NATA	National Accreditation Testing Authority
NEPC	National Environment Protection Council
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
OCP	Organochlorine Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PFAS	Per- and Poly- Fluoroalkyl Substances
POEO Act	Protection of the Environment Operations Act 1997
PSI	Preliminary Site Investigation
SEPP 55	State Environmental Planning Policy No. 55 – Remediation of Land
TRH	Total Recoverable Hydrocarbons
TX Tower	TX Australia Pty Ltd TV transmission tower
UST	Underground Storage Tank
VOC	Volatile Organic Compounds

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by Mirvac (Mirvac, the client) for the provision of environmental services associated with a property located at 15 Richmond Avenue and Richmond Avenue, Willoughby, NSW (the site). The site is legally identified as Lots 11 and 12 in Deposited Plan (DP) 1162507 and occupies an area of approximately 0.28 hectare (ha). The site location and layout are shown on **Figure 1** and **Figure 2**, respectively.

It is understood that the site is proposed to be redeveloped for residential land uses. As such, Mirvac have requested JBS&G prepare a Preliminary Site Investigation (PSI) report detailing the environmental status of the site to support the Concept Plan Modification Application and to address the requirements of *State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55).*

The objectives of this investigation were to assess the potential for contamination based on current and historical site activities and to draw preliminary conclusions regarding the potential contamination status of the site to support the proposed concept Master Plan, as per the requirements of SEPP 55.

The agreed scope of works completed as part of the assessment comprised; a review of available site history and background information to identify potential areas of environmental concern (AECs) and associated contaminants of potential concern (COPC); review of historical investigations undertaken for the site; development and documentation of a conceptual site model (CSM) based on the available information and preparation of a PSI report in general accordance with relevant EPA Guidelines

The site comprises a rectangular shaped parcel of land bound by Richmond Avenue to the west and bushland to the south and in turn Gore Hill Freeway. The majority of the site is occupied by a TX Australia Pty Ltd TV transmission tower (TX Tower) and associated services/infrastructure. An adjoining vacant land parcel comprising dense vegetation occupies the southern portion of the site which extends further south to an embankment south of the site, that slopes down steeply several metres to the Gore Hill Freeway.

Based on the findings of this investigation, and subject to the limitations in **Section 7**, the following observations are made:

- The site comprised a cleared parcel of land assumed to be used for dairy farming purposes until it's redevelopment in the 1950s, to accommodate the telecommunications tower, with associated services/infrastructure added in 2014-2015 to the current TX Tower configuration.
- The investigation identified the potential for soil and groundwater impacts to be present at the site, however, the investigation did not identify the potential for gross or widespread contamination which may preclude redevelopment of the site in accordance with the proposed Concept Plan modification and associated residential use. Identified potential soil and groundwater impacts are considered representative of common contaminants and potentially contaminating land use activities which can be readily dealt with during the Development Application (DA) stage (i.e. including completion of detailed site investigations consistent with relevant Council Development Control Plans (DCPs) and SEPP 55 requirements) for redevelopment and assessment for site suitability.
- Based on the PSI, the site is considered to be capable of being suitable for the proposed land use.

It is recommended that a detailed site investigation be undertaken at the next phase in accordance with SEPP 55.

It is also recommended that Hazardous Building Material Surveys (HBMS) be undertaken prior to any demolition and redevelopment works for the site.

1. Introduction & Background

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by Mirvac Residential (NSW) Developments Pty Ltd (Mirvac, the client) for the provision of environmental services associated with a property located at 15 Richmond Avenue and Richmond Avenue, Willoughby, NSW (the site). The site is legally identified as Lots 11 and 12 in Deposited Plan (DP) 1162507 and occupies an area of approximately 0.28 hectare (ha). The site location and layout are shown on **Figure 1** and **Figure 2**, respectively.

It is understood that the site is proposed to be redeveloped for residential land uses and as such, Mirvac have requested JBS&G prepare a Preliminary Site Investigation (PSI) report detailing the environmental status of the site to support the Concept Plan Modification Application and to address the requirements of *State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55)* and in accordance with NEPC (2013[1]).

1.2 Objective

The objectives of the investigation are to assess the potential for contamination from current and historical site activities and whether the site is capable of being suitable for the proposed land use.

1.3 Scope of Work

The scope of works completed as part of the assessment included:

- A review of available site history and background information to identify potential areas of environmental concern (AECs) and associated contaminants of potential concern (COPC) including:
    - Review of current Section 10.7 Planning Certificates obtained from Willoughby City Council (Council);
    - Historical aerial photographs;
    - Current and historical land title records;
    - Heritage records held by the Office of Environment & Heritage (OEH) and any local heritage information as may be publicly available via online sources;
    - Records of environmental incidents, former environmental licences, or contaminated land notices or notifications, as held by the Environment Protection Authority (EPA) including information with regards to per- and polyfluoroalkyl substances (PFAS) investigation programs;
    - Licensed groundwater bores present within a 1.5 km radius of the site;
    - The environmental setting including information relating to topography, geology, soils and hydrogeology of the site and surrounding areas; and
    - Review of previous environmental investigation reports prepared for the site;
- Development and documentation of a conceptual site model (CSM) based on the available information; and
- Preparation of this PSI report in general accordance with relevant EPA guidelines presenting the outcomes of the assessment and associate conclusions.

[1] *National Environment Protection (Assessment of Site Contamination) Measure No. 1 2013*. National Environment Protection Council (NECP 2013)

2. Site Condition & Surrounding Environment

2.1 Site Identification

The location of the site is shown in **Figure 1** and the current site layout is shown in **Figure 2**. The site details are summarised in **Table 2.1**.

Table 2.1: Site Details

Lot/DP	Lot 11 DP 1162507 Lot 12 DP 1162507 (**Figure 2**)
Site Address	15 Richmond Avenue, Willoughby, NSW and Richmond Avenue, Willoughby, NSW
Local Government Authority	Willoughby City Council
Site Area	Approximately 0.28 ha
Site Zoning	SP2: Special Infrastructure under Willoughby Local Environmental Plan (LEP) 2012
Historical Land Use	Agricultural
Current Use	Telecommunications Tower
Proposed Use	Residential (4-5 storey residential flat building)

2.2 Site Condition

The site comprises a rectangular shaped parcel of land bound by Richmond Avenue to the west and Gore Hill Freeway to the south. The site is currently utilised for a TX Australia Pty Ltd TV transmission tower (TX Tower) and associated services/infrastructure (**Photograph 1** and **2**). A modern building of brick construction was located beneath the TX Tower and was noted to be of brick construction. It is noted that the building was not accessed at the time of the site inspection. An adjoining vacant land parcel comprising dense vegetation occupies the southern portion of the site (Lot 12 DP 1162507), with vegetated vacant land extending further south, comprising a steep embankment sloping down several metres to the Gore Hill Freeway to the south. Based on a review of topographic maps[2], the site appears to have been subject to cut and fill activities in order to accommodate existing site levels.

Photograph 1: Building beneath the TX Tower and associated infrastructure

Photograph 2: small shed and overhead TX Tower with garden beds

[2] *'Spatial Information Exchange Viewer'*, NSW Land and Property Information, Accessed 4 February 2020, https://maps.six.nsw.gov.au/

2.3 Surrounding Land Use

The current land use of adjacent properties or properties across adjacent roads is summarised below.

- North – The site is bound to the north by the Channel 9 Studios. Further afield is Artarmon Road and then residential properties.
- South – The site is bound directly to the south by a highly vegetated portion of land forming an embankment down to the Gore Hill Freeway. Flat Rock Creek (within Prentice Parklands) and several residential allotments are located beyond the Gore Hill Freeway;
- East – The site is bound to the east by a large parcel of highly vegetated land. Residential allotments are located further east off Walter Street and Willoughby Road; and
- West – The site is bound to the west by Richmond Avenue. Further afield are several residential allotments and a highly vegetated recreation area (Artarmon Reserve - playing fields). Flat Rock Creek is noted to dissect Artarmon Reserve, flowing in a south-easterly direction.

Based on the review of surrounding properties, consideration, in regard to the potential for contaminating activities should be made to the Nine Network Studios located to the north/northeast of the site. Further discussion is provided in **Section 4**. All other potentially contaminating sites are noted as either being remote or positioned down and/or cross gradient from the site, presenting no significant site migration risks that require further evaluation.

2.4 Topography

Review of the Spatial Information Exchange Viewer (LPI 2020[3]) regional topographic map indicated that the site is situated within an area of gently undulating regional topography which generally falls to the south/southeast of the site. Locally, the site lies at an elevation ranging from approximately 65 and 75 m Australian Height Datum (AHD), with slope gradient falling toward the south/southwest.

It is noted that during the site inspection, ground surfaces across the majority of the site appeared to be generally level. An embankment was observed in the southern, highly vegetated portion of the site, with a steep slope extending south to the Gore Hill Freeway

2.5 Geology and Soils

Reference to the online ESPADE 2.0 tool hosted by the NSW Office of Environment and Heritage (OEH 2020[4]) and the 1:100 000 Geological Series Sydney Geological Survey of NSW Sheet 9130 (DMR 1983[5]) indicates that the site is present within the following natural geological and soil landscapes:

- **Geology:** Triassic Hawkesbury Sandstone - characterised by medium to coarse grained quartz sandstones with very minor shales and laminate lenses.
    - **Landscape:** Undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief is between 20-80 m with gentle slopes (10-25%), broad convex crests, moderately inclined side slopes with benches, and localised rock outcrop on broken scarps.
- **Soils:** Hawkesbury Colluvial – comprising generally shallow to moderately deep yellow earths and earthy sands on crests and inside of benches, gleyed podzolic soils and yellow podzolic

[3] *'Spatial Information Exchange Viewer'*, NSW Land and Property Information, Accessed 4 February 2020, https://maps.six.nsw.gov.au/
[4] *ESPADE 2.0*. NSW Office of Environment and heritage, accessed 19 August 2019 (OEH 2019);
[5] Sydney 1:100 000 Geological Sheet 9130, 1st edition. Geological Survey of New South Wales, Sydney.

soils on shale lenses and shallow to moderately deep siliceous sands and leached sands along drainage lines.

- **Limitations**: Potential for localised steep slopes, high soil erosion hazards, rock outcrops, shallow highly permeable soil with very low soil fertility.

It is noted that JBS&G (2019[6]) previously completed an environmental assessment across the site and broader surrounds. During the investigation fill material across the TX tower property was identified to range from 0.8 m to 1.0 m below the ground surface. The identified fill materials generally comprised silty clay with inclusions of sandstone, igneous and bituminous gravels and concrete pieces. Fill material was generally underlain by orange/brown silty and sandy clay with some ironstone gravels and then sandstone bedrock. Sandstone rock was encountered between depths of 0.8 m bgs and 1.4 m bgs across the TX tower property.

2.6 Hydrology

A review of Nearmap[7] identified that the nearest surface water receptor to the site to be Flat Rock Creek located approximately 100 m south of the site, beyond the Gore Hill Freeway. Flat Rock Creek flows to the east before entering into Long Bay, located 2.2 km to the southeast.

It is anticipated that surface water generated during periods of rainfall is likely to result in infiltration into the ground surface at a rate reflective of the silty clay low permeability soils and/or heterogeneous moderate permeability fill material. In sealed portions of the site, surface water is expected to be collected by local stormwater drainage networks before discharging into the stormwater drains present along Richmond Avenue. In periods of heavy or prolonged rainfall, excess water is anticipated to follow the topographic gradient of the area towards Flat Rock Creek. It is noted that due to the presence of the Gore Hill Freeway, excess water is likely to be captured in stormwater infrastructure within the freeway easement.

2.7 Hydrogeology

A review of the NSW Department of Primary Industries online database (2019[8]) database identified one registered groundwater well to be situated within a 1.5 km radius of the site. The nearest identified groundwater well (GW103591) was located 0.74 km southwest of the site and was listed for Monitoring Purposes. The total well depth was identified as 5.8 m bgs, however no standing water level was recorded. Lithology was reported as Fill (road base) to 2.0 m bgs, Clay to 4.0 m bgs and Sandy Clay to 5.8 m bgs.

Investigations undertaken by JBS&G across the immediate area have identified that perched groundwater is likely to be present within localised (shallow) filled areas and generally within the soils in the lower landscape above sandstone bedrock. Deeper groundwater is anticipated to be hosted by fracturing/jointing of the Hawkesbury Sandstone.

Based on the available topographical, geological and hydrogeological information, it is anticipated that perched water is likely to flow towards the south and south east.

2.8 Acid Sulfate Soils

Review of the *1:25 000 Prospect/Parramatta River Acid Sulfate Soil (ASS) Risk Map* (DLWC 1997[9]) indicated that the site is located within an area of 'no known occurrences' of acid sulfate soil (ASS) materials.

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6 'Review of Land Contamination Information – Nine Network Australia Television Studios'. JBS&G 27276/125240. Dated 17 October 2019 (JBS&G 2019)

7 https://www.nearmap.com/au/en

8 NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corp. Accessed 4 February 2020.

9 *Prospect/Parramatta River Acid Sulfate Soil Risk Map* (Edition 2), NSW Department of Land and Water Conservation (DLWC 1997)

Based on a review of previous investigations across the site and broader surrounds (JBS&G 2012), underlying geology, soil/rock physical characteristics and local topography, the management of potential ASS is not considered necessary.

2.9 Meteorology

A review of average climatic data for the nearest Bureau of Meteorology monitoring location (Observatory Hill[10]) indicates the site is located within the following meteorological setting:

- Average minimum temperatures vary from 8.1 ^{o}C in July to 18.9 ^{o}C in February;
- Average maximum temperatures vary from 16.4 ^{o}C in July to 26.0 ^{o}C in January;
- The average annual rainfall is approximately 1213.3 mm with rainfall greater than 1 mm occurring on an average of 99.7 days per year; and
- Monthly rainfall varies from 68.1 mm in September to 133.5 mm in June.

[10] http://www.bom.gov.au/climate/averages/tables/cw_066062.shtml, Commonwealth of Australia, 2013 Bureau of Meteorology, Product IDCJCM0028 accessed by JBS&G on 4 February 2020.

3. Site History

3.1 Aerial Imagery

Copies of aerial photographs are included in **Appendix A.** Review of historical imagery indicates that the site has been a vacant parcel of land until it was redeveloped during years 1961 to 1970 to accommodate a telecommunications tower facility. Ground surfaces across the TX Tower portion of the site appeared to be grass covered until early 2014, when the area beneath the Tower was replaced with a small brick building. Between 2014 and 2015 the building, carpark and landscaping across the TX Tower portion of the site was completed, and the site has generally remained unchanged ever since.

3.2 Council Records

Copies of Section 10.7 Planning Certificates 2 and 5 were obtained for the site from Willoughby City Council and reviewed as part of this investigation.

The planning certificates outlined the following information pertaining to the site:

- The land is zoned SP2 – Infrastructure under Willoughby Local Environmental Plan 2012;
- The land has not been identified as comprising soils classified as Class 1 or Class 2 ASS;
- The site is not affected by Section 38 or 39 of the *Coastal Protection Act 1979*;
- The land is not within a proclaimed mine subsidence district under Section 15 of the *Mine Subsidence Compensation Act 1961*;
- The land has not been certified as biodiversity certified land;
- The land has not been identified as comprising a heritage item;
- The land has not been affected by a policy that restricts development of land because of likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulfate soils or any other risk (other than flooding);
- Development on the site is not subject to flood related development controls;
- The land has not been identified on the Loose-Fill Asbestos Insulation Register as containing loose-fill asbestos ceiling insulation;
- The land is not declared to be significantly contaminated land within the meaning of *Contaminated Land Management Act 1997*; and
- The land is not subject to a management order, a voluntary management proposal, ongoing maintenance order or a site audit statement and is not considered to be significantly contaminated to warrant regulation under the *CLM Act 1997.*

3.3 EPA Records

A search of the NSW EPA's database was undertaken on 5 February 2020 for the site and immediate surrounds. The search comprised review of the following:

- NSW EPA contaminated land public register of record of notices (under Section 58 of the *Contaminated Land Management Act 1997* (*CLM Act*));
- NSW contaminated sites notified to the EPA (under Section 60 of the *CLM Act*); and
- NSW EPA *Protection of the Environment Operations Act 1997* (*POEO Act*) public register of licence, applications and notices (maintained under Section 308 of the *POEO Act*);
- EPA's public PFAS register

The search identified that, for the site, there were:

- No notices issued under Section 58 of the *CLM Act*;
- The site has not been notified to the EPA under section 60 of the *CLM Act*. The following properties located in proximity to the site have been listed as contaminated, albeit regulation under the *CLM Act* is not listed as being required:
    - Shell Coles Service Station, located at 616/626 Willoughby Road, Willoughby, approximately 0.7 km north of the site but not upgradient and unlikely to pose a contamination risk to the site;
    - BP Express Tower located at 498 Willoughby Street, Willoughby, approximately 0.3 km northeast of the site but not upgradient and unlikely to pose contamination risk to the site.
- No licences or notices have been issued for the site under the *POEO Act*. The following licences and notices have been issued for properties in proximity to the site:
    - A clean-up notice was issued on 29 August 2019 to BP Willoughby Service Station located at Lot 7 in DP 27372 498 Willoughby Road, Willoughby, NSW, for recorded high concentrations of benzene and petroleum hydrocarbon at one monitoring location. It is noted that whilst this property is nearby the site, it is positioned across a ridge line, at a lower elevation to the site. As such this property is not considered to pose a contamination risk to the site.
    - A POEO licence was issued on 19 May 2000 to TCN Channel Nine Studios located at 24 Artarmon Road, Willoughby, NSW, for 'helicopter related activities.' A total of three licence variations occurred during years 2001 to 2014 to amend line items relating to noise limits, pollution, equipment maintenance and flight monitoring. This area is to the east of the site within the Channel Nine site.
- The site, nor those in the immediate area have been notified to the EPA with regards to PFAS contamination.

3.4 Historical Land Titles

Historical Land titles were obtained for the site and reviewed as part of this investigation. Relevant information is summarised in **Table 3.1** below.

Table 3.1 Summary of Historical Title Search Results

Date of Acquisition and term held	Schedule of Registered Proprietors
Lot 11 DP 1162507	
23.03.1923 (1923 to 1955)	Robert Henry Foster (Master Dairyman)
22.02.1955 (1955 to 1958)	Eliza Jane Widow (Transmission Application not investigated)
12.08.1958 (1958 to 1986)	Television Corporation Limited
30.05.1986 (1986 to 2011)	T.C.N. Channel Nine Pty Limited
14.09.2011 (2011 to date)	TX Australia Pty Limited
Lot 12 DP 1162507	
23.03.1923 (1923 to 1955)	Robert Henry Foster (Master Dairyman)
22.02.1955 (1955 to 1958)	Eliza Jane Widow (Transmission Application not investigated)

Date of Acquisition and term held	Schedule of Registered Proprietors
12.08.1958 (1958 to 1986)	Television Corporation Limited
30.05.1986 (1986 to 2017)	T.C.N. Channel Nine Pty Limited
15.09.2017 (2017 to date)	L.E.P.C9 Pty Limited

Leases and Easements

Lot 11 DP 1162507

- Leases:
  - 18.10.2007 (AD 326910) – Expired or surrendered
- Easements:
  - 30.11.2017 (AM 925028) Easement for Electricity and Other purposes

Lot 12 DP 1162507

- Leases:
  - 18.10.2007 (AD 326910) – Expired or surrendered
  - 04.11.2011 (AG 466858) – Expired or surrendered
  - 16.09.2015 to Nine Network Australia Pty Limited – expires 13.08.2020
- Easements:
  - 18.03.2011 (D.P. 1162507) Easement for Support variable width

3.5 Australian and NSW Heritage Register

A search of both the Australian Heritage Trust database and the NSW Heritage Inventory did not identify items of Australian or NSW historical significance on or in close proximity to the site. Review of Section 10.7 planning certificates for the site did not identify any heritage items at the site.

3.6 Summary Site History and Integrity Assessment

A combined review of available historical information indicates that the site has historically been used as a dairy farm until the mid-1950s until it was acquired by a television corporation in 1958. Following this time, the site was redeveloped to accommodate a telecommunications tower facility, with further development of a modern building, TX Tower services/infrastructure, paved areas and carpark beneath the tower in 2014-2015 to the current TX Tower condition.

Based on the range of sources and the general consistency of the historical information along with historical aerial photographs, it is considered that the historical assessment has an acceptable level of accuracy with respect to the potentially contaminating activities historically occurring at the site.

4. Previous Investigations

A summary of previous environmental investigations undertaken at the site are provided below.

4.1 Review of Land Contamination Information (JBS&G 2019[11])

JBS&G (2019) completed a review of land contamination information supplemented with the collection of limited quantitative soil contamination data for a property located at Willoughby (Nine Network Australia Televisions Studios). The investigation is noted to have comprised an assessment area incorporating the site and larger parcel of land to the north and northeast of the site.

The scope of works completed included a review of the broader site history, environmental setting and previous investigations, supplemented with the analysis of soil samples from 11 locations including two within the site (JB05 & JB06, **Figure 3**) for a range of COPC. The key findings relevant to the current site are summarised below:

- Fill materials at the site were noted to generally comprise silty sand topsoil to 0.25 m bgs, sandy gravelly clay to between 0.8 m and 1.0 m bgs. Natural sands and weathered sandstone bedrock were encountered underlying fill materials. No odours or ACM were observed at either sample locations. Trace ash was noted in fill materials at a depth of 0.4 m bgs at sample location JB06.
- Collected samples were analysed for a suite of contaminants including heavy metals, organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), total recoverable hydrocarbons (TRH), benzene, toluene, xylene, ethylbenzene, naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAHs), and asbestos.
- Analysed samples were subsequently compared against residential land use criteria (HIL-A) as presented in NEPC (2013). No COPCs were reported to exceed the adopted site assessment criteria within soil samples collected from locations JB05 and JB06 at the site (**Figure 3**).
- It is noted that several USTs were identified within the western portion of the Channel Nine Studios, neighbouring the site to the north. The investigation target soil samples to the tank farm area and identified localised impacts within the soils surrounding the tank farm in the Channel Nine site. It is understood that a groundwater assessment was undertaken across the Channel Nine property and reported minor exceedances of heavy metal concentrations consistent with typical background urban settings. No other COPC were detected in groundwater above the adopted site assessment criteria. It is noted that an assessment of groundwater was not undertaken across the TX Tower site. As such, migration risk resultant from the upgradient USTs was not identified at the site.

It is noted that for a site area of 0.28 ha, EPA (1995) *Sampling Design Guidelines* recommend a minimum of nine systematic sample locations for site characterisation. Further investigation is required to appropriately assess potential contamination and site suitability.

[11] 'Review of Land Contamination Information – Nine Network Australia Television Studios'. JBS&G 27276/125240. Dated 17 October 2019 (JBS&G 2019)

5. Conceptual Site model

Based on the site setting and history review, and review of previous investigations, areas of environmental concern and potential contaminants of concern have been identified for the site and are presented in **Table 5.1**.

Table 5.1: Potential Areas of Environmental Concern and Associated Contaminants of Potential Concern

Area of Environmental Concern (AEC)	Contaminant of Potential Concern (COPC)
On Site	
Historical and existing site structures	Heavy metals (specifically lead paint and lead dust), and asbestos
Infrastructure/Services	Polychlorinated biphenyls (PCBs) and total recoverable hydrocarbons (TRH)
Fill materials of unknown origin used to create existing site levels	Heavy metals, PAH, TRH/ BTEX, organochlorine pesticides (OCPs), PCBs and asbestos
Off Site	
Channel Nine Commercial/Industrial Property located on northern boundary of the site	Heavy metals, PAHs, TRH, benzene, toluene, ethylbenzene, xylene (BTEX) and volatile organic compounds (VOCs)

1.1 Potentially Contaminated Media

Potentially contaminated media present at the site include:

- Surface soils;
- Fill materials;
- Natural soils/bedrock;
- Groundwater; and
- Soil vapours.

As the site has a long history of commercial land use as a TX Tower with associated infrastructure/services, the potential use and storage of oil, lubricants, and other chemicals have been identified at the site. During such use, spillage and leakage may have occurred and as such, surface soils are considered a potentially contaminated media.

Given the potential for historical filling to generate current and historical site levels, there is the potential for fill material to have been placed at the site from unknown sources prior to construction of the existing/former site grades. Based on this, fill material underlying the site has been identified as a potentially contaminated medium.

Based on the potential leachability of contaminants within surface soils/fill material and the historical use of the site, vertical migration of contamination from the fill material/surface soils into the underlying natural soils/bedrock may have occurred. As such, the natural site soils and bedrock are considered potentially contaminated media.

Given the anticipated depth to bedrock (**Section 2.7**) and the potential occurrence of fill material associated with current site levels, there is a possibility of shallow perched groundwater within either fill materials or occurring across the bedrock interface with near surface soils. The anticipated shallow depth to underlying bedrock of low permeability may result in relatively high potential for lateral migration of contaminants within subsoil water across the bedrock surface.

Considering the above, and the potential leachability of the identified COPC, it is considered that groundwater is a potentially contaminated medium. As with the natural soils, the potential for contamination of groundwater will depend upon the actual nature, occurrence and characteristics of contamination within the overlying fill material and natural soils.

Given the potential for volatile soil and groundwater contamination, associated with USTs, soil vapour is also considered to be a potentially contaminated medium.

1.2 Potential for Migration

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is determined by the following factors:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.

The potential contaminants identified as part of the site history review and previous investigations at the site and broader surrounds are generally in either a solid form (e.g. heavy metals, asbestos, etc.) or liquid form (e.g. fuel, lubricants, etc.), however, dependent upon concentrations, there is the potential for impacts from volatile COPC impacts to occur in a vapour form also in soils and groundwater underlying the site.

As the site is primarily paved with concrete pavements or vegetated with grass cover and dense vegetation, the potential for windblown dust migration of contamination from the site is generally low. The potential for contamination migration via surface water movement and infiltration of water and subsequent migration through the soil profile is considered generally to be low in areas of hardstand ground covering (TX Tower). The potential is considered to be moderate in unsealed areas, specifically the southern vegetated portion of the site given the underlying geology (**Section 2.5**).

Given the potential for perched groundwater along the soil-rock interface and/or within fill materials across the site, migration of contamination via groundwater movement is considered to be a potential migration pathway, albeit moderate (based on underlying geology).

The vapour generation potential associated with volatile and semi-volatile COPC is identified as a potential migration pathway, particularly in areas of subsurface infrastructure, that underlie the site, and within areas identified to contain fill materials.

1.3 Potential Exposure Pathways

Based on COPC identified in various media, as discussed above, and proposed site development activities, the exposure pathways for the site during and following development works include:

- Inhalation of potential COPC vapours and fibres migrating upwards from fill material of unknown origins or impacted surface soils resulting from historical hydrocarbon leaks/spills and asbestos use; and/or
- Potential dermal and oral contact to impacted soils as present at shallow depths and/or accessible by future service excavations across the extent of the site; and/or
- Potential oral and dermal contact to shallow groundwater as accessible by potential future service excavations and/or installed services pits; and/or
- Potential contaminant uptake by vegetation within landscaped areas; and/or
- Potential offsite exposure to users of the aquatic ecosystem of Flat Rock Creek and in turn Long Bay (located hydro-geologically down gradient of the site).

1.4 Receptors

Potential receptors of environmental impact present within the site which may need to be addressed with respect to the suitability of the site for the proposed use include:

- Future workers of non-paved areas (landscapers, residents, construction works) and residents/occupants whom may potentially be exposed to COPC through direct contact with impacted soils and/or inhalation of dusts / fibres associated with impacted soils; and/or
- Residents / excavation / construction / maintenance and landscaping workers conducting activities at the site, who may potentially be exposed to COPC through direct contact with impacted soils present within excavations and/or inhalation of dusts from unsealed areas / fibres associated with impacted soils;
- Flora species to be established on the vegetated areas of the site; and/or
- The aquatic ecosystem of Flat Rock Creek and in turn Long Bay which is located hydro-geologically down gradient of the site.

Where petroleum or other volatile COPC impact is identified, potential inhalation exposure to vapours will need to be considered.

1.5 Preferential Pathways

For the purpose of this assessment, preferential pathways have been identified as natural and/or man-made pathways that result in the preferential migration of COPC as either liquids or gasses/vapours.

Man-made preferential pathways are present throughout the site, generally associated with fill materials present beneath existing ground surface, and at near surface depths over the remainder of the site. Fill materials are anticipated to have a higher permeability than the underlying natural soil and/or bedrock.

Sub-surface services are also likely present throughout the site at near surface depths, including any potential stormwater pipelines that discharge from the site to Richmond Avenue. Preferential pathways can be formed by the generally higher permeability backfill used to re-instate these trenches and backfill along Richmond Avenue.

Preferential pathways are also important in the assessment of potential off-site sources of COPC. Preferential pathways are potentially present in the adjoining road network, as associated with service easements, and also as associated with the underlying geology of the site and broader surrounds (Hawkesbury Sandstone soil/rock interface).

6. Conclusions & Recommendations

6.1 Conclusions

Based on the findings of this investigation, and subject to the limitations in **Section 7**, the following observations are made:

- The site comprised a cleared parcel of land assumed to be used for dairy farming purposes until it's redevelopment in the 1950s, to accommodate the telecommunications tower, with associated services/infrastructure added in 2014-2015 to the current TX Tower configuration.
- The investigation identified the potential for soil and groundwater impacts to be present at the site, however, the investigation did not identify the potential for gross or widespread contamination which may preclude redevelopment of the site in accordance with the proposed Concept Plan modification and associated residential use. Identified potential soil and groundwater impacts are considered representative of common contaminants and potentially contaminating land use activities which can be readily dealt with during the Development Application (DA) stage (i.e. including completion of detailed site investigations consistent with relevant Council Development Control Plans (DCPs) and SEPP 55 requirements) for redevelopment and assessment for site suitability.
- Based on the PSI, the site is considered to be capable of being suitable for the proposed land use.

6.2 Recommendations

It is recommended that a detailed site investigation (DSI) be undertaken at the next phase in accordance with SEPP 55.

It is also recommended that Hazardous Building Material Surveys (HBMS) be undertaken prior to any demolition and redevelopment works for the site.

7. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own inquiries.

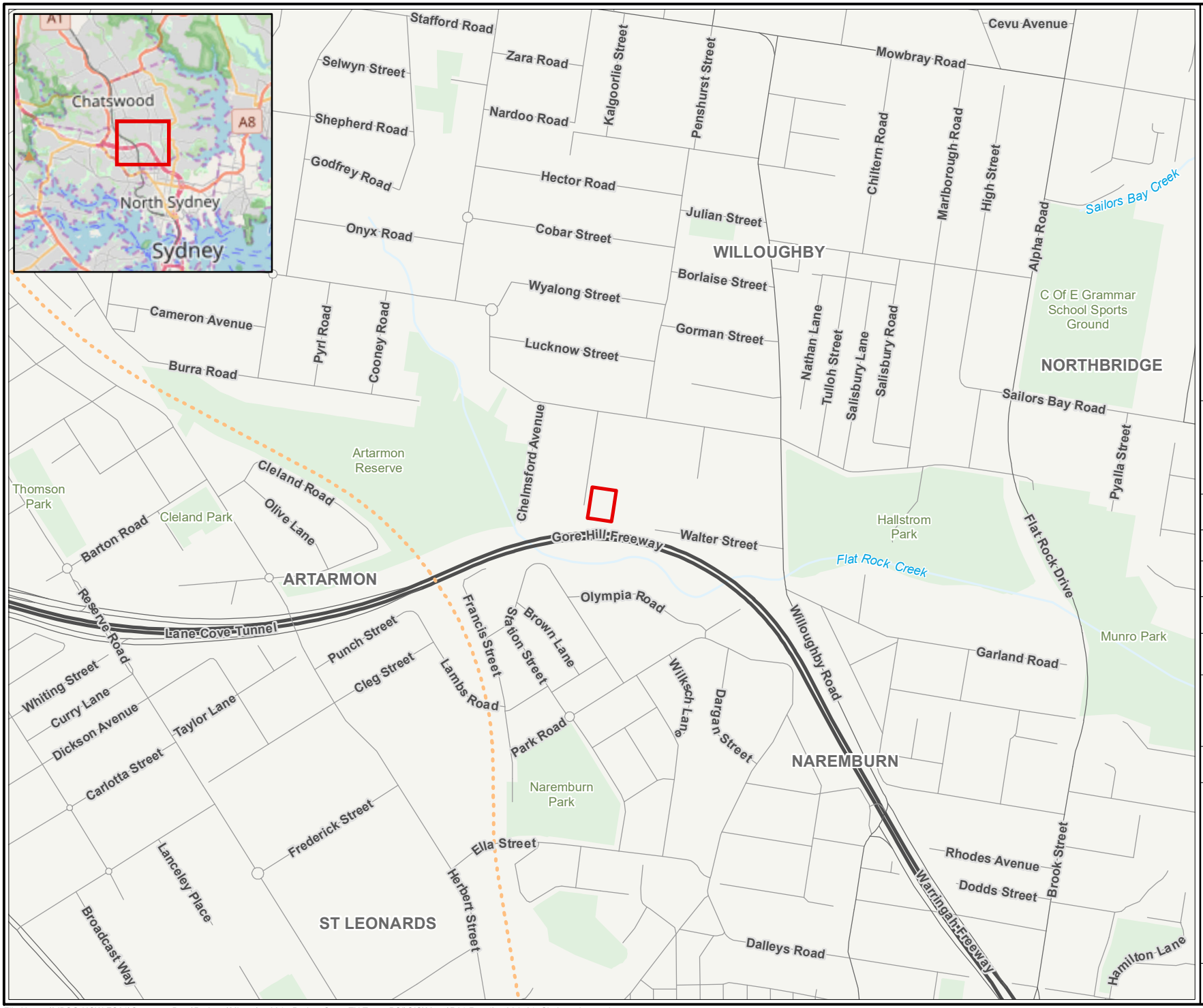
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend

- Approximate Site Boundary
- Motorway
- Primary Road
- Local Road
- Waterway
- Parks and

JBS&G

Job No: 57864	
Client: Mirvac	
Version: R01 Rev 1	Date 30/03/2020
Drawn By: CA	Checked By: CB
Scale 1:10,000	

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

SITE LOCATION

FIGURE 1

File Name: \\JBSG-NSW-FS01\Company Data\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\R01 Rev 1\57864_01_SiteLocation.mxd
Reference: NSW Spatial Services, 2020

Legend

- Approximate Site Boundary
- Cadastre (NSW Spatial Services, 2020)
- Carpark
- Shed
- Modern Building
- Transformer

JBS&G

Job No: 57864	
Client: Mirvac	
Version: R01 Rev 1	Date 30/03/2020
Drawn By: AS	Checked By: CB
Scale 1:750	

0 20
metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

SITE LAYOUT

FIGURE 2

File Name: \\JBSG-NSW-FS01\Company Data\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\R01 Rev 1\57864_02_SiteLayout.mxd
Reference: Nearmap, www.nearmap.com - Imagery 21-01-2020

Legend

- Approximate Site Boundary
- Cadastre (NSW Spatial Services, 2020)

Historical Sample Locations

- Borehole Location JBS&G 2019
- 0.8 Fill Depth (mbgl)

JBS&G

Job No: 57864	
Client: Mirvac	
Version: R01 Rev 1	Date 30/03/2020
Drawn By: AS	Checked By: CB
Scale 1:750	

0 20
metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL SAMPLE LOCATIONS

FIGURE 3

File Name: \\JBSG-NSW-FS01\Company Data\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\R01 Rev 1\57864_03_HistoricalSampleLocations.mxd
Reference: Nearmap, www.nearmap.com, Imagery - 21-01-2020

Appendix A Historical Aerial Imagery

Source: Base Image - Department of Lands, Sydney, 06-03-1930, Map 3422

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
0	Original Issue - Aerials	SE	11-10-2012

Legend:

- Approximate Site Boundary

JBS ENVIRONMENTAL

Figure: Willoughby, March 1930, Map 3422

Client: Nine Network Australia

Project: Artarmon Rd, Willoughby NSW

Job No: 42410 File Name: 42410_1930

Source: Base Image - Department of Lands, Sydney, 05-1951, Run 9A

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
0	Original Issue - Aerials	SE	11-10-2012

Legend:

- Approximate Site Boundary

JBS ENVIRONMENTAL

Figure: Willoughby, May 1951, Run 9A

Client: Nine Network Australia

Project: Artarmon Rd, Willoughby NSW

Job No: 42410 File Name: 42410_1951

Source: Base Image - Department of Lands, Cumberland Series, 1961, Run 30E

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
0	Original Issue - Aerials	SE	11-10-2012

Legend:

- Approximate Site Boundary

JBS ENVIRONMENTAL

Figure: Willoughby, 1961, Run 30E

Client: Nine Network Australia

Project: Artarmon Rd, Willoughby NSW

Job No: 42410 File Name: 42410_1961

Source: Base Image - Department of Lands, Port Jackson, 29-04-1972, Run 4

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
0	Original Issue - Aerials	SE	11-10-2012

Legend:

- Approximate Site Boundary

JBS ENVIRONMENTAL

Figure: Willoughby, April 1972, Run 4

Client: Nine Network Australia

Project: Artarmon Rd, Willoughby NSW

Job No: 42410 File Name: 42410_1972

Source: Base Image - Department of Lands, Sydney, 30-10-1980, Run 2

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
0	Original Issue - Aerials	SE	11-10-2012

Legend:

- Approximate Site Boundary

Figure: Willoughby, October 1980, Run 2

Client: Nine Network Australia

Project: Artarmon Rd, Willoughby NSW

Job No: 42410 File Name: 42410_1980

Source: Base Image - Department of Lands, Sydney, 19-09-1991, Run 9

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
0	Original Issue - Aerials	SE	11-10-2012

Legend:

- Approximate Site Boundary

Figure: Willoughby, September 1991, Run 9

Client: Nine Network Australia

Project: Artarmon Rd, Willoughby NSW

Job No: 42410 File Name: 42410_1991

Source: Base Image - Department of Lands, Sydney, 16-03-2002, Run 9

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
0	Original Issue - Aerials	SE	11-10-2012

Legend:

- Approximate Site Boundary

JBS ENVIRONMENTAL

Figure: Willoughby, March 2002, Run 9

Client: Nine Network Australia

Project: Artarmon Rd, Willoughby NSW

Job No: 42410 File Name: 42410_2002

Source: Base Image - Department of Lands, Sydney, 10-12-2005, Run 9

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
0	Original Issue - Aerials	SE	11-10-2012

Legend:

- Approximate Site Boundary

JBS ENVIRONMENTAL

Figure: Willoughby, December 2005, Run 9

Client: Nine Network Australia

Project: Artarmon Rd, Willoughby NSW

Job No: 42410 File Name: 42410_2005

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2010

FIGURE 2010

File Name: \\JBSG-NSW-FS01\Company Data\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2010.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20100122

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2012

FIGURE 2012

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2012.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20121106

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2014

FIGURE 2014

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2014.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20141121

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2016

FIGURE 2016

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2016.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20160909

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2018

FIGURE 2018

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2018.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20180118

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2020

FIGURE 2020

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2020.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20200214

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2010

FIGURE 2010

File Name: \\JBSG-NSW-FS01\Company Data\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2010.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20100122

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2012

FIGURE 2012

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2012.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20121106

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2014

FIGURE 2014

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2014.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20141121

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2016

FIGURE 2016

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2016.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20160909

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2018

FIGURE 2018

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2018.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20180118

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2020

FIGURE 2020

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2020.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20200214

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2010

FIGURE 2010

File Name: \\JBSG-NSW-FS01\Company Data\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2010.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20100122

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2012

FIGURE 2012

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2012.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20121106

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2014

FIGURE 2014

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2014.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20141121

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

15 Richmond Avenue, Willoughby, NSW

HISTORICAL AERIAL PHOTOGRAPH - 2016

FIGURE 2016

File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2016.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20160909

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

Client: Mirvac

Version: R01 Rev A	Date 14/02/2020
Drawn By: AS / RF	Checked By: CB

Scale 1:750

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File Name: N:\Projects\Mirvac\57864 - Project One - TX Tower PSI\GIS\Maps\Aerials\57864_HistoricalAerialPhotograph_2018.mxd
Reference: Nearmap, www.nearmap.com - Imagery 20180118

Legend

Approximate Site Boundary

JBS&G

Job No: 57864

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Version: R01 Rev A	Date 14/02/2020
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Scale 1:750

0 10 20

metres

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Reference: Nearmap, www.nearmap.com - Imagery 20200214

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		Name	Name	Signature	Date
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1	Claudia Bennett	Matthew Bennett	Matthew Bennett		30/03/2020
2	Claudia Bennett	Matthew Bennett	Matthew Bennett		02/04/2020