Provide workplace and housing choice through a variety of building types to cater for a diverse community

O67 Provide a variety of building types, and encourage flexible living and working accommodation.

O68 Accommodate the needs of people with mobility impairment, including young children in prams and the elderly by providing accessible housing.

O69 Ensure that non-residential activities do not detract from residential amenity.

Provide well connected private external spaces that are well integrated with the buildings

O70 Design communal landscape spaces to be useable and easily accessible from adjoining buildings, and that provide a pleasant and comfortable environment;

O71 Provide residential front gardens to dwellings that are set back from the street edge.

Land covered by this DCP

This plan applies to the precinct known as Rhodes West, being the precinct generally bounded by the main Northern Rail Line, Outlon Avenue (near Homebush Bay Drive), Homebush Bay and Parramatta River as identified in Figure K17-2 Rhodes West Precinct Plan.

Structure of the DCP

The DCP comprises four main sections:

- Section K17.1 Introduction
- Section K17.2 Framework Plan – sets out the urban design structure and principles of the DCP
- Section K17.3 General controls - provides the controls for public and private domain that apply to all development at Rhodes West
- Section K17.4 Site-specific controls – provides the specific controls that apply to the remaining development sites within each of the Precincts

K17.2 Framework Plan

Urban design and place making principles

The Framework Plan at Figure K17-3 Rhodes West Framework Plan illustrates the overall urban design framework for Rhodes West. This DCP has been prepared making regard to the following urban design and place making principles:

(a) Provide a stronger identity for Rhodes West to enable it to achieve its wider metropolitan potential as a Specialised Centre, particularly for employment generating activities by:

- Establishing a visually interesting and appealing skyline of tower buildings that display high architectural design quality in their slender form as well as detailed articulation and design.
- Designing high quality public open spaces that encourage people to gather, mingle, and traverse. Achieved in the alignment and form of squares and parks that recognise pedestrian desire lines, the framing of public spaces with appropriately scaled built form and in the achievement of excellence in urban design and landscape architecture. Refer to Figure K17-4 Rhodes West Open Space Plan.
- Creating interesting places that people want to visit and that have an appropriate mix of uses that activate and give address to streets and open spaces.

(b) Create focal points with different levels of activity that build on the activity areas that currently exist. Particularly at the Shopping Centre along Rider Boulevard and at the corner of Mary Street and Rider Boulevard adjacent the Rhodes Station. Active recreation spaces include the following:

- Town Square and commercial and retail uses close to the Rhodes Station
- Central Park
- Waterfront activity incorporating community facility, cafes and restaurants
- Shoreline Drive North Park
- Permanent and flexible uses around a mid-block oval plaza and laneways in Station Gateway West (Precinct D)
- New developed Recreation Centre along Gauthorpe Street between Marquet Street and Walker Street
- Community facility at the foreshore

(c) Promote visual connectivity along streets and through development sites to key public domain areas within Rhodes West, and to more distant water views through the following:

- Vehicle, pedestrian, and cyclist connections to align with key views and vistas
- Enhance east west view corridors along streets through greater building setbacks
- Pedestrian connections through Precinct B are to align with a diagonal vista from the elevated location of Walker Street to the extension of Marquet Street (west of Shoreline Drive)
- Terminate north and south views along Shoreline Drive with a tower building

(d) Create attractive streets for people to use through the following means:

- Provide non-residential uses including shops, commercial offices, cafes and restaurants, at activity nodes that activate street frontages where there are higher levels of pedestrian activity
- Planting street trees to provide shade and to soften the built form of adjoining developments
- Introducing building setbacks to provide for ground level front gardens of residential buildings
- Introduce a change in level between the public domain and a residential dwelling and front fencing to provide privacy and to allow surveillance of the public domain
- Create laneways through key peninsula blocks to introduce pedestrian dedicated outdoor areas to create connections and to provide variety in the public domain

(e) Demonstrate high quality architectural design of buildings through the following:

- Design building forms to address and define the public domain
- Reiterate the curved shape of Shoreline Drive in the associated built form to create a visually interesting street
- Cluster tower buildings between Shoreline Drive and Walker Street and close to the railway station. Tower buildings are to be setback from Walker Street and Shoreline Drive with some intervening development to maintain the effect of a street wall, however, without a continuous wall effect
- Stagger buildings to avoid a row of buildings along the ridgeline and vary the height of buildings from foreshore to the ridgeline
- Buildings that are slender and slimline in form and that are highly articulated in their built form and facade treatments are sought
- Tower buildings are to define key street frontages and urban corners

Figure K17-3 Rhodes West Framework Plan

Figure K17-4 Rhodes West Open Space Plan
Source: Rhodes Peninsula 'Frontdoor2Foreshore, Open Space Masterplan

K17.3 General controls

Introduction

This Section sets out the general planning objectives and controls that apply to Rhodes West. These controls are to be read and applied in conjunction with the precinct specific controls in *Section K17.4 Site-specific controls*.

Development Controls are provided for the:

- Public domain
- Private domain

A short description of the intent of the controls is provided and where relevant controls are illustrated with diagrams and images of built projects demonstrating good practice.

A. Public domain

A.1 Pedestrian network and amenity

Continuity - Promoting pedestrian access is central to creating a high quality public domain. Encouraging pedestrian access reduces car dependency, promotes equal access and increases opportunities for social exchange and community life. Continuous comfortable and safe pedestrian access should be provided throughout Rhodes West and should link all streets, parks, residences, shops, offices, public transport stops and major pedestrian routes in adjoining areas. Refer to Figure K17-5 Rhodes West Public Domain Plan.

Comfort, convenience and appearance - Pedestrian routes need to be as direct as possible and comfortable. Allowing appropriate levels of sunlight, and capturing breezes. Correct orientation and appropriate adjoining building height improves their quality, as does the provision of shade and weather protection. Pavement treatments that clearly define pedestrian areas and level of priority should be used, especially where pedestrian routes and vehicle routes crossover at driveways and pedestrian crossings. Well designed and well constructed pedestrian areas encourage their use. It is essential that all pedestrian areas are clearly identified as public areas.

Security - An integrated approach can improve actual and perceived personal security in pedestrian areas. Pedestrian routes should be continuous and without dead ends.

Preferably, pedestrian routes should be part of the general street system, with vehicular traffic providing a level of passive surveillance. They should be overlooked from adjoining buildings, have clear lines of sight and be without obstacles like shrubs and bulky street furniture that can provide hiding places. Pedestrian routes with high night time use should be well lit and directed along more trafficked streets that have busy adjoining uses.

Access - Pedestrian routes should be designed to be accessible to everyone, including people with mobility impairments. They should offer a continuous path of unimpeded travel where possible, or include areas without steps and steep grades.

Continuity

Controls	
C1.	Provide a continuous pedestrian network through the streets, parks and public rights of way as set out in the Framework Plan.
C2.	Connect to the regional pedestrian network by linking to the Bicentennial Park path system at the southern end of the peninsula, and to Blaxland Road to the north.
C3.	Supplement connections to the street system of the east side of Rhodes Peninsula, through links at Walker Street rail underpass, the retail area and Oulton Avenue.
C4.	Extend pedestrian access to the south of Walker Street to improve connections to Homebush Bay Drive, Liberty Grove, Concord West and residential areas to the east.
C5.	Provide links to Meadowbank Park and the ferry wharf via the pedestrian link across John Whitton Bridge.
C6.	Allow for the pedestrian/cycleway bridge to Homebush Bay West (Wentworth Point) that lands along the alignment of Gauthorpe Street at the Foreshore Park.
C7.	Provide pedestrian amenity lighting to meet Australian Standard.
C8.	Implement CCTV surveillance to promote security and safety.

Comfort

Controls	
C9.	Intersection and crossing design should favour pedestrian convenience and safety. Local pedestrian crossings should link major destinations and areas of intense pedestrian activity.
C10.	Provide a paved footpath to both sides of every street.
C11.	Separate pedestrian and vehicular traffic through use of a formed vertical kerb between the footpath and the carriageway.
C12.	Pavement width should allow for comfortable walking, unimpeded by obstacles. The placement of trees, street furniture and signage should provide for amenity without causing clutter.
C13.	Circulating pedestrian pathways is to be 3.0m wide.
C14.	Street furniture, trees and light poles are allowed within the zone provided minimum unobstructed width of 2.4m is maintained for pedestrian.

Appearance

Controls	
C15.	Avoid ambiguity in the design of public spaces and secondary streets, particularly at parks, entrances and areas with a strong built edge and residential presence.
C16.	Access to the foreshore must be open and unambiguous, particularly via the secondary streets and at the entrance / exit points to the foreshore linear park. Avoid the use of walls and gates at these entrances.

Security

Controls	
C17.	Minimise pedestrian areas with limited surveillance due to visual or physical access or distance from buildings and / or passing traffic.
C18.	Provide quality of lighting in areas of concentrated car parking, pedestrian/ vehicle laneways, and at the interface between buildings and streets in commercial and retail areas.
C19.	Identify safe night time pathways through good lighting, maximum casual surveillance and minimal concealment opportunities.
C20.	Front fences and walls along street frontages should use visually permeable materials and treatments. Where solid walls or fences are proposed, these should be limited to 1m in height.
C21.	Provide safety provision in accordance with CPTED - ‘Safer by Design’ principles. The safety requirements include provisions in relation to: • Lighting, CCTV, laneway vehicular access management, letterbox security, overbridge design, visual openness, basement car park planning, emergency service access and directional signage.

Equal Access

Controls	
C22.	Integrate design for equal access into the design of streets and open spaces. Design of the public domain should comply with the Commonwealth Disability Discrimination Act. It should incorporate requirements set out in AS 1428, as set out in the City of Canada Bay Council Development Control Plan 2013 – Appendix A: Access and the Canada Bay Standard Conditions of Consent.
C23.	Provide kerb ramps at all intersections, with pedestrian refuges at wide or busy streets.

Figure K17-5 Rhodes West Public Domain Plan

A.2 Cycle strategy

A well designed cycle network provides recreational opportunities and reduces car dependency by providing alternative means of transport. All public streets and public rights of way should be designed to encourage cycle use. Dedicated cycle lanes are to be provided in two areas – where additional safety is required in the more heavily trafficked Walker Street, and as a predominantly recreational route along Foreshore Reserve. Both these routes provide connections to regional cycleways, and to major public recreation areas.

Safe and convenient cycle access is also dependent on provision of intersections and crossings that favour cyclists along the dedicated cycle routes, and the provision of cycle lockup facilities at common destinations such as stations, schools, retail areas, residences and work places.

Cycle routes that are illustrated in Figure K17-6 Rhodes West Cycle Strategy should be overlooked from adjoining buildings, have clear lines of sight and uninterrupted path of travel, be well lit, sign posted and protected from high winds. Recreational cycleways should be attractive and made interesting through appropriate location and detailed design.

Controls	
C1.	Provide a cycle network through the public streets and the foreshore park as set out in the Framework Plan.
C2.	Connect to the regional cycleway, and improve access to the pedestrian / cycleway at John Whitton Bridge and the new Homebush Bay Bridge.
C3.	Provide commuter cycle lanes along Walker Street, from Mary Street to the underpass at the northern end of the peninsula, at a minimum width of 1.4m.
C4.	Provide a recreational cycle path through the Foreshore Reserve, which also connects to the regional cycleway at both ends. The recreational cycleway continues under John Whitton Bridge to the stairs and ramps on the eastern side of the bridge. Refer to the Public Domain Technical Manual for standards.
C5.	Design intersections and crossings along dedicated cycle routes to favour cyclist's safety and convenience.
C6.	Provide lockable bicycle storage at Rhodes Station, the retail centre, and in publicly accessible facilities. Refer Photo K17-1.
C7.	Separate cycle and pedestrian routes through the Foreshore Reserve.
C8.	Design cycle paths, cycle parking and end of trip facilities at least to the minimum design standards set out by Austroads. Refer Photo K17-2.
C9.	Bicycle parking is to be provided at the station.

Photo K17-1 Rhodes Railway Station

Photo K17-2 Cycle Parking Facility

Figure K17-6 Rhodes West Cycle Strategy

A.3 Sustainable transport infrastructure

Rhodes Station provides the opportunity to design an integrated neighbourhood that promotes public transport use. Access to public transport decreases car dependency and provides a means of travel for people without car availability. A convenient and safe pedestrian network is central to encouraging public transport use. Access for less abled people, provision of commuter parking for cycles and vehicles, and good interchange between modes and also promotes higher levels of uptake. The rail and bus routes are illustrated in Figure K17-7 Rhodes West Public Transport Plan.

Controls	
C1.	Provide convenient pedestrian and cycle connections to Rhodes Station, bus stops on Concord Road, and Meadowbank Ferry Wharf.
C2.	Encourage interchange between public transport modes.
C3.	Promote ease of access to the station through a permeable street network.
C4.	Locate bus stops at activity nodes including the retail centre, and also close to publicly accessible facilities.
C5.	Bus stops and taxi ranks are to be provided with good lighting, shelters / seating and route / schedule information.
C6.	Public bicycle parking facilities are to be located at public open spaces, with convenient access to commuter and recreational cycleways throughout Rhodes West.

A.4 Vehicle circulation and parking

Vehicular routes should provide convenient access to and between peninsula developments. Vehicular access should be designed with consideration of road functional hierarchy, pedestrian activity patterns and safety. On-street parking is to be provided generally throughout, to add life to the streets. Parking controls should reflect the requirements of land uses fronting streets.

Controls	
C1.	Promote permeability for vehicles, pedestrians and cyclists and a spread of traffic throughout the peninsula by adopting the street layout shown in the Framework Plan.
C2.	Access to private vehicle parking in developments is restricted in the locations shown in Figure K17-12 Rhodes West Vehicle Access Restrictions.
C3.	To promote the shared use of private vehicles, to reduce parking demand and to minimise traffic generation, developments exceeding 200 dwellings are to allocate one car space in a convenient location on the street frontage for use by a car share company. One additional car share space is to be allocated for each additional 300 dwellings.
C4.	Applicants are to provide adequate signage on behalf of the car share company to clearly advertise the provision.
C5.	Liaison with TfNSW regarding the integration of bus services within the streetscape.
C6.	Bollards used as vehicle barriers shall meet relevant Australian standard to withstand the impact.

Figure K17-7 Rhodes West Public Transport Plan

A.5 Landscape

Landscape treatment can provide amenity, improve the legibility of the urban environment, reinforce the structure of the public domain, enhance a 'sense of place' and define different landscape characters. Tree planting in particular will affect the visual quality and amenity of the public domain, and create a sense of green 'fingers of landscape' extending from the river into the site.

A broad framework for the landscaping of streets and parks is proposed below. This will contribute to a consistency of character at Rhodes West. The strategy responds to:

- The strong tradition of street planting in the Canada Bay Local Government Area;
- Pre-existing indigenous landscapes, both ridge and riparian, to emphasise the relationship of the public domain framework to landform and landscape;
- Retention of existing trees wherever possible and where they provide particular amenity, or reinforce existing street patterns; and
- Provision of appropriate amenity, including sun and shade, along streets.

Controls	
C1.	Street tree selection for Rhodes West is to follow the current approvals for civil infrastructure works.
C2.	Retain, wherever possible, existing trees in the following areas: • Mary Street and the extension of Mary Street to the foreshore. • East west stand of trees near the mangroves. • Along the eastern edge of Walker Street and the extension of Walker Street to the south.
C3.	Ensure that appropriate species are selected to suit streetscape conditions including, street width, building height and setback, orientation and views.
C4.	Create conditions favourable to the planting and long term health of trees in the design and construction of streets.
C5.	Species and spacing should be consistent within blocks.
C6.	Establish a riparian zone along the foreshore, with appropriate tree, shrub and groundcover species.
C7.	Provide visual openness in accordance with CPTED - 'Safer by Design' principles considering the placement of landscaping.

A.6 Street furniture, paving and lighting

The design and construction of the public domain can reinforce important site characteristics and contribute to the Rhodes West identity. A number of public domain conditions will be established by the development requiring particular treatments. Each part of the public domain has an individual character and function that should be emphasised through design, however continuity throughout the entire area is paramount.

Controls	
C1.	Design and build the streets in accordance with the Canada Bay Engineering Requirements for Development.
C2.	Use the range of standards for furniture, lighting and signage set out in the Canada Bay Engineering Requirements for Development.
C3.	Provide safety provision in accordance with CPTED - 'Safer by Design' principles considering all implemented street furniture, paving and lighting.

Lighting

Controls	
C4.	Establish a hierarchy of lighting levels based on the civic significance of the street and the perceived threat of crime. Walker Street as a 'spine' created by the railway line should have the highest level of illumination, along with the civic and urban streets that link Walker Street with the retail centre and the foreshore.
C5.	Provide a level of lighting for streets and parks that enhances security and legibility, while minimising impact on residential dwellings.
C6.	Coordinate and standardise street lighting throughout the development.
C7.	In riparian and conservation areas additional care should be taken to ensure that light does not interfere with animal habitats.

Materials

Controls	
C8.	For parks establish a simple palette of materials that: • Reflects the streetscape palette in the Canada Bay Engineering Requirements for Development; • Unifies the range of spaces within the public domain; • Reinforces hierarchies and details within the spaces; and • Can be used in a variety of ways to allow for variation to suit local conditions.

Paving

Controls	
C9.	Generally paving is to provide a simple and subdued ground plane, that creates a background to buildings and streetscape elements. Accent paving should only be used on retail and commercial streets, in key public places and in parks.

Street Furniture

Controls	
C10.	Utilise simple, robust elements that are durable and fit for their purpose. The range of elements should be coordinated for streets and for parks, and relate to the character and function of these spaces.
C11.	Placement of furniture should provide an acceptable level of amenity, without creating clutter or obstruction.

Signage

Controls	
C12.	Locate street name signs at intersections, wall mounted on buildings where possible to reduce clutter.
C13.	Consolidate traffic signs as far as possible, to reduce clutter.
C14.	No private identification sign is permitted within the public right of way.
C15.	Public access rights are to be clearly indicated for public space and, where relevant, over publicly accessible private land.
C16.	Include signage from the Parramatta River Foreshore Signage Manual, as outlined in the Rhodes Peninsula Domain Manual.

A.7 Infrastructure and water management

A carefully planned system of services, integrated with streetscape design, can reduce maintenance time, damage and repair costs and contribute positively to the quality of the public domain. Measures for controlling and improving the quality of stormwater entering the Parramatta River should be integrated into the design of streets and parks, through engineering structures, and using best practice techniques.

Controls	
C1.	Integrate services design with the design of all new streets and parks with consideration of the following: • Retaining existing mature trees; • Creating optimum conditions for new planting; and • Allowing ease of access to service corridors. • Streetscaping /landscaping and furnishings should not obstruct driver sightlines to other road users, regulatory signposting, traffic signals etc. Particular care should be taken to ensure appropriate selection and placement of landscaping/furnishings adjacent to intersections, driveways and pedestrian crossing facilities.
C2.	Locate all new services underground, within a consolidated strip adjacent to the kerb line. Where possible, new services should occupy a single services corridor, accessible through a single access cover.
C3.	Power supply is to be installed in underground format. Street lights must be installed in the precinct to ensure that the precinct is adequately lit to the following standards; • Walker Street – P1 • Marquet street, Mary street and Gauthope street – P2 • Through site link – PX2
C4.	Multi-Function Poles shall be provided with optic fibre connections to facilitate future CCTV, WiFi and LiFi installations for the community where required.
C5.	Service access covers should relate to the geometry and materiality of paving design.
C6.	Utilise water sensitive urban design strategies and integrate stormwater design in the design of streets and parks.
C7.	Integrate systems to capture and filter low flow stormwater, to improve the quality of discharge to Homebush Bay and Parramatta River.
C8.	Provide litter and sediment traps for stormwater outlets. Engineering structures should be integrated into the design of parks, without the need for extensive screening.

A.8 Public art

Public art is an important cultural activity. It aids legibility of place, enlivens the public domain and can define and reveal a specific identity for Rhodes Peninsula. Public art ranges from the monumental to the temporal. Potential expressions of public art include:

- Free standing objects;
- Artist's involvement in the siting and layout of public spaces such as parks, squares and forecourts;
- Artist's involvement in creating site elements such as paving, street furniture, fountains and building modulation; and
- Festivals and other cultural events.

Themes relevant to the regional and local context of Rhodes include:

- Local geography, flora and fauna;
- Aboriginal heritage;
- Early European history;
- Harbour location; and
- Urban revitalisation.

Public art is encouraged throughout Rhodes West. It is especially appropriate for the parks, public squares and places that are to have layout, design and details that directly respond to location, function and site conditions. Refer Photo K17-3, Photo K17-4 and Photo K17-5.

Controls	
C1.	All public art should be relevant to Rhodes West, be of a scale appropriate to the public realm, and be specific to time and place.
C2.	Development proposals are to include a public art strategy that describes how proposed public art has been selected to suit the historic, environmental and social contexts of Rhodes West and contributes to a unique 'sense of place'.
C3.	Public art is required in Shoreline Park North, Shoreline Park South and Rhodes Town Square.
C4.	Public art is encouraged in other publicly accessible locations such as main entrances, lobbies, street frontages, gardens, walls and rooftops.
C5.	Consult with Council and community groups in the design and execution of public artworks.
C6.	Consider artworks that serve a dual role, as play equipment for children, or informal seating for example.

Photo K17-3 Veil of Trees - Janet Laurence, Sculpture Walk, Art Gallery Road, The Domain, Sydney

Photo K17-4 Tied to Tide - Jennifer Turpin, Pyrmont Point Park, Sydney

Photo K17-5 Public art reflecting industrial heritage, Jacksons Landing waterfront park, Sydney

B. Private domain

This section of the DCP contains general controls for built form within the private domain and generally adopts the controls from the Renewing Rhodes DCP 2000. Additional controls have been included in this DCP where refinements have been made to the Framework Plan.

B.1 Land use

Mixed use zone

Mixed use development can make a significant contribution to the local character, and provide street surveillance and after hours activity.

Controls	
C1.	Design for a mix of uses within buildings by encouraging: • Developments with retail and/ or commercial frontage at street level and commercial premises and / or housing at upper levels; • Flexible design of ground floor apartments to facilitate future change of use, incorporating individual street address, appropriate layout, and adequate floor to floor height; and, • Home based businesses with flexible layouts for business and residential use.
C2.	Create a commercial centre which links to the existing centre on the eastern side of Rhodes Station and to the Rhodes Waterside Shopping Centre by concentrating street level retail / commercial frontage in the following areas: • An activity strip along Walker Street; • Between the station entrance and Mary Street; and • Along the eastern side of Rider Boulevard.
C3.	To activate the residential zone, the preferred location for non-residential uses is nominated in key street frontages and corners, whilst managing environmental impacts on surrounding residents. Refer to Figure K17-8 Rhodes West Mixed Use Zone.
C4.	To achieve high quality living environments: • Ground floor level residential apartments are not permitted in the activity strip, although entrance lobbies to residential development above are encouraged. • Ground floor apartments opposite the activity strip should incorporate sills and balustrades located a minimum 0.5m above finished footpath level for privacy. • Residential development within 50m of Homebush Bay Drive is not permitted, unless measures to ameliorate adverse impacts of noise, pollution and loss of privacy are incorporated. Refer to SEPP (Infrastructure) 2007.

Mixed Use in Station Gateway West (Precinct D)

Controls		
C5.	To ensure development in Precinct D optimises its location close to Rhodes Station and is integrated with development of Rhodes West as a whole, it should incorporate the following provisions: • A 6-8m wide public pedestrian walkway connecting Walker Street, Marquet Street and Shoreline Drive must be created to provide direct access to the foreshore park. For detail refer to B.5-C4. • A honeycomb of publicly accessible through block connections especially to Marquet Street and Rider Boulevard is encouraged, to increase choice of routes, particularly to Rhodes Station and enrich the pedestrian environment. Through block connections include internal and external arcades, and double fronted commercial lobbies and shops. Through block connections achieve surveillance and provide public domain character, supplemented by outdoor areas such as courtyards. Their use should be optimised by providing a legally registered public right of way on the title of the land between the hours of 7am and 7pm daily, excluding public holidays, as a minimum. • Deep soil garden areas and permeable paving should be provided to courtyards within the block, to create a distinctive leafy character and optimise natural infiltration of stormwater. • An active pedestrian oriented environment with high pedestrian amenity should be created around Rhodes Station and surrounding streets. • New public squares and a network of through-site links that enhance access between the foreshore and Rhodes Station.	• Mixed use buildings that provide high residential amenity complying with the building separation requirements of the LEP. • Active street frontages with non-residential uses including community uses, commercial, retail and cafes / restaurants.

Figure K17-8 Rhodes West Mixed Use Zone

B.2 Built form

The height distribution for buildings at Rhodes West generally follows the topography, ranging from lower buildings at the foreshore to taller buildings east of Shoreline Drive. This distribution maximises opportunities for view sharing, protects the amenity of the foreshore park and controls the impact of new development on the harbour.

The site-specific controls in *Section K17.4* provides detailed guidance on building height, massing and scale for the remaining development parcels at Rhodes West.

Controls	
C1.	The maximum height of development should comply with the Height Map contained in the Canada Bay Local Environment Plan 2013 (as amended) and the maximum heights shown in the site-specific controls of this DCP.
C2.	The maximum Floor Space Ratio (FSR) of development is to be consistent with the FSR map contained in the Canada Bay Local Environment Plan 2013 (as amended).
C3.	Developments are to be consistent with the maximum building envelope plans contained in the site-specific controls in this DCP.

Photo K17-6 Roof forms that are incorporated into the overall building design can add visual interest to the Rhodes West skyline

Internal floor levels

Controls	
C4.	To achieve quality living environments, maximise direct sunlight and allow future adaptability of uses, provide the following minimum heights: • Provide minimum ceiling heights for apartment and mixed use buildings: » Habitable rooms: 2.7m » Non-habitable room: 2.4m » 2 storey apartments: 2.7m for main living area floor and 2.4m for second floor, where its area does not exceed 50% of the apartment area » Attic spaces: 1.8m at edge of room, with a 300 minimum ceiling slope • In mixed use areas: Provide minimum 3.3m height for ground and first floor to promote future flexibility of use.

Architectural roof features

Controls	
C5.	To provide a visually interesting skyline, architectural roof features, as defined in the Canada Bay Local Environment Plan 2013 (as amended), may extend above the maximum building height limit provided they are of high architectural design quality integrated into the overall building design, and do not adversely impact on neighbouring properties in terms of overshadowing and loss of views. Architectural roof features may extend above the maximum height limit of the Height of Buildings Map within the Canada Bay Local Environment Plan 2013 (as amended). Refer Photo K17-6,

Thresholds heights between streets and private domain

Controls	
C6.	To optimise accessibility, provide floor levels to entrances of ground floor retail and commercial uses, that are contiguous with the adjoining footpath level, to the maximum extent practical.
C7.	To protect privacy, elevate ground floor level apartments above adjacent footpath levels – 500mm is suggested as a minimum and 1500mm is suggested as a maximum. This requirement needs to be balanced against the provision of access and adaptability for commercial and retail uses at ground level.

Maximum number of storeys/ height for buildings within parkland open space

Controls	
C8.	To minimise visual impact and optimise views from the private domain, the Community Facility building sited within the Foreshore Park in Precinct B must not be higher than 12m.

Photo K17-7 Variety in building types is required on large sites

B.3 Building bulk

Allow for a mix of building types from low-rise to mid-rise and tower buildings within the development cross section (Refer Photo K17-7). Improve the amenity of living and working environments, and directly promote sustainable practices by:

- Enabling habitable and service rooms to be naturally lit and ventilated;
- Reducing site cover, resulting in increased landscaped areas;
- Permitting views between buildings from the public domain;
- Permitting sunlight between buildings to public spaces;
- Minimising the impact of building bulk on adjoining areas; and
- Creating a silhouette of slender and slimline tower buildings against the sky which is visually consistent with the role of Rhodes as a Specialised Centre.

Retail/ commercial uses

Controls	
C1.	To avoid bulky towers the floor plate of commercial buildings above 4 storeys should not exceed 1,400m^2 including the core.
C2.	For retail and commercial uses in the mixed use zone only, deeper building footprints are permitted up to 4 storeys in height.
C3.	To optimise natural light to work spaces, no point on an office floor above 4 storeys should be more than 12m from a window, excluding the core.
C4.	To allow natural lighting and ventilation at ground and first floor level of deep buildings, courtyards and atria which are open to the sky, are encouraged. For buildings greater than 6 storeys, courtyards and atria should have a minimum width of 8m.

Residential use

Controls	
C5.	To achieve good cross ventilation and access to natural light, the depth of residential buildings up to 9 storeys in height should not exceed 18m from window face to window face.
C6.	The depth of residential buildings greater than 9 storeys should not exceed 18m from window face to window face, and 26m overall including balconies, terraces and the like.
C7.	Should a building exceed the maximum building depths from window face to window face, it needs to be demonstrated that the apartments can achieve acceptable access to natural light and cross ventilation.
C8.	To achieve natural ventilation and daylight, a minimum 60% of all residential apartments within a building should have openings in two or more external walls of different orientation. Single orientation apartments should predominantly face north, east or west.
C9.	A maximum of 15% of apartments in a building may have a single southern aspect (SW-SE).
C10.	To avoid long internal corridors, the number of apartments served by a common lobby should be no more than 8 per floor. Where this cannot be achieved, no more than 12 apartments should be provided off a circulation core on a single level. For buildings of 10 storeys or over, the maximum number of apartments sharing a single lift is 40.
C11.	To achieve high quality living environments, double loaded access corridors are to have outlook, access to sunlight and natural day lighting and preferably be naturally ventilated.

Photo K17-8 Well articulated facades including refinement in window and balcony design

B.4 Setbacks

Street setbacks establish the building line. They are needed to create:

- A territorial threshold between the public street and the private dwelling.
- A buffer to street activity.
- Security, where properly designed to avoid ambiguous public accessible small spaces.
- A landscaped setting for buildings.
- Privacy from the street.
- Environmental amenity to buildings such as access to sunlight and daylight.

Consistent ground level setbacks are needed to provide:

- Increased pedestrian amenity.
- Desirable view corridors and vistas.
- Strong street definition where they are continuous.

Controls	
C1.	Street setbacks should comply with *Section K17.4 Site-specific controls*
C2.	To create an urban character, provide strong street definition, enhance retail activity, and define prominent corners, build to the street edge along and opposite the activity strip in the mixed use zone, and on important corners as nominated in Figure K17-9 Rhodes West Setbacks Plan and as illustrated in Photo K17-9 and Photo K17-14. Non-compliance with these figures will be assessed on a case-by-case basis.
C3.	To create a residential character, comply with 3m street setbacks along north south streets, as nominated in Figure K17-9 Rhodes West Setbacks Plan.
C4.	To achieve adequate separation between buildings for solar access, and to create wide view corridors to the water, that can be landscaped as ‘green fingers’, a consistent 5m street setback is preferred along east west streets, as nominated in Figure K17-9 Rhodes West Setbacks Plan.
C5.	To minimise the impact of tower buildings on the public domain in terms of wind and to create a human scale at street level buildings greater than 9 storeys in height are to be setback a minimum 10m from the primary street boundaries, except within Station Gateway West (Precinct D), where a minimum of 3m setback is permitted.
C6.	A 2 to 4 storey street wall fronting Rider Boulevard is required to create urban character, to provide strong street definition, and achieve a built form that allows direct sun to streets and reduces the apparent scale of taller buildings. Development above the street wall level should be set back 5m from the street edge.
C7.	Buildings fronting the foreshore with a façade length of up to 18m are to achieve a minimum 3m setback along the reserve.
C8.	To achieve a varied built edge, buildings with a façade length of more than 18m fronting the Foreshore Reserve are to comply with the following controls: • The ends of buildings fronting the Foreshore Reserve (adjacent to east/west streets) are to have a building setback (including balconies) of not less than 10m from the Foreshore Reserve • The bays of the building extending forward of the 10m setback line may extend to no less than 7m from the Foreshore Reserve (not including balconies) • Balconies in the bays of the building extending up to 7m from the Foreshore Reserve shall not extend along the full length of the façade of each bay • The setback of the building fronting the Foreshore Reserve in between the setback described in dot point two above, may extend to no less than 8.8m from the Foreshore inclusive of balconies
C9.	Projecting balconies are permitted forward of the minimum building setback line for a maximum of 50% of the length of the building.

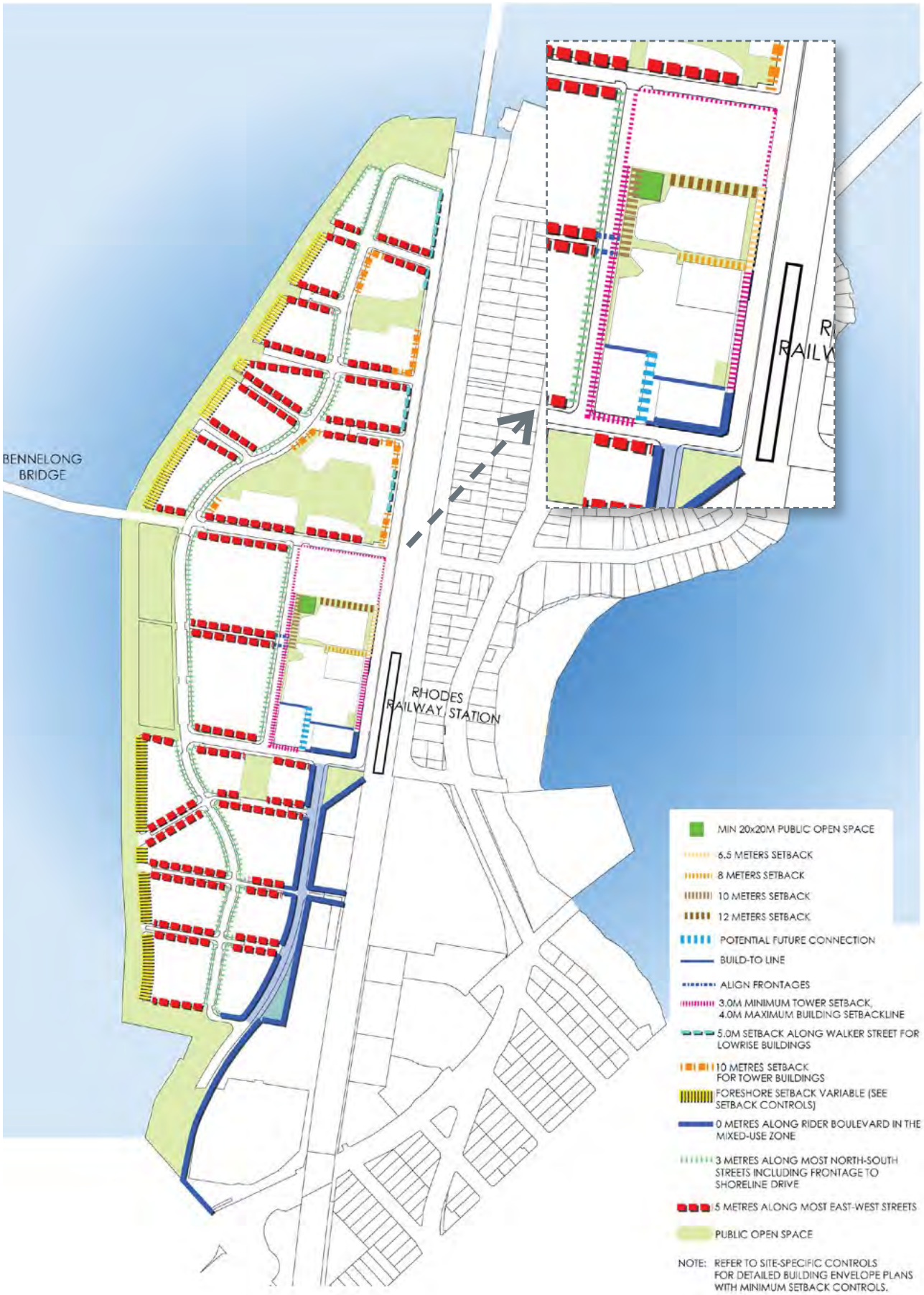


Figure K17-9 Rhodes West Setbacks Plan

B.5 Definition of streets and open spaces

The definition and character of streets is significantly influenced by:

- The proximity of a building to the street, or street setback;
- Consistency of the street setback;
- Continuity of the building frontage;
- Resultant landscape potential; and
- Building height.

The strategy promotes an urban design response specific to each street condition, while creating a coherent identity for the peninsula and also identifying where special amenity can be achieved through variable building setbacks. The definition of streets and open spaces should be read in conjunction with Figure K17-9 Rhodes West Setbacks Plan and *Section K17.4 Site-specific controls*.

Controls	
C1.	To allow buildings to address streets, lots resulting from the subdivision of large blocks, should have at least one frontage to a primary or secondary street.
C2.	To contribute to the hierarchy of different street types and functions, development is required to build to identified street and park setback lines as shown in Figure K17-9 Rhodes West Setbacks Plan.
C3.	To encourage surveillance of the street and communal gardens, orientate primary openings in living areas to the street and rear gardens.
C4.	To provide a public pedestrian walkway connecting Walker Street, Marquet Street and Shoreline Drive with a width of 6-8m subject to performance requirements to accommodate: • Sufficient space to accommodate sufficient clear width, swept path and height for emergency vehicle access as required by the NSW Fire Brigade and NSW Ambulances and other day-to-service vehicles required to maintain the central oval plaza and laneway public domain and as necessary to service businesses. • Planting of mature trees in the laneways and central oval plaza as illustrated in the Public Domain Concept Plan (Context Landscape Design 2014). • Provision of outdoor dining zones associated with cafe, bar and restaurant tenancies. • Projecting shop or other signage. • Laneway vehicular access management in liaison with NSW Police to restrict vehicular access.

Photo K17-9 Example of a building that strongly defines the street corner and street edge

B.6 Building articulation and address

Building articulation refers to the three dimensional modelling of a façade. Refer Photo K17-8, Photo K17-10, Photo K17-12 and Photo K17-13.

Building articulation establishes the:

- Relationship between the building and the street, through the use of entry porches, loggias, balconies, bay windows and the like;
- Environmental amenity, through the use of sun shading devices, noise barriers, privacy screens; and
- Degree of continuity between the interior rooms and outdoor spaces, through the location of balconies, terraces and verandahs.

Photo K17-10 Well articulated facade

Controls	
C1.	Comply with the building envelopes controls in *Section K17.4 Site-specific controls* including building articulation zones. The intention of the building articulation zone is to promote stepping in the general line of the building facades including the line of windows, and balconies to create visually interesting buildings.
C2.	Residential tower buildings greater than 9 storeys in height are to demonstrate a slender and slimline appearance to create a visually interesting skyline. The buildings in Photo K17-11 have a slender and slimline quality.
C3.	Residential tower buildings are to articulate the vertical proportions in their external appearance. Extensive horizontal articulation through the use of solid balustrades is to be avoided as this design strategy tends to result in overly bulky buildings which are neither slender nor slimline.
C4.	Tower buildings greater than 9 storeys, should demonstrate vertical proportions in the articulation of building facades. Photo K17-11 illustrates how vertical elements appropriately accentuate the vertical proportions of a tower building.
C5.	Provide a high degree of articulation. Do not rely on the excessive use of a single type of sun shading to articulate building facades. Louvre type sun shading can add excessively to building bulk when used over large facades areas.



Photo K17-11 Residential tower buildings that have a slender and slimline quality with elements that accentuate vertical proportions

Photo K17-12 Mix of horizontal and vertical elements provides articulation

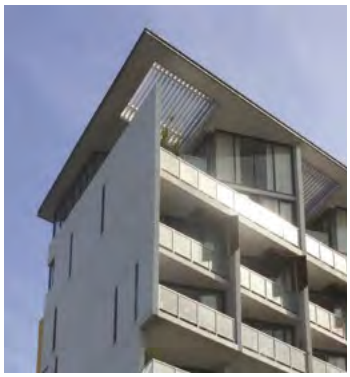


Photo K17-13 Roof form adds to building articulation

Photo K17-14 Principle of curved street geometry reflected in building form suitable for Shoreline Drive

B.7 Diversity of apartment types

A mix of apartment types and sizes is promoted to cater to a variety of socio-economic, age, ethnic and other circumstances. A range of dwelling sizes and types creates a housing mix that will cater to a diverse population and enrich the local character.

This DCP encourages a component of individual duplex, pair and row housing, but recognises that the apartment type is likely to be the predominant housing form on the Rhodes Peninsula.

Apartment typologies can be based on circulation and building section characteristics, which have a significant impact on the quality of air, light, solar access, privacy and outlook to dwellings.

Controls	
C1.	To achieve a mix of dwelling sizes, all residential and mixed-use development should provide a range of dwelling sizes in accordance with the requirements of the Canada Bay Local Environmental Plan.d
C2.	To achieve environmental amenity, all access corridors should have a component of daylight, either at the point of vertical circulation or at the ends of corridors and preferably be naturally ventilated.
C3.	To achieve high quality living environments, cross ventilated apartments are encouraged, including dual aspect apartments.
C4.	To achieve solar access in high density areas where it may be difficult to ensure direct sunlight to the ground floor in midwinter, two-storey apartments are encouraged at ground floor level. This control is not intended to conflict with the provision of accessible housing. Refer Photo K17-15.
C5.	To innovatively combine different apartment types, ‘hybrid’ buildings are encouraged.
C6.	To optimise liveability for all dwellings, internal and external living areas should be integrated. Noise attenuation for buildings facing the rail line and busy roads
C7.	A noise attenuation zone should be created between habitable rooms facing the noise source, particularly bedrooms, by; • Locating service areas such as circulation, kitchens, laundries, storage and bathrooms to create a noise buffer; • Locating screened balconies or wintergardens to create a noise buffer, and; • Selecting sound isolating materials, including acoustic glazing.
C8.	To protect local residential amenity, building articulation should be designed to minimise external noise reflectivity.
C9.	Buildings adjacent the Northern Railway Line are to consider the provisions of State Environmental Planning Policy (Infrastructure) 2007 and related guideline documents and seek appropriately qualified acoustic engineering advice in relation to the mitigation of rail-related impacts on development.

Photo K17-15 Two level maisonette apartments

B.8 Flexibility

Flexible building design is sensitive to the access requirements of people of all ages and abilities, and provides for a degree of future adjustment to accommodate:

- Changing access needs, such as for occupants with impaired mobility, including young children in prams and the elderly.
- Households of varying sizes, age groups and privacy needs.
- Housing that is easily modified for occupation and visitation by people with disabilities and progressive frailties.
- Home occupation.
- Future changes of use.

Flexible buildings are more functional in the long term because they are suitable for a wider range of inhabitants and can accommodate changing requirements.

Flexible building design improves the quality of the built environment and achieves sustainable practice, by encouraging development designed for durability, flexibility and low energy consumption.

Controls	
C1.	To cater for a wider range of occupants and avoid disability discrimination, the accessibility and adaptability of all buildings should be maximised in all residential and mixed use developments.
C2.	Adaptable housing units are to be designed and constructed to meet the performance requirements and provide the essential features required by AS4299 Adaptable Housing at the minimum rate of 15% of total dwellings. Where the total number of adaptable housing units to be provided is not a whole number, the number is to be rounded up to the next whole number. One accessible parking space is to be provided for each adaptable unit.
C3.	Housing design that provides for a degree of future adjustment of its configuration is encouraged. Consider accommodating: • Variable wall locations • Variable number of bedrooms • Home occupation • Multiple entry points • Adaptable housing • Liveable housing
C4.	To optimise flexibility for future changing uses, windows or skylights should be provided to all habitable rooms and to the maximum number of non-habitable rooms possible.
C5.	The design of commercial space that provides for a degree of future adjustment of its configuration is encouraged. Consider accommodating: • Variable lettable areas; • Multiple service cores; and • Residential uses including home-based business dwellings.

B.9 Visual privacy and building separation

Thoughtful design can ensure that views and outlook are maximised from all dwellings without compromising the visual privacy of the residents or their neighbours.

Privacy between dwellings and the public domain and non residential uses should also be fully considered.

Controls	
C1.	To achieve privacy to private internal and external spaces, consider: • Building separation distance • Appropriate internal room layout • Location and design of windows and balconies • Design of appropriate screening devices and landscaping. Refer Photo K17-26.
C2.	The use of tinted glazing as the sole means of achieving privacy is not permitted.
C3.	To achieve privacy to ground floor level apartments, without compromising surveillance of any adjoining public domain, generally elevate the ground level by a minimum of 0.5m and maximum 1.5m above the adjoining footpath level and provide suitable front walls or fences to front gardens.
C4.	To achieve privacy as well as to provide well spaced buildings for sunlight access and natural ventilation, the following minimum separation between openings of habitable and non-habitable rooms within dwellings must be provided for all buildings up to 20 storeys, in accordance with SEPP 65, Apartment Design Guide: *Up to four storeys/12m* • 12m between habitable rooms / balconies • 9m between habitable and non-habitable rooms • 6m between non-habitable rooms
C5.	Development consent must not be granted to development that results in a building being separated from another building by less than: • for a building higher than 14 storeys but not higher than 20 storeys—24 metres, and • for a building higher than 20 storeys—40 metres. This increased separation has been determined through the Master Planning process in order to exceed conventional standards and deliver best practice for a highly visible, high density site consistent with the Vision.

Refer additionally to SEPP 65, Apartment Design Guide:

- Section 2F Building separation, and
- Section 3F Visual privacy.

B.10 Acoustic privacy

The potential for unwanted noise sources increases in more densely developed areas where there are more people living more closely together. To achieve an appropriate acoustic environment, design consideration must be given to the following:

- Siting of building
- Building planning
- Internal room layout
- Location of private open space
- Location of windows
- Building materials

Controls	
C1.	To reduce the transmission of noise internally, sound insulation requirements between separating floors, ceilings and walls of adjoining dwellings should exceed the Building Code of Australia minimums.
C2.	The siting and design of buildings should minimise the transmission of noise externally, through careful consideration of the layout of internal rooms and external living spaces, design of openings, screens, blade walls, and the like, and choice of materials.
C3.	Design restaurants and cafes to minimise the impact of noise associated with late night operation on nearby residents by using measures such as double glazing, and providing outdoor eating areas under awnings to help contain noise to street level.
C4.	To enable occupants to control internal living environments, at least 25% of double glazed windows to dwellings should be openable.

Refer additionally to SEPP 65, Apartment Design Guide:

- Section 4H Acoustic privacy, and
- Section 4J Noise and pollution

B.11 Solar access and daylight

Solar access to internal and external areas is a major determinant of environmental comfort. Good passive solar design offers financial benefits, by reducing the need for artificial heating and cooling. Glass allows heat in the form of sunlight to enter buildings, yet is a poor insulator of heat. The design of windows and other glazed areas need to consider the environmental impact of heat gain, heat loss and glare, as well as issues of streetscape, privacy, architectural resolution and views.

To the public domain

Controls	
C1.	To create a useable open space network that can be enjoyed by local residents and workers, new development should retain solar access to a minimum of 50% of the area of neighbourhood parks and green spaces during lunchtime hours (noon to 2:00pm) during mid winter (22 June).
C2.	To protect the comfort and safety of pedestrians and motorists, new buildings and facades should minimise glare. Mirror glass is not to be used. A maximum of 20% reflectivity index is permitted for all external glazed elements. A Reflectivity Report that analyses the potential glare of any proposed new development, where building facades contain high proportion of glazing, is required to be submitted with the Development Application.

To the private domain

Controls	
C3.	To achieve high quality living environments, a minimum of 2 hours direct sunlight between 9:00am and 3:00pm should be provided to principal living rooms and private open spaces in at least 70% of dwellings within a residential development, on 22 June (Winter Solstice). A maximum of 15% of apartments in a building may receive no direct sunlight between 9am to 3pm in mid-winter (21 June).
C4.	To assist plant growth, maximise direct sunlight to communal open space as much possible within residential developments on 22 June.
C5.	To facilitate solar access to principal living rooms and private open spaces at first floor level, two storey and mezzanine ground floor apartments are encouraged.
C6.	To achieve high quality internal environments, appropriate sun protection should be provided to glazed areas facing north, west and east in residential and commercial developments. Refer Photo K17-16 and Photo K17-17. Avoid extensive areas of glazing unprotected from solar access during summer. Shading devices including eaves, awnings, colonnades, balconies, pergolas, external louvres and planting to control the penetration of sun, should be used to maximise solar access in winter, and minimise solar access in summer. On east and west facing facades subject to direct sunlight, external shading should be integrated into the design, or the area of glazing minimised. Avoid the excessive use of louvres of a single style, which can reduce building articulation and add to the bulk and scale of buildings. Refer to Photo K17-18.

Photo K17-16 Horizontal sun shading over west facing windows protects from undesirable heat gain

Photo K17-17 Deep balconies and adjustable screens shade windows from undesirable heat gain

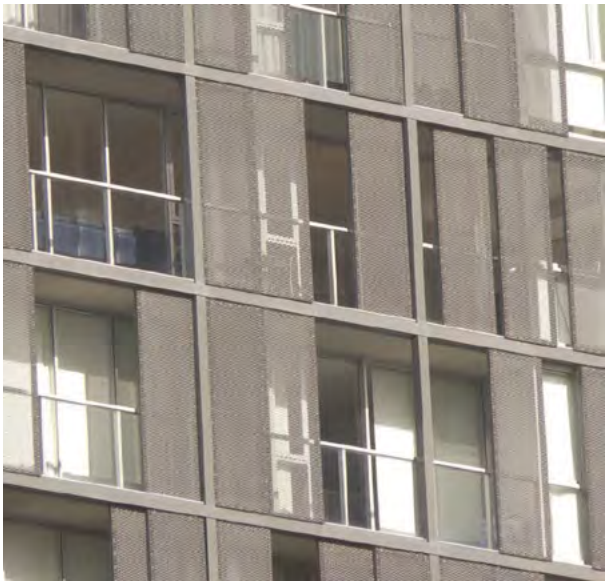


Photo K17-18 Using one type of sun shade over large areas can add to building bulk

B.12 Natural ventilation

Living, retail and work environments are to maximise natural lighting. Living and working environments which are not reliant on artificial cooling and daytime lighting during the daylight hours, will have reduced energy inputs over the long term. The provision of good natural ventilation and daylight facilitates builds-in future flexibility.

Controls	
C1.	To reduce energy inputs over the long term, buildings should be designed so that living and working environments are substantially naturally lit and ventilated, using ventilation by means such as thin cross section buildings.
C2.	To avoid reliance on mechanical ventilation or air conditioning and minimise use of artificial lighting, windows should be provided to all living and working environments. Do not rely on skylights to provide the sole source of daylight and ventilation to habitable rooms.
C3.	To achieve high quality living environments residential buildings up to a height of 9 storeys are to have a maximum depth of 18m window line to window line. Buildings greater than 9 storeys in height are to have a maximum depth of 23m.
C4.	A minimum of 60% of residential apartments should be naturally cross ventilated.
C5.	Developments which seek to vary from the maximum building depth and minimum percentage of naturally cross ventilated apartments must demonstrate how natural ventilation can be satisfactorily achieved, particularly in relation to habitable rooms.
C6.	To achieve natural ventilation, doors and openable windows should be located in two walls facing different or preferably opposite directions. The placement of small low windows on the predominantly windward side of the building, and larger higher windows on the leeward side, can encourage cross ventilation. The use of passive climate control in commercial buildings, through stack effect ventilation and the building's mass to ameliorate extreme temperature variations is encouraged.
C7.	To allow daylight into ground and first floor levels, buildings should be articulated using atria and courtyards.

Refer additionally to SEPP 65, Apartment Design Guide Part 4B Natural ventilation.

B.13 Building materials, finishes and colours

Building materials, finishes and colours used on external facades create a finer texture to streetscapes and city skylines and can contribute to the identity and 'sense of place' at Rhodes West.

Building materials can cause environmental impacts before they reach the building site, during their life in the building and in their eventual disposal. This DCP encourages building materials selected to suit each particular application and which provide the required performance with the least overall environmental impact.

Controls	
C1.	To optimise thermal comfort and minimise energy consumption, insulation must be provided in wall, ceiling and roof systems.
C2.	To minimise resource depletion, plantation timbers, Australian regrowth timbers and recycled timbers should be used. The use of Australian native rainforest timbers, imported rainforest timbers and timbers from old growth forest is not permitted.
C3.	To minimise environmental impacts, materials with the following characteristics are to be selected: • With low embodied energy; • That are durable; • That are recycled or able to be recycled; • That are sourced from renewable resources and materials; • That are non-polluting in manufacture, use and in disposal; and, • That are non toxic, do not "outgas".
C4.	Use colour to provide visual interest in building facades. Colour can be used to articulate vertical proportions of tower buildings, such as in Photo K17-11 or primary building entries such as in Photo K17-19.
C5.	Development Applications are required to include an assessment of the environmental sustainability of selected building materials. Selected materials are to display energy efficiency in production and their contribution to sustainable building design and construction.
C6.	A best practice sustainable approach to building materials and finishes should be taken, including: • Use of precast concrete walls; • Use of re-usable formwork for internal floors and core walls on site; • Reinforcing steel with a high recycled steel content; • Low VOC paints for all internal flat and low sheen areas; • Water based paints for all internal gloss and semigloss areas; and • No use of unsustainable rainforest timbers, specification of sustainably sourced timber and minimal use of MDF.

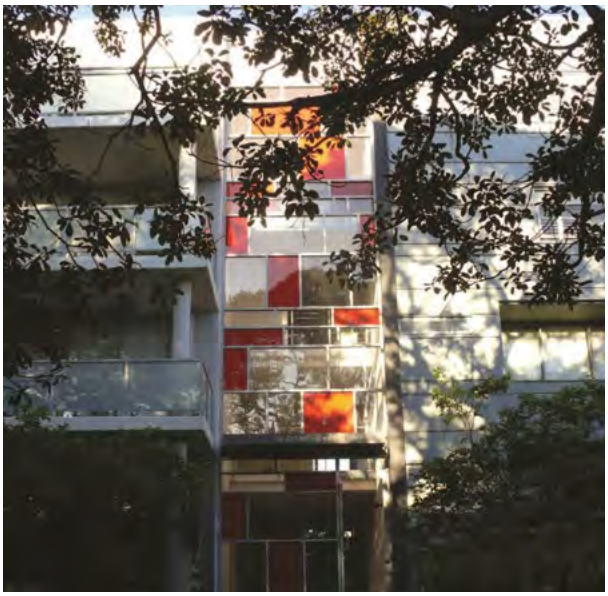


Photo K17-19 Building entries can be distinguished through the use of colour, as well as awnings that extend into the public domain

B.14 Public domain interface

Active street frontage

Active street frontages support a lively, interesting and safer public domain. Busy pedestrian areas and nonresidential uses such as shops, studios, offices, cafes, recreational and civic uses promote the most active frontages. Active frontages at ground level should be established along major pedestrian routes. Refer to Photo K17-20 and Photo K17-21.

In residential areas the interaction between the public and private domain can be strengthened by maximising the number of entrances and locating more public functions on the street side of the building. In mixed use areas, ground level retail and commercial frontage provides the benefit of public safety, commercial activity and street life. Active frontages should extend above street level with uses which provide transparency and visual contact with the street.

Due to the temperate climate, favourable orientation, and views to Olympic Park and Homebush Bay from the public domain, Rhodes West is a desirable location for outdoor dining. Outdoor dining has the potential to contribute to the liveliness of the streets and public open spaces.

Controls	
C1.	An active frontage is defined as one, or a combination of the following: • Shopfronts, if predominantly glazed and accompanied by an entry • Community use if accompanied by an entry • Commercial lobby if accompanied by an entry • Entrance to residential/ commercial use • Café or restaurant if accompanied by an entry and/ or outdoor seating • Any other use that in the opinion of the consent authority is consistent with the strategy
C2.	Minimise the number and width of vehicle footpath and cyclepath crossings, to optimise pedestrian and cyclist safety.

Photo K17-20 Built form that frames public open space with pedestrian link to surrounding street

Photo K17-21 Active street with restaurants and cafés with outdoor dining

B4 - Mixed use zone

C3.	To create a lively centre, active frontages must be established along the activity strip identified in Figure K17-9 Rhodes West Setbacks Plan, with ground level retail and commercial uses, and entrances to residential or commercial development above. Active ground floor frontage should also be maximised to all other streets, laneways and plazas in the mixed use zone, especially at street corners. Refer to Photo K17-23 and Photo K17-24.
C4.	To create an interesting pedestrian environment, predominantly clear glazing should be provided to the street frontage of retail and commercial windows at ground floor level.
C5.	To create a friendly pedestrian environment, roller shutters to ground floor retail street frontages are prohibited.
C6.	To create a lively centre, street level retail frontage for individual tenancies is limited to 20m, except on street corners where 30m frontages are permitted, and along Rider Boulevard and Oulton Avenue where bulky retailing may be accommodated.
C7.	To create a safe and lively retail complex, active frontages must be provided to the pedestrian spine of the retail centre. Ground level shops with frontage to both a public street and a pedestrian spine, should have public entrances on both frontages.
C8.	To enliven the street, laneways and plazas, outdoor eating areas should be located at ground floor and first floor level along street frontages and adjacent to parks, with minimal disturbance to pedestrian circulation and residential amenity.
C9.	To enliven the street, provide surveillance, accommodate home occupation, and facilitate potential future adaptation for mixed or commercial use, design every ground floor apartment fronting a primary street in the mixed use zone to incorporate a direct street entrance.
C10.	Complete existing connections and establish new pedestrian connections through the block, to create a fine-grained network of interconnected laneways and open spaces.

R4 - Residential zone

C11.	To achieve street surveillance, maximise the number of pedestrian entrances to residential buildings. Refer to building articulation and address controls.
C12.	To achieve amenity in local neighbourhoods, permissible non-residential uses such as publicly accessible facilities, local shops and cafes are preferred where they will be most accessible and visible, such as at street level, in the following locations: • Along Walker Street; • At the Gauthorpe Street extension in the Foreshore Park; and • Fronting parks at locations identified in Figure K17-9 Rhodes West Setbacks Plan.

Figure K17-10 Rhodes West Active Street Frontages

B.15 Awnings and entrance canopies

In retail and mixed use streets awnings increase pedestrian amenity by providing wet weather protection and shade. Refer to Photo K17-22. For public and commercial buildings in residential streets discontinuous awnings and entrance canopies create a protected transition area between internal and external spaces at building entrances. Refer to Photo K17-25 and Figure K17-10 Rhodes West Active Street Frontages.

Awnings

Controls	
C1.	To achieve weather protection in the major pedestrian areas, continuous awnings must be provided to the activity strip and discontinuous awnings in transition areas opposite and adjoining the activity strip.
C2.	To provide adequate weather protection awning height is to be minimum 3.2m and maximum 4.5m and integrate with adjoining properties. The awning face should be horizontal. Steps for design articulation or to accommodate sloping streets are to be maximum of 0.75m. Awning width is to be a minimum 2m, setback 0.8m from the face of the kerb and to suit adjoining awnings. Where street trees are required the entire length of the awning is to be set back from the inside edge of the tree hole. Cut out segments are not acceptable. Awnings wider than 3.66m require approval from the Director General of Local Government.
C3.	To achieve protection from the sun, awnings should have no more than 50% of their area transparent.
C4.	To create a safe pedestrian environment at night and avoid visual clutter, under awning lighting should be provided and recessed into the soffit of the awning or wall mounted on the building.
C5.	To promote a safe and weather protected pedestrian connection, a continuous awning from Rhodes Station to the bus interchange should be provided.
C6.	To accommodate a design for any awning or overbridges on ground level and facing the roadway with an underpass of 4.3 meter clearance.

Canvas awnings

C7.	To assist sun shading generally, retractable or fixed canvas awnings or shade cloths are permitted.
C8.	To provide sun shading to east and west facades, vertical canvas blinds may be used along the outer edge of awnings. These blinds should not carry advertising or signage.

Entrance canopies

C9.	To provide weather protection canopies are required at the pedestrian entries of all buildings. Entrance canopies are permitted within building setbacks. Where there is no building setback, entrance canopies can extend 2m beyond the property line over the footpath or further to align with the width of any adjoining discontinuous awning.

Photo K17-22 Awning to active street frontage

Figure K17-11 Rhodes West Location of Awnings

Photo K17-23 An example of a mid-block activated open space that is lively and attractive and that can accommodate different activities

Photo K17-24 Laneways can accommodate seating, planting and other street furniture to enhance amenity

Photo K17-25 Awning to residential entry

Photo K17-26 Side gardens achieve privacy with landscaping

B.16 Signage and advertising

Signage and advertising should communicate effectively and contribute in a positive way to the public domain. Signage and advertising structures should be unobtrusive, informative and compatible with an attractive shopping environment. Important factors to be considered are:

- Avoiding physical and visual clutter of the public domain;
- Avoiding conflict between advertising signs and nearby safety; public directions or traffic signs; and
- Protecting residential amenity

Controls	
C1.	Signage must be designed to avoid confusion with directional and traffic signs.
C2.	Signage should be designed to add character to the street and complement the architecture.
C3.	To minimise visual clutter, signage should be integrated with awnings. Suspended signage should be a minimum of 2.7m clear above finished footpath level.
C4.	Building identification is the only signage permitted above first floor level.
C5.	A single retail centre and major tenant pylon is permitted along Homebush Bay Drive.
C6.	To achieve durability, signage and advertising should be constructed of non-combustible materials and be resistant to vandalism.
C7.	To protect residential amenity, advertising signage is not permitted facing private residential streets, or on side walls abutting residential properties.
C8.	To minimise visual clutter, the source of light to illuminated signage should be concealed or integral with the sign. Electrical conduits to illuminated signs including neon signs should be concealed. The ability to adjust the light intensity is required. A curfew on illumination may be imposed to protect the residential amenity of nearby residential development.

B.17 Private and communal open space

Garden spaces

Dwellings should have access to private or communal garden spaces that are useable and comfortable. Internal landscape spaces should contribute to the character and environmental quality of the landscape of the peninsula. These spaces should have a balance of podium, or terrace space, and deep soil, planted garden spaces. Design of podium landscapes should create optimum conditions for establishment and long term viability of planted gardens. Refer to Photo K17-27.

Controls	
C1.	The area of communal open space required should be at least 25% of the site. Developments must achieve at least 50% direct sunlight to the principal useable part of the open space for a minimum of 2 hours between 9am to 3pm on 21 June (mid-winter).
C2.	Where communal open space cannot be totally provided at ground level, it should be provided on a podium or roof, communal roof or private open space. Where developments are unable to achieve the recommended communal open space, such as those in dense urban areas, they must demonstrate that residential amenity is provided in the form of increased private open space and/ or in a contribution to public open space.
C3.	To optimise natural infiltration and encourage substantial planting, deep soil landscape space should be provided wherever possible, and maximised.
C4.	Development sites in the residential zone are to contain landscaped areas in the form of private, common and public open space. Refer to *Section K17.4 Site-specific controls.*
C5.	To achieve a garden quality, half the area of communal open space should be unpaved and provide soft landscaping.
C6.	To achieve a leafy residential quality, a minimum of one large tree, with a spreading canopy, and mature height of 12m minimum, should be planted in soft landscaping zones for every 100m^2 of landscape space. Locally indigenous species are preferred.
C7.	Each apartment at ground level or on podiums or car parks, must have minimum private courtyard open space of 15m^2, with minimum depth for planting of 3m.
C8.	To assist stormwater management, landscape areas should provide some capacity for storage and infiltration of stormwater falling within the total landscape space.
C9.	To create optimum conditions for the establishment and long term viability of planted areas. Plantings are to achieve the following guidelines in deep soil zones: • Large trees (13-18m high with 16m diameter canopy at maturity) with: » Minimum soil volume: 80m3 » Minimum soil depth: 1.3m » Minimum soil area: 8m x 8m or equivalent • Medium trees (9-12m high with 8m diameter canopy at maturity) with: » Minimum soil volume: 35m3 » Minimum soil depth: 1m » Minimum soil area: 6m x 6m or equivalent • Small trees (6-8m high with 4m diameter canopy at maturity) with: » Minimum soil volume: 15m3 » Minimum soil depth: 800mm » Minimum soil area: 4.5m x 4.5m or equivalent

C10.	Deep soil zone are to be at least 7% of the site area and to meet the following minimum requirements: (ADG – Part 3E: Deep soil zones) • Site area: » 650-1,500m^2: 3m » Greater than 1,500m^2: 6m » Greater than 1,500m^2 with significant tree cover: 6m
C11.	For planting on top of built structures such as basement car parks, podiums or roofs, ensure that the minimum soil standards for the following plant types and sizes are complied with: • Large trees (12-18m high with up to 16m diameter canopy at maturity): » Minimum soil volume: 150m3 » Minimum soil depth: 1,200mm » Minimum soil area: 10m x 10m or equivalent • Medium trees (8-12m high with up to 8m diameter canopy at maturity): » Minimum soil volume: 35m3 » Minimum soil depth: 1,000mm » Minimum soil area: 6m x 6m or equivalent • Small trees (6-8m high with up to 4m diameter canopy at maturity): » Minimum soil volume: 9m3 » Minimum soil depth: 800mm » Minimum soil area: 3.5m x 3.5m or equivalent • Shrubs: » Minimum soil depth: 500-600mm • Ground cover: » Minimum soil depth: 300-450mm • Turf: » Minimum soil depth: 200mm
C12.	Variations may be considered to the above guidelines supported by advice from a qualified arborist.
C13.	Drainage and irrigation must be provided to all planters over structure.
C14.	All planters on podium levels must be accessible for maintenance.

Photo K17-27 Pedestrian connections between buildings to internal common open space

B.18 Front gardens

Well designed front gardens can retain existing landscape elements and supplement the stock of vegetation, particularly trees, in the public domain. Front gardens contribute to street character and amenity, enhance definition of the public and private domains, and can provide a positive setting for the building.

Front gardens

Controls	
C1.	Garden structures such as gazebos, play equipment, swimming pools and spa baths are not permitted in front gardens.
C2.	To minimise the visibility of car parking, garages and parking structures are not permitted forward of the building alignment to public streets;
C3.	To minimise the impact of driveways in front gardens, appropriate design, materials selection and screen planting is encouraged.
C4.	To minimise impact on the root zone of street trees, driveways, kerb crossings, parking, paved areas and external structures should be located appropriately.
C5.	Front gardens should generally be wide enough to be useable, and should have adequate continuous access to allow maintenance.
C6.	To achieve safety, lighting at both pedestrian and vehicular street entry points should be provided to each residential building.
C7.	To provide a pleasant streetscape and privacy of ground level private gardens a minimum of 1 small tree in front gardens of ground floor dwellings is required.

Front fences

C8.	The maximum height of front fences is 1.2m from the finished footpath level of the adjoining street. Front fences may be sloping or stepped along sloping streets.
C9.	Fences should be integrated with the building and landscape design through the use of common materials and detailing and be part of a suite of fences in the street. Refer Photo K17-28.
C10.	Fences should highlight building entrances, to allow for outlook and street surveillance
C11.	Fences must be partially transparent. Solid fencing or fencing with frosted or obscure glazing is not permitted

Photo K17-28 Front fences have some transparent quality to allow for surveillance of the adjoining public domain, we well as privacy for occupants

B.19 Above ground open space

Every dwelling should have access to private open space to extend the liveable area and take advantage of the temperate climate.

Private open space should be designed to allow privacy, security and solar access. Where private gardens are not possible, well designed balconies and terraces have the potential to improve amenity and lifestyle of apartment residents. Some useable communal open space at ground level should also be provided where there is no access to private gardens.

Photo K17-29 Building articulation in balustrade design

Controls	
C1.	To achieve residential amenity, at least one balcony, terrace, verandah, loggia, or deck must be provided to each dwelling where direct access to ground level private open space is not available. Refer Photo K17-29.
C2.	All apartments are required to have primary balconies as follows: • Studio apartments: » Minimum area: 4m^2 » Minimum depth of balcony: no requirement • 1 bedroom apartments: » Minimum area: 8m^2 » Minimum depth of balcony: 2m • 2 bedroom apartments: » Minimum area: 10m^2 » Minimum depth of balcony: 2m • 3+ bedroom apartments: » Minimum area: 12m^2 » Minimum depth of balcony: 2.4m • For apartment balconies with the following circumstances: » At 10 storeys or above, subject to consistently high wind speeds; » In close proximity to road, rail or other noise sources; and » Exposure to significant levels of aircraft noise. In these situations, the use of other forms of balconies (e.g. wintergardens, bay windows or juliet balconies) are appropriate, with natural ventilation demonstrated.
C3.	To achieve high quality living environments, smaller secondary above ground open space elements are also encouraged, such as balconies adjacent bedrooms, screened external clothes drying balconies adjacent laundries and bathrooms. Such spaces may have screens to a height of 1.4m. The preferred depth of secondary open space is 1.2m and the minimum permissible depth is 0.9m.
C4.	Above ground open space must be designed to provide security and protect the privacy of neighbours.
C5.	Lightweight pergolas, sunscreens, privacy screens and planters are permitted on roof terraces, provided they do not increase the bulk of the building. These elements should not significantly affect the views available from adjoining properties, the immediate vicinity or from the nearby ridges.
C6.	To optimise useability, the primary above ground space element should include a potable water tap and barbeque gas outlet where possible.

Refer additionally to SEPP65, Apartment Design Guide Part 4E Private open space and balconies.

B.20 Services

Low energy services

The consumption of electricity generated by the burning of fossil fuels contributes to CO2 production, the 'greenhouse effect' and global warming. The construction and use of buildings, accounts for a high proportion of overall energy consumption and consequently presents opportunities for energy savings and reductions in CO2 emissions. Applicants are required to satisfy the requirements of SEPP (BASIX).

Controls	
C1.	Install energy efficient building services, including but not limited to, low energy heating and cooling systems and timer switches. The use of green power and solar cells is encouraged.
C2.	Passive solar design principles should be provided in building design to avoid the need for additional heating and cooling.
C3.	Building designs should be energy efficient by isolating and selecting spaces to be heated or provide individual room controls if using a centralised system; select low energy lighting such as compact fluorescent light fittings, and low energy appliances (minimum 3-star rating).
C4.	To minimise energy consumption incorporate clothes lines that are screened from public view, in preference to dryers. Locate clothes lines for sun and breeze wherever possible.
C5.	To maximise safety and minimise visual clutter all new services should be located underground. Building services such as drainage and sewerage pipe work should not be exposed.
C6.	Appliances with a low energy rating are to be used when provided as part of a development.
C7.	Minimum energy requirements, include: • Building Management Tools like motion sensors, time based controllers, irrigation control systems and air quality control systems for carparks to minimise water and energy use • An average thermal comfort star rating of 5 or better (BERSPro, AcuuRate or FirstRate5) • Double Glazed, low-e glass to all apartment windows achieving summer/ winter (glass only) U-values of 1.7 or less • R2.5 insulation to all non-glazed external walls • R3.0 plus foil insulation to the underside of all roofs and roof terraces over apartments • Energy efficient variable speed fans for mechanical exhaust system • Energy efficient light fittings • Energy efficient VVVF lifts

B.21 Water conservation

Water conservation is an important element of an integrated ESD strategy. Measures can be implemented to match water quality with its intended use, to reduce water demand and use water more efficiently.

Applicants are required to satisfy the requirements of SEPP (BASIX) and Water Sensitive Urban Design Strategies.

Controls	
C1.	Water saving devices such as dual flush toilets, tap aerators, low water use dishwashers and washing machines must be provided to all new developments.
C2.	Spring return taps must be used for all public amenities.
C3.	Appliances and plumbing hardware should have a “AAA” Australian Standards Conservation Rating.
C4.	Implement fit for purpose substitution by matching water quality with its intended use. Roofwater should be retained on site for use externally, such as garden watering, cleaning and irrigation. The collection and storage of rainwater for toilet flushing should be considered. The recycling of grey water for toilet flushing or external use should also be considered.
C5.	The installation of insinkerators is not permitted.
C6.	Water conserving landscape practices, such as use of mulch, irrigation zoning, limited turf areas and flow regulators on hoses should be incorporated into design and management arrangements.
C7.	Minimum water requirements, include: • Drip irrigation to all planters/ on slab landscaping, except turf areas • Water efficient taps • Non-potable (recycle) water reticulation to all apartment WC’s and laundries (washing machine supply), the irrigation of gardens and the supply of carwash bays • Recycling of water from the fire pump testing system

B.24 Site facilities

Site facilities include loading areas, waste areas, mail boxes, external stores, end of cycle trip facilities laundries and clothes drying areas. Development should provide appropriate site facilities for retail, commercial and residential uses, and locate and design them to minimise their impact on the streetscape.

Controls	
C1.	Loading facilities must be provided via a rear lane or side street where such access is available.
C2.	Adequate waste and recycling areas must be provided to all developments. These areas are to be visually integrated to minimise their visibility from the street. Such facilities must be located away from openable windows to habitable rooms to avoid amenity problems associated with smell and noise.
C3.	To achieve amenity, provide either communal or individual laundry facilities to every dwelling, and at least one external clothes drying area. The public visibility of this area should be minimised. Clothes drying is only permitted on balconies that are permanently screened from public view.
C4.	To avoid visual clutter, all apartments are to have a balcony that has portion of the balustrade which has a minimum height of 1.4 metres and minimum width of 1.5 metres wide to screen drying clothes.
C5.	To optimise convenience, lockable mail boxes should be provided close to the street, integrated with front fences or building entries. Safety requirements need to be assessed in accordance with NSW Police regulations set-out in CPTED 'Safer by Design' principles.
C6.	To minimise the negative impact of smells on occupants on upper levels ducted vents must be provided to commercial kitchens.
C7.	To facilitate the maintenance of communal open space, garden maintenance storage including connections to water and drainage should be provided.
C8.	In addition to storage in kitchens, bathrooms and bedrooms, provide the following storage to each apartment: • Studio: $4m^3$ • 1 bedroom: $6m^3$ • 2 bedroom: $8m^3$ • 3 + bedrooms: $10m^3$ With: • At least 50% of the required storage to be located within the apartment; and • Storage is to be accessible from circulation spaces, living areas or laundry.
C9.	To encourage sustainable transport options provide change rooms, showers and lockers for people walking, running or cycling to work on all employment generating development. Locate these facilities close to secure bicycle parking.
C10.	To provide a safe public environment CCTV surveillance is to be provided in liaison with NSW Police.

Refer additionally to SEPP 65, Apartment Design Guide Part 4G Storage

B.25 Pedestrian access, parking and servicing

Pedestrian access and mobility

Most people experience some form of mobility impairment at some stage during their lives which may be caused by a variety of factors including ageing as well as injury and disease. It is important that access to the facilities of the Rhodes Peninsula is made easy for a wide variety of people.

The creation of a barrier free environment in all public spaces, premises and associated spaces will ensure that all people who live, work, or visit Rhodes Peninsula are able to access and use all spaces, services and facilities, and participate in community life at Rhodes.

Controls	
C1.	To cater for mobility impairment, provide at least one main entry with convenient, barrier-free access in all buildings. Access should be direct and without unnecessary barriers. Obstructions which cause difficulties should be avoided. These include: • Uneven and slippery surfaces • Steep stairs and ramps • Narrow doorways, paths and corridors • Devices such as door handles which require two hands to operate, or revolving doors
C2.	To cater for mobility impairment, appropriately designed and convenient seating and ablutions should be provided.
C3.	To cater for drivers with mobility impairment, adequate parking should be provided for people with mobility disabilities, and safe, easy and convenient access to the building.
C4.	To cater for visitors with mobility impairment, the proportion of visitable dwellings should be maximised.
C5.	An assessment of the accessibility of developments is to accompany all development applications for new buildings and substantial alterations to existing buildings involving changes to pedestrian access.

B.26 Vehicular access

Vehicle access to developments should minimise conflicts between pedestrians and vehicles, visual intrusion, and disruption of streetscape continuity. The location and design of vehicle entrances needs to be carefully considered to avoid disrupting pedestrian and cycle movement and promote pedestrian and cycle safety. Minimising the size and quantity of vehicle crossings will retain streetscape continuity and reinforce a high quality public domain.

Controls	
C1.	Provide access to parking from rear or side lanes or secondary streets wherever possible. Where practical, buildings are to share vehicle access points, and internal on-site signal equipment is to be used if necessary. Vehicular access is to be avoided in locations identified in Figure K17-11 Rhodes West Location of Awnings.
C2.	To optimise pedestrian safety, pedestrian and vehicle access should be clearly differentiated.
C3.	Provide a minimum 6m distance between a vehicle and pedestrian entries to avoid conflicts and maintain safety.
C4.	To optimise pedestrian amenity, driveways should be consolidated within blocks, particularly those in single body corporate ownership.
C5.	Vehicle access and pathway layouts should be designed to satisfy Australian Standards.
C6.	To optimise pedestrian access and safety, vehicular access ramps parallel to the street frontage are not permitted.
C7.	Where a port cochere is proposed, it is to be located so as not to interrupted pedestrian access to a building or along a street frontage. Pedestrian access is to be maintained along street footpaths.
C8.	The maximum permitted width of driveway crossings to detached, row and pair housing is 2.5m. The maximum permitted width of driveway crossings to all other lots is 6m generally, and 12m for the entrance to the retail centre near Homebush Bay. Dependent on the number of vehicles, 3m is the preferred width of driveway crossings, and car park and service entries.
C9.	In commercial, retail and light industrial developments, minimise the width of driveway crossings by consolidating car access, docks and servicing, and waste disposal. Avoid conflicts with pedestrian access and the impact of any such access on residential amenity.
C10.	Visual intrusion of vehicle access points must be minimised in accordance with NSW Police regulations set-out in CPTED ‘Safer by Design’ principles.

Figure K17-12 Rhodes West Vehicle Access Restrictions

B.27 On-site parking

The higher residential density and mixed use envisaged for the Rhodes Peninsula will enhance public transport use and viability, and reduce travel demand. This DCP promotes public transport use by minimising car parking requirements whilst providing for on-site service vehicle parking. Underground and semi-underground parking minimises the visual impact of car parks and is an efficient use of the site creating an opportunity for increased private, common and private open space.

Provision

Controls	
C1.	Parking provision shall be in accordance with Table K17-1 Private vehicle parking rates.

General

C2.	Stack parking is not permitted for residential development except where two spaces are provided for one apartment.
C3.	Car share, electric vehicle charging station and motorcycle parking rates are to be as per Table K17-3
C4.	One accessible parking space is to be provided for each adaptable unit.
C5.	Parking and service areas are to satisfy AS2890.1 and AS2890.2.

Basement and semi-basement car parking

C6.	To maximise the area for soft landscaping consolidated parking areas should be concentrated under building footprints wherever possible.
C7.	To accommodate a relatively safe environment in accordance with CPTED 'Safer by Design' principles.

At grade car parking

C8.	To achieve a high quality public domain, at grade car parking is only permitted to the rear of shops, restaurants and the like, and to detached, pair and row housing. It must be located behind the building line and screened from the public domain unless accessed via a lane or private street.

Above ground car parking

C9.	To achieve a high quality public domain, internal car parking which protrudes more than 1.2m above ground level of the adjacent public domain must be located behind the building alignment and be screened from the public domain in a manner that is an integral part of the external design of the building.
C10.	Parking structures should be designed to minimise reliance on artificial ventilation of car exhaust.

Bicycle parking

C11.	To encourage cycling provide the following bicycle parking in accordance with Table K17-2 Bicycle parking rates.
C12.	To encourage cycling, ensure resident and employee bicycle parking is secure.
C13.	To encourage cycling, provide end of cycle trip facilities in retail/ commercial developments.
C14.	Secure bike parking facilities are to be provided in accordance with the following: a) Class 1 bike lockers for occupants of residential buildings; b) Class 2 bike facilities for staff/employees of any land use; and c) Class 3 bike rails for visitors of any land use
C15.	Where bike parking for residents is provided in a basement, it is to be located: a) on the uppermost level of the basement; b) close to entry/exit points; and c) subject to security camera surveillance where such security systems exist.
C16.	A safe path of travel from bike parking areas to entry/exit points is to be marked.
C17.	Bike parking for visitors is to be provided in an accessible on-grade location near a major public entrance to the development and is to be signposted.

Table K17-1 Private vehicle parking rates

Residential	All dwelling types	Per dwelling Car Parking Rates for all apartments, multi dwellings and mixed use development: • studio dwelling—0.1 car spaces • 1 bedroom dwelling—0.3 car spaces • 2 bedroom dwelling—0.7 car spaces • 3 or more bedroom dwelling—1 car space Car Share schemes, carpark decoupling and the like shoudl be utilised wherever possible to reduce the amount of on-site carparking.
	Visitors	max 1 space per 20 apartments
	Service vehicles	max 1 space per 50 apartments for first 200 apartments plus 1
Commercial	Commercial offices	max 1 space per 40m^2 Gross Floor Area
	Service vehicles	1 space per 4,000m^2 GFA for first 20,000m^2 GFA and a space per 8,000m^2 GFA thereafter
	Retail	1 space per 40m^2 Gross Floor Area
	Service vehicles	1 space per 500m^2 for first 2,000m^2 and 1 space per 1,000m^2 thereafter (50% of spaces for trucks)

Table K17-2 Bicycle parking rates

Residential	Residential	• 2 per dwelling (resident) • 2 per 10 dwellings (visitor)
	Visitors	min 1 space per 12 apartments
Commercial	Employees	• 2 per 150m^2 GFA (employee) • 2 per 400m^2 GFA (visitor)
Retail	Visitor	min 1 space per 750m^2 GFA
	Retail complex/ shops	• 2per 250m2 GFA (resident) • 4+2 per 100m2 GFA (visitor)
	Cafes	min 1 space per 25m^2 public area for employees min 2 spaces for clientele

Table K17-3 Car share rates, electric vehicle charging stations and motorcycle rates

Land Use	Rates
Residential, Commercial, Retail	• Refer to Canada Bay DCP General Controls

K17.4 Site-specific controls

Introduction

Design controls and objectives have been prepared for each development site to ensure that the urban design and built form objectives and principals of the Canada Bay Local Environment Plan 2013 (as amended) and this Development Control Plan are achieved.

Considerable input from Council's Urban Design Consultant has guided the preferred framework for each site with urban design and place making principles. This input has guided the delivery of high quality living and working environments that are well designed and set a high standard for Rhodes as a recognisable Specialised Centre in Sydney.

These controls provide certainty to the community, Council and landowners as the to general position of the buildings on each site having regard to street setbacks, maximum building depths, building separation distances, and building heights in metres and maximum relative levels (RLs), as well as the size and general configuration of public open spaces. The building envelope controls also nominate the preferred location for non-residential uses to activate the public domain.

The design controls have been prepared on a precinct by precinct basis, however, do not undertake a detailed design of individual buildings. This flexibility in the development control allows the potential for a creative Architectural approach within set parameters, and is subject to refinement as detailed design proceeds. The building envelopes are not intended to prescribe the exact location of buildings footprints or the final location for vehicle and pedestrian access points.

Car parking is generally provided below the buildings and in certain locations extends beyond the building envelope under roads and public open spaces. These arrangements will be subject to detailed discussions at the DA stage for the various buildings and open spaces.

Building envelopes

Under the Canada Bay Local Environment Plan 2013 (as amended) Height of Building and Floor Space Ratio development standards have been established for all remaining development lots at Rhodes West.

The building envelopes described in this section allow some flexibility on the design of buildings, however the envelopes have been carefully developed in consultation with Council's Urban Design Consultant to maximise public benefit.

The envelopes have been tailored to each site, taking into consideration its particular characteristics and place making potential. These characteristics are described for each of the remaining sites in each precinct in terms of the following:

- The relationship of the building to the public domain, including street and public open space frontages;
- The desired character of parks and streets;
- The optimum development potential; and
- The environmental impact.

Building envelopes describe the building setbacks and separation distances, maximum building depths, minimum dimensions of public spaces around buildings and maximum building height.

The Urban Design Framework defines the physical outcome for the remaining development sites, whilst encouraging architectural innovation within the building envelopes indicated. The site-specific building envelope controls should be read in conjunction with the general controls for the private and public domain in *Section K17.3* of this DCP.

The building envelope controls illustrated in this section allow some latitude for the detailed architectural design of buildings. This development control is intended to promote highly articulated buildings with generous balconies, recesses and steps in facades to ameliorate a sense of excessive bulk.

Figure K17-32 Indicative Development Concept of this DCP shows the indicative development concept for all development sites combined, based on developments which comply with the development standards of the Canada Bay Local Environment Plan 2013 (as amended) and this DCP.

The Precincts

The Precincts, as defined in the Canada Bay Local Environment Plan 2013 (as amended) and the remaining development sites have been adopted from the previous planning framework (SREP 29: Rhodes Peninsula) and are as follows:

- Precinct A – Site A
- Precinct B – Site 2A, 3A, 3B, 3C and 3D
- Precinct C – Site A
- Precinct D – Station Gateway West

Figure K17-13 Rhodes West Precincts, Sites and Lots identifies the precincts, sites and lots, the subject to the site-specific design provisions of this DCP.

For each of the sites, an urban design framework is provided to illustrate the following controls:

- Building Envelope Plan and Sections
- Minimum building setbacks
- Maximum building depth
- Maximum building height
- Building articulation zone
- Location of public and private open space
- Preferred location for vehicle and pedestrian access

Figure K17-13 Rhodes West Precincts, Sites and Lots

Precinct A (Site A)

Located at the southern end of Rhodes, Precinct A has a mix of retail, commercial and residential uses. Retail uses are contained in the Rhodes Shopping Centre and at the ground floor level of some of the commercial and residential buildings fronting Rider Boulevard.

The key development controls illustrated in Figure K17-14 Precinct A Building Envelope Plan, Figure K17-15 Precinct A Building Envelope Section A-A and Figure K17-16 Precinct A Building Envelope Section B-B are as follows:

Controls	
C1.	Maximum building height ranging up to 25 storeys including a 4 storey podium.
C2.	Maximum FSR of 2.4:1 (Refer to Canada Bay Local Environment Plan 2013 (as amended)).
C3.	An area of 1,375m^2 of public open space as a town square located at the northern side of the site.
C4.	Vehicle access located off laneway between commercial building to the south and proposed building on Site A.
C5.	Preferred location for non-residential uses at ground floor to activate Rider Boulevard and new public open space.
C6.	Preferred separate entries for residential and nonresidential uses.
C7.	The edge building is to be designed to address the Town Square. The façade of the edge building must be a minimum of three storeys in height and not exceed 4 storeys before setbacks.
C8.	A minimum building setback for the tower building of 5m to Rider Boulevard and 5m from the podium alignment to the Rhodes Town Square.
C9.	The edge building should incorporate a continuous colonnade along its length and along the Rider Boulevard frontage to accommodate the significant diagonal pedestrian flows traversing the site generated by Rhodes Station.
C10.	Consideration should also be given to incorporating an arcade linking the Town Square to the footpath cycleway.
C11.	The ground floor of the edge building fronting the Town Square must have active uses such as retail, cafes and taverns.
C12.	The tower building form and design is to reinforce and not detract from the civic quality of the Town Square. Generally, this is to be achieved by observing a 5m minimum setback above the 3-4 storey street wall.
C13.	Vistas into the site from Walker Street and Servier Avenue must be acknowledged in the overall design of the project and given architectural recognition in the composition of the building façade. The vista from Mary Street, Walker Street and Rider Boulevard into the Town Square also require consideration.

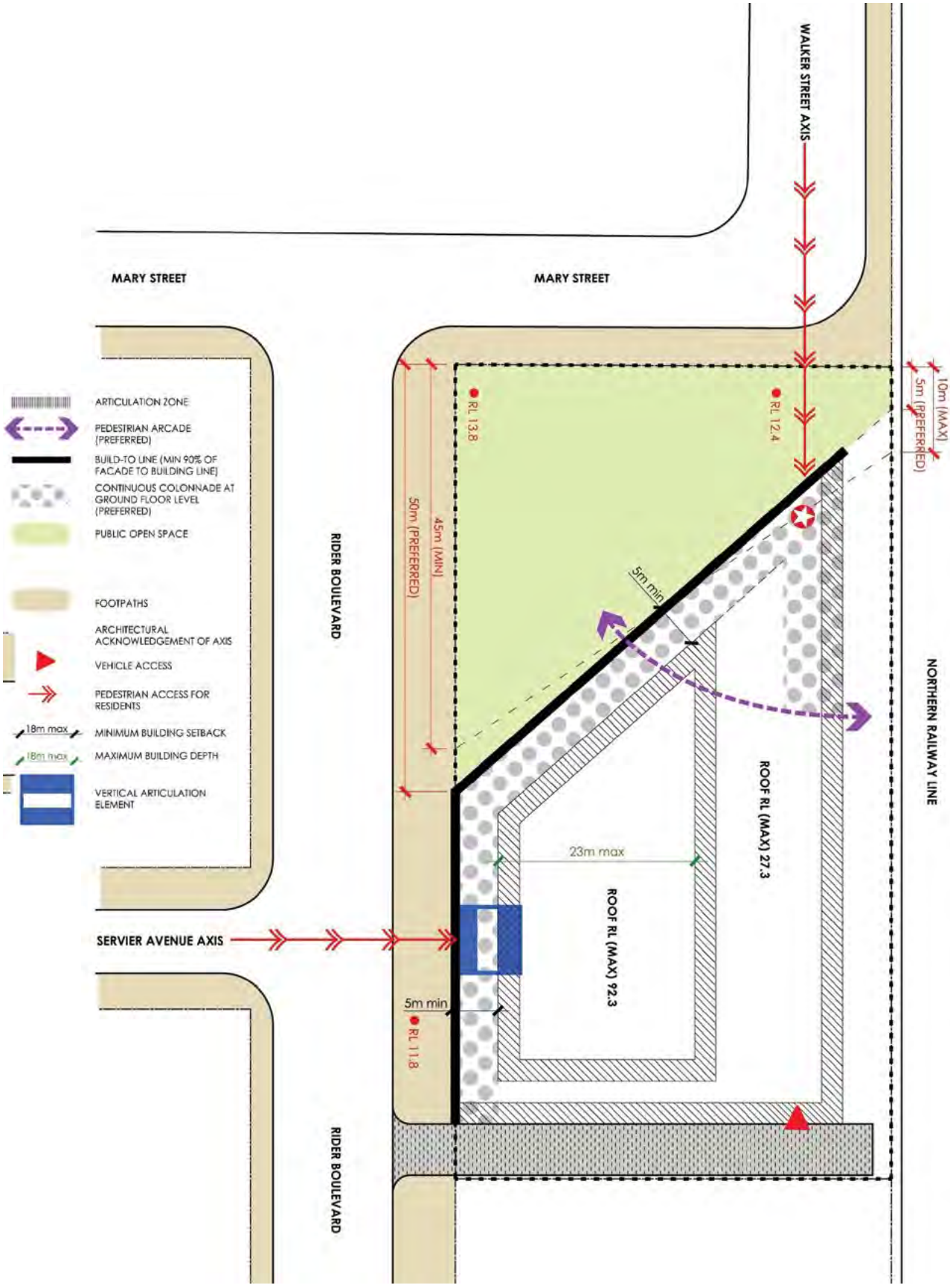


Figure K17-14 Precinct A Building Envelope Plan

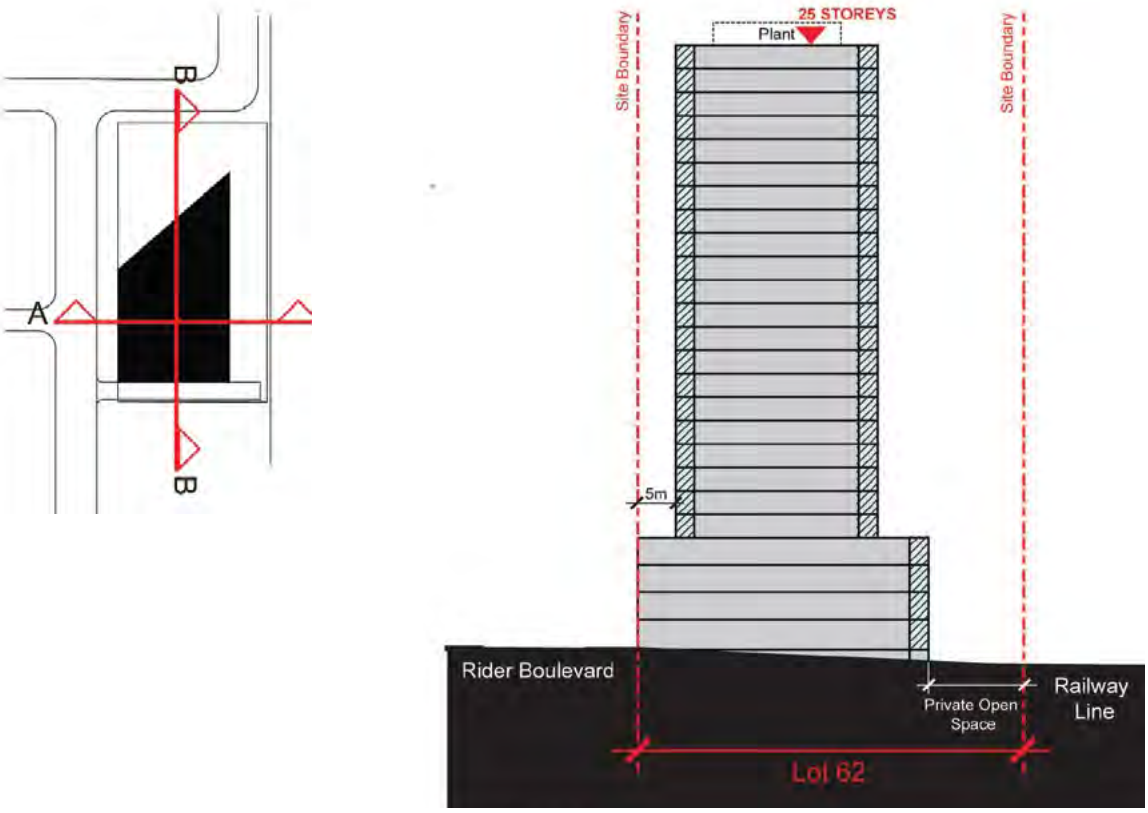


Figure K17-15 Precinct A Building Envelope Section A-A

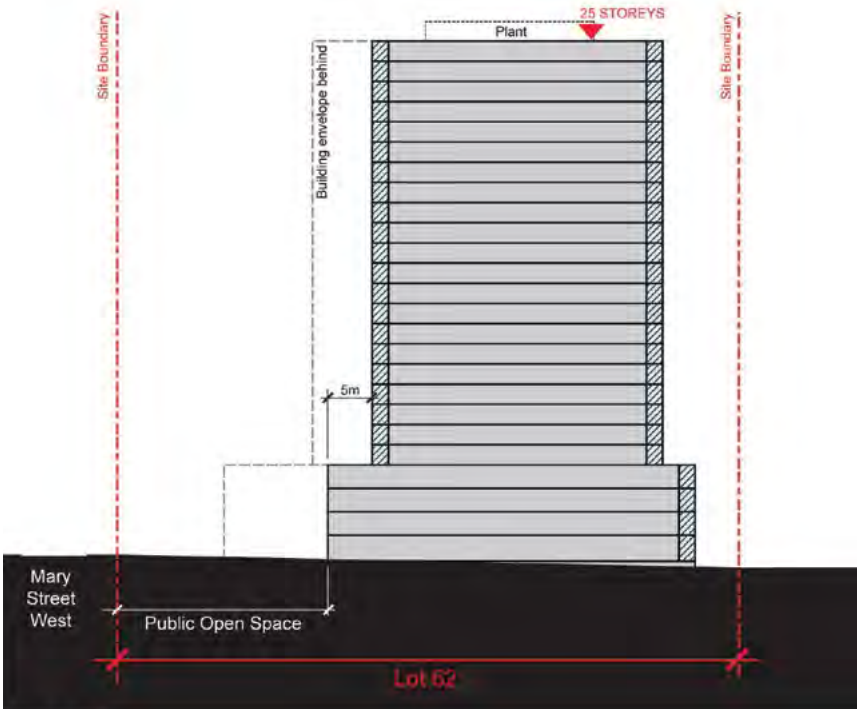


Figure K17-16 Precinct A Building Envelope Section B-B

Precinct B

Precinct B is centrally located within Rhodes West. The Precinct is 10.16 hectares in area and is planned as predominantly residential with local non-residential uses such as neighbourhood shops and cafes.

There are five remaining development sites and surrounding public domain to be developed following site remediation processes. The remaining development parcels are known as Sites 2A, 3A, 3B, 3C and 3D.

Precinct B comprises a large new local park which straddles these two land ownerships. As such the overall precinct has been considered as one Precinct Plan as illustrated in Figure K17-17 to Figure K17-20. For the purpose of describing the development controls, the separate landownership have been used.

Sites 2A + 3A

Sites 2A and 3A have a frontage to Walker Street of approximately 140m. The sites are located between Timbrol Avenue, a no-through road for vehicles and Gauthorpe Street, which provide public access from Walker Street directly to the foreshore and the planned community facilities. With the consolidation of these lots with the secondary road known as Peake Street, the provision of publicly accessible open space between tower and podium buildings is achieved.

Controls	
C1.	Building heights ranging from low-rise buildings of 4-5 storeys which frame the public open space to tower buildings in the north east corner (25 storeys), south east corner (25 storeys) and north west corner (20 storeys).
C2.	The maximum Floor Space Ratio is 2.8:1.
C3.	Car park entry is from Timbrol Avenue.
C4.	Combined with Site 3B a minimum of 16,000m^2 of public open space is required.
C5.	One level of basement car parking and one level of partially above ground car parking.
C6.	Above ground parking screened behind the street front building line to all streets and open spaces.
C7.	Preferred location for non-residential uses fronting Walker Street and the through site link open space.
C8.	Minimum building setbacks as illustrated in Figure K17-17 Precinct B Building Envelope Plan.
C9.	Separate pedestrian entries and lobbies for residential and non-residential uses.
C10.	The preferred location for non-residential uses including retail and commercial uses is along the Walker Street frontage and fronting onto the diagonal pedestrian plaza from the south east corner of the site.
C11.	The indicative alignment of non-residential frontages on the northern and southern sides of the pedestrian plaza are indicated on the building envelope plan. To avoid a ‘gun-barrel’ effect it is recommended that the alignment is to be staggered with stepping and recesses to provide pedestrian interest.
C12.	To maintain a view corridor along the diagonal alignment of Marquet Street by providing an undercroft space with a minimum height of 15m beneath the tower building in the south west corner of the site. Exposed columns are to have a high architectural design quality with a slender form and quality materials and integrated into the overall architectural design of the building.
C13.	To enhance the forecourt space at the Timbrol Avenue / Walker Street provide an undercroft space over two levels of the tower building.

Sites 3B, 3C and 3D

Sites 3B is located on the eastern side of Shoreline Drive and forms part of the new Central Park in Precinct B. This site has long frontages to both Shoreline Drive to the west and Gauthorpe Street to the south.

The new park front is to the north of Site 3B. Built form is to be located in the southern part of the site with the contribution to the new park forming the northern part of the site. Sites 3C and 3D are located on the western side of Shoreline Drive and also have a frontage to the Foreshore Reserve. These sites are divided by Peake Street, a secondary street, which provides vehicle access to basement parking on both sites. The key development controls for each of the three remaining development parcels are summarised below:

Site 3B

Controls	
C14.	A maximum height of 18 storeys above a single level podium stepping down to 15 storeys above a two level podium fronting Shoreline Drive is required.
C15.	Break up the bulk and length of the building; provide a recess in the façade of a minimum 4m in depth and length, in the location where the step in height occurs, as illustrated in the building envelope plan. Design the building as two linked buildings.
C16.	The car park entry is to be from Gauthorpe Street.
C17.	Combined with Sites 2A + 3A provide a minimum of 16,000m^2 of public open space.
C18.	One level of basement car parking and one level of above ground car parking.
C19.	Above ground parking screened behind the street front building line to all streets and open spaces.
C20.	The preferred location for the primary pedestrian entry is from Gauthorpe Street.

Site 3C

C21.	Building height ranging from 4 storeys fronting the Foreshore Reserve up to 9 storeys fronting Shoreline Drive.
C22.	Maximum floor space ratio of 2.2:1.
C23.	Car park entry from Peake Street.
C24.	Two levels of basement car parking.
C25.	All buildings with an address to a street frontage.
C26.	The design of the building fronting Shoreline Drive is to accentuate the curvilinear alignment of the street through building setbacks, façade articulation, and balcony and balustrade forms.

Site 3D

C27.	Building height ranging from 3 storeys fronting the Foreshore Reserve up to 9 storeys fronting Shoreline Drive.
C28.	A maximum floor space ratio of 2.3:1.
C29.	Car park entry from Peake Street.
C30.	Two levels of basement car parking.
C31.	Preferred location for non-residential uses fronting the community facility lot to the south.
C32.	The building on the southern boundary is to align with the Gauthorpe Street view corridor.
C33.	The building on the northern boundary is to align with the Peake Street view corridor.
C34.	Separate pedestrian entries and lobbies for residential and non-residential uses are required.
C35.	The design of the building fronting Shoreline Drive is to accentuate the curvilinear alignment of Shoreline Drive through building setbacks, façade articulation, and balcony and balustrade forms.
C36.	The central private courtyard is to provide the main pedestrian access to the parallel building fronting the Foreshore Reserve.

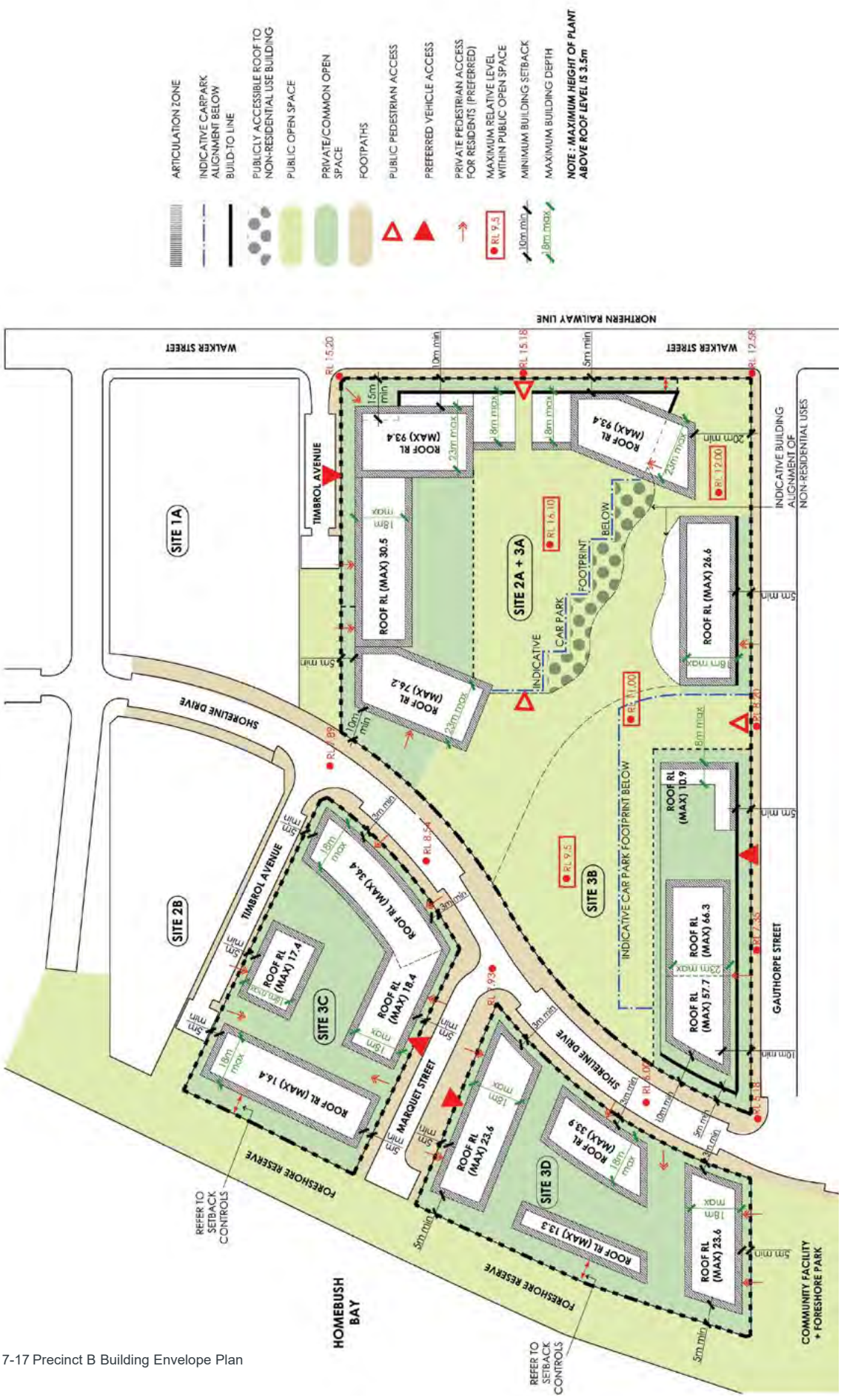


Figure K17-17 Precinct B Building Envelope Plan

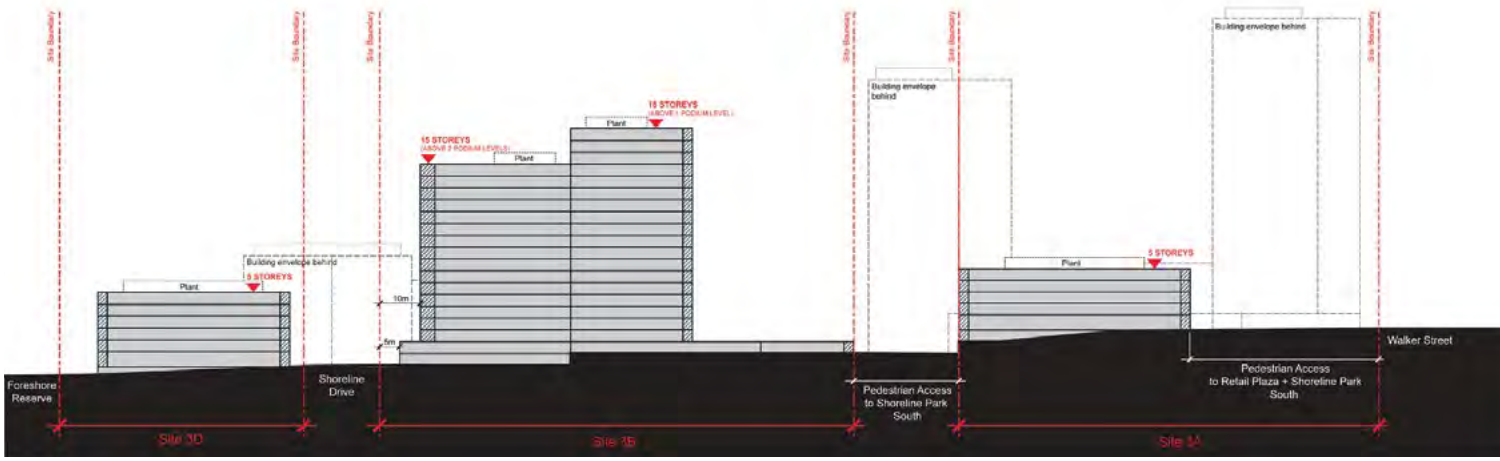


Figure K17-18 Precinct B Building Envelope Section A-A

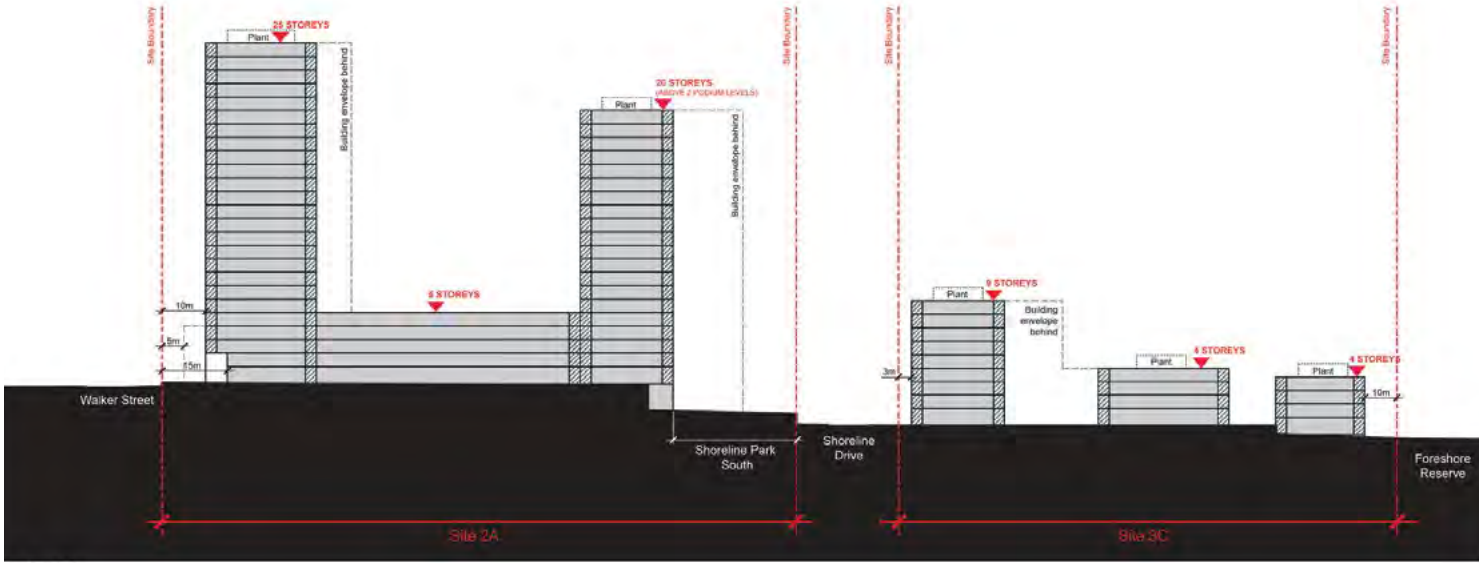
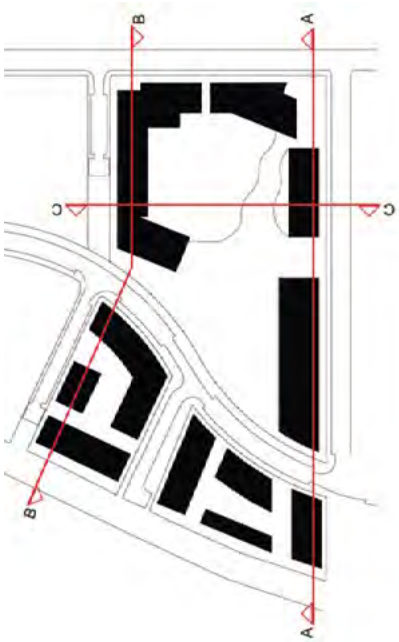


Figure K17-19 Precinct B Building Envelope Section B-B



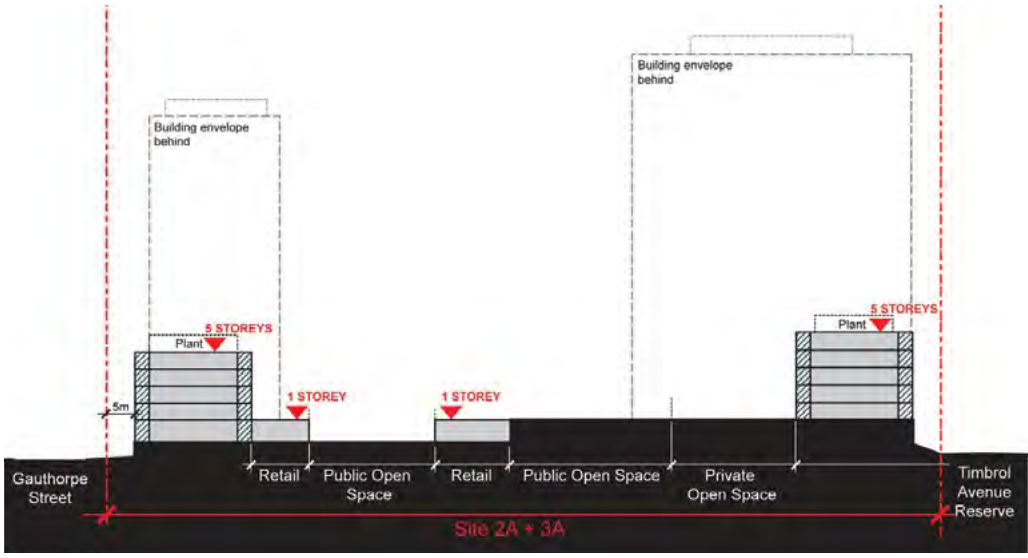


Figure K17-20 Precinct B Building Envelope Section C-C

Precinct C (Site A)

Precinct C is located at the northern end of Rhodes West. The area is predominantly a residential precinct. Two development parcels remain which are known as Site A.

The development provides an opportunity to create additional publicly accessible open space by amalgamating the lots. The open space is to be centrally located with a wide pedestrian accessible link between Walker Street and Shoreline Drive.

The development controls for the parcels are summarised below:

Controls	
C1.	Tower building in the south west corner of Site A of 25 storeys.
C2.	Tower building in the north western corner of Site A of 25 storeys.
C3.	Lower-rise buildings of 6 and 7 storeys fronting Shoreline Drive and Walker Street.
C4.	Single storey building on the corner of Walker Street and Nina Grey Avenue as a podium to the tower building above.
C5.	Building setback controls as illustrated in Figure K17-21 Precinct C Building Envelope Plan, Figure K17-22 Precinct C Building Envelope Section A-A and Figure K17-23 Precinct C Building Envelope Section B-B including: • Tower buildings are setback 10m from Walker Street and Shoreline Drive street frontages • Lower rise buildings are to align with the street frontages with a minimum of 5m setback to provide adequate space for ground level garden courtyards fronting the street
C6.	Vehicle access is to be provided from Nina Grey Avenue.
C7.	A minimum of 4,600m^2 of public open space to be provided in a linear alignment between Walker Street and Shoreline Drive.
C8.	The preferred location for non-residential uses including local shops to be provided fronting onto the public open space with a northern aspect with good sunlight access, close to Walker Street.

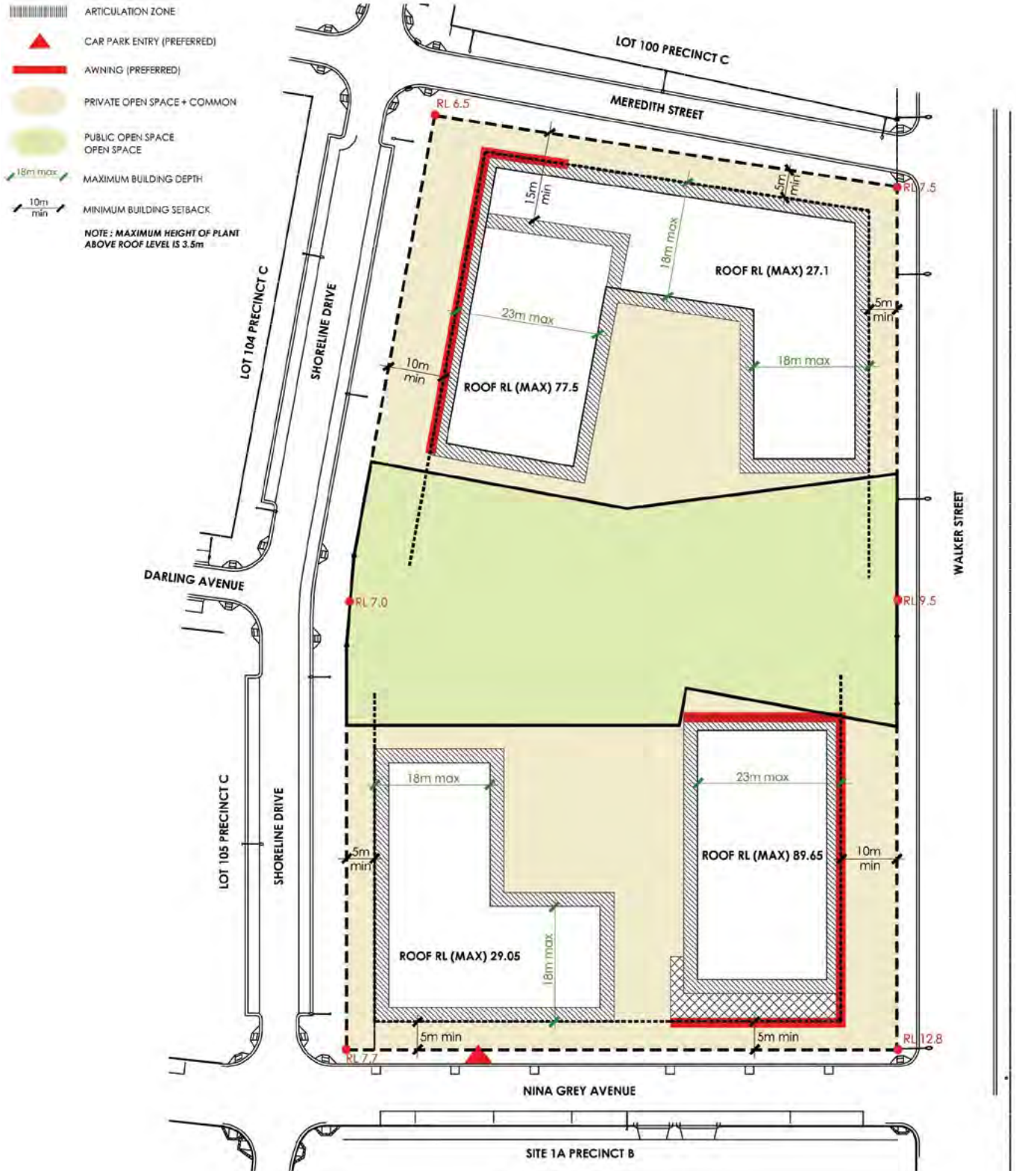


Figure K17-21 Precinct C Building Envelope Plan

Figure K17-22 Precinct C Building Envelope Section A-A

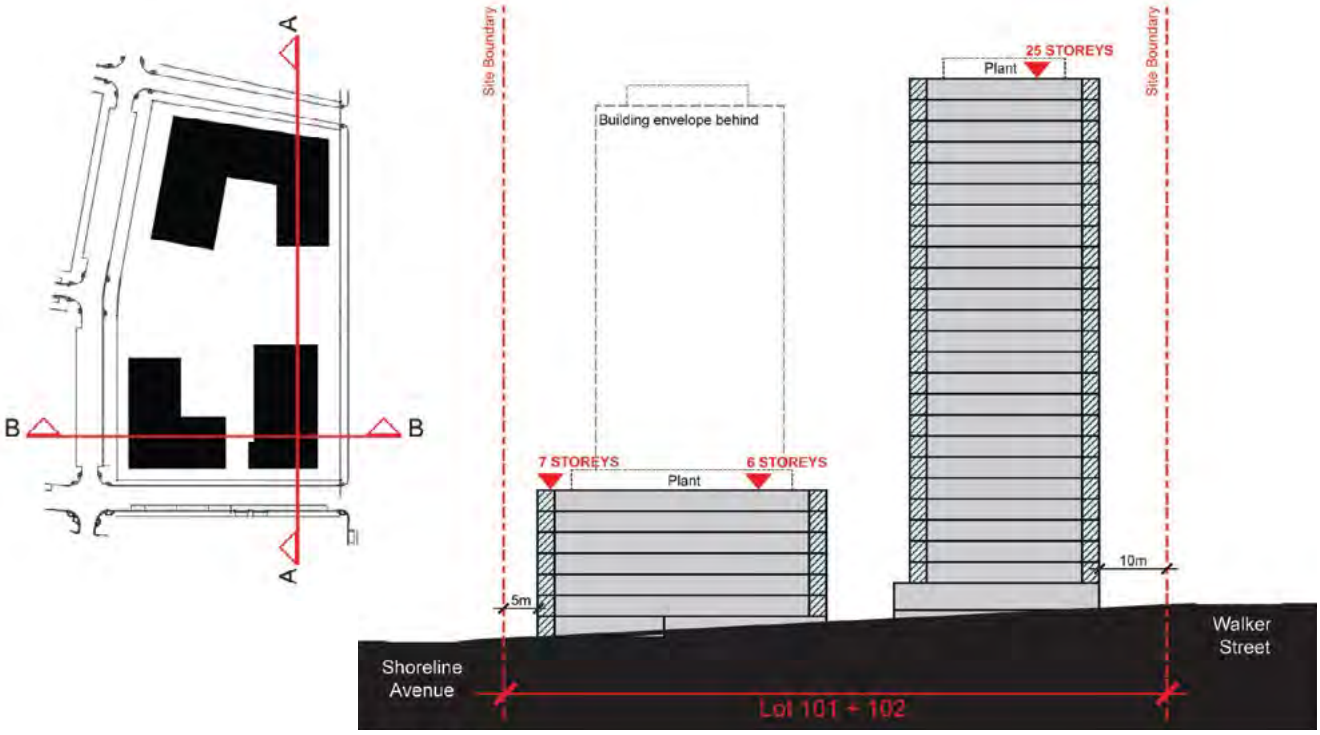


Figure K17-23 Precinct C Building Envelope Section B-B

Precinct D (Station Gateway West)

The Station Gateway West Masterplan (CM+, November 2014) was prepared to inform the planning framework for the Station Precinct and is supported, and superseded in some cases, by the Station Gateway West Master Plan (Hatch Roberts Day, August 2021). Precinct D, known as Station Gateway West, is located next to Rhodes Station, and is bounded by Walker Street, Marquet Street, Mary Street West and Gauthorpe Street. Refer "Figure K17-25-28".

Rhodes West has the potential to grow as a true Transit Oriented Development, adjacent to the waterfront, connected to surrounding communities and metropolitan Sydney. A mixed use precinct that includes residential, commercial and social places.

Station Gateway West will be completed as a place- led urban destination, reflective of and, building upon the original Master Plan intent. The delivery of additional public benefit and amenity to support the urban context and transit importance of the Precinct has driven the design process. The development capacity, height and form of development at Station Gateway West respects the ground plane amenity and demonstrates realisation of the best practice criteria.

Fine grain podium and tower building typologies will activate a connected public space network of forecourts, transit plazas and pedestrian laneways. The podiums will contribute to pedestrian comfort, provide greening opportunities and define a legible ground plane guiding residents and visitors to and from key destinations.

The shape, variety and siting of buildings will contribute to the gateway character of Station Gateway West whilst providing a visually interesting skyline with visible sky from important vistas across the Peninsula.

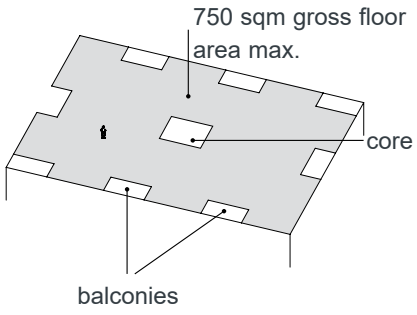
Critically, the Station Gateway West Master Plan future-proofs:

- the site itself for optimum connectivity, urban open space and residential amenity, and
- the surrounding area, with a particular focus on not compromising existing public spaces and facilitating embellishment and improvement of the public realm and infrastructure.

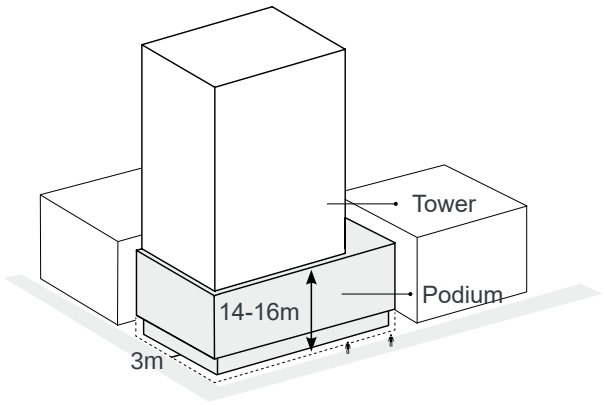
The architectural expression, is envisaged to be contemporary, exhibiting a sophistication, lightness and transparency in detailing. The public domain paving, lighting, furniture, signage, materials and finishes, and landscaping will be a seamless continuation of the public domain of the surrounding streets and squares. A highlight of the public domain will be the incorporation of engaging, relevant and place specific public artwork and installations, drawing themes from the history of the place, and from cultural cues, as well as looking to the future.

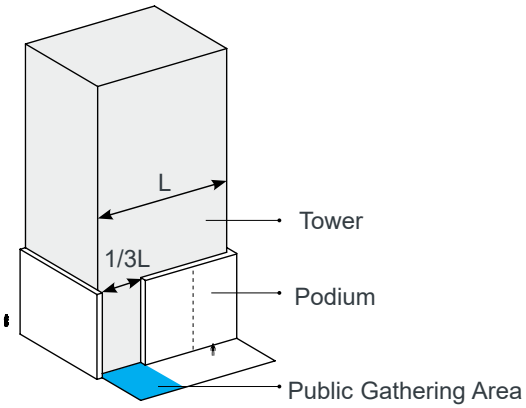
Controls	
C1.	The maximum permissible building height on the subject sites are defined in the Canada Bay Local Environment Plan. Building height reaches 159 metres (equivalent to 45 storeys) adjacent to Rhodes Station and steps down to the west and south. Refer to Figure K17-25 Precinct D (Station Gateway West) Master Plan and the building envelope sections in Figures Figure K17-26 to Figure K17-31.
C2.	The maximum Floor Space Ratio (FSR) is defined in the Canada Bay Local Environment Plan 2013.
C3.	The mid-block is to provide a fine grained network of plaza's and laneways, creating a permeable city block.
C4.	Pedestrian connections, through a series of new urban places and plazas between Rhodes Station, to Marquet Street, Mary Street and Annie Leggett Promenade to the waterfront are required. Additional north-south retail laneway connections between Town Square and the new Recreation Centre are also required. Refer to Figure K17-25 Precinct D (Station Gateway West) Master Plan.

C5.	Consistent with the Objectives and supplementing SEPP 65, building-to building setbacks within the Precinct are to achieve the following separation controls: 15 - 20 storeys - 24m Above 20 storeys - 40m
C6.	Towers above 20 storeys are to provide a 4 storey differential in building height.
C7.	Residential towers above podium level shall have a maximum gross floor area of 750 square metres as per diagram opposite. The two towers at 34 Walker Street can be developed following the existing/approved floor plate, subject to demonstration design quality in accordance with the requirements of the Apartment Design Guide and this DCP.
C8.	A minimum podium height of approximately 14-16m building height is required.
C9.	A tower and podium building typology is required, subject to the following outcomes: a) A ground floor setback of 3m is to be provided. b) A Podium to Tower setback of 4m is to be provided. c) Maximum 1/3 of a tower frontage along a street or public space can be extended down to the ground. Public gathering areas must be associated with the 2/3 of the façade that is grounded by a podium.



(Above) Maximum gross floor area of 750 square metres



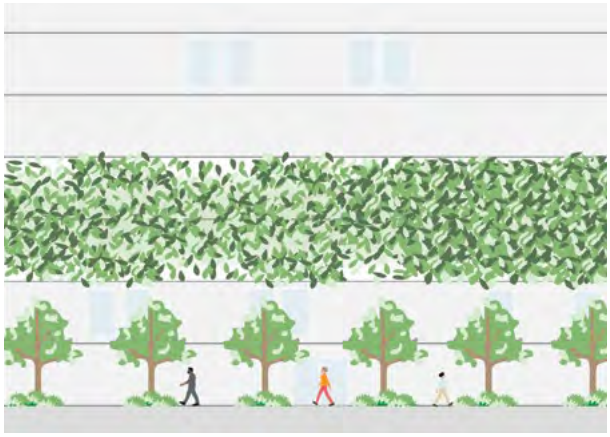


C10.	The street wall has a maximum continuous frontage of 45m. Facades longer than 45m are to have a recess of a minimum of 3 x 3 meter and provide other means in the visual composition to break up overly bulky buildings. The composition and detailing of a facade is important to the appearance of the building and influences its perceived scale. Well designed facades reflect the use, internal layout and structure of an apartment building.
C11.	A minimum of 60% street frontage is dedicated to active retail uses. All building fronting a street will have 15-20 doorways per 100m of a façade.
C12.	A tower Setback Line applies to all new property frontages and is a minimum of 4m.
C13.	A Build-to-line with a zero setback is required for the mid-block laneways and plaza. Laneway width is 8-12m and minimum plaza width is 20m. Laneway width is subject to performance requirements to accommodate: • Sufficient space to accommodate sufficient clear width, swept path and height for emergency vehicle access as required by the NSW Fire Brigade and NSW Ambulances and other day-to-day service vehicles required to maintain the central oval plaza and laneway public domain and as necessary to service businesses • Planting of mature trees in the laneways and central oval plaza as illustrated in the Public Domain Concept Plan (Context Landscape Design 2014) • Provision of outdoor dining zones associated with cafe, bar and restaurant tenancies • Projecting shop or other signage
C14.	Through site links and laneways are to have clear line-of-sight from Precinct D to Annie Leggett Promenade, with buildings setback to the same distance as buildings fronting Annie Leggett Promenade.
C15.	Union Square must not receive any additional overshadowing from new development between 9.00am and 2.00pm on the Winter Solstice. Peg Patterson Park must not receive any additional overshadowing from new development between 12.00pm and 2.00pm on the Winter Solstice. Mcilwaine Park must not receive any additional overshadowing from new development between 8.30pm and 12.30pm on the Winter Solstice. Turfed area within Mcilwaine Park must not receive any additional overshadowing from new development between 8.00am - 2.00pm on the Winter Solstice.
C16.	Provide a taxi rank, kiss-and-ride drop-off and pickup bay and disabled parking spaces in proximity of the Rhodes Station on Walker Street.
C17.	Bus bays relocated and expanded along eastern and western edges of Walker Street to accommodate the projected increase in patronage.
C18.	Maximise pedestrian amenity by providing bus shelters and building awnings for weather protection from Rhodes Station to the bus interchange.

C19.	Buildings are designed to minimise wind impacts to new areas of open space without the need for roofs or canopy structures. Any proposed development must demonstrate that a sufficient level of 'Wind Comfort Standard for Sitting in Parks' (in accordance with Lawson Wind Comfort Criteria) is achievable without the need for any open space cover or mitigation measures other than the design of the building itself. Maximum awnings coverage consistent with the Station Gateway West Master Plan (Hatch Roberts Day, August 2021) and Figure K17-11.
C20.	A single overhead connection from the development to the Station Concourse with a pedestrian bridge over Walker Street is permitted subject to a high level of urban design and architectural quality being achieved. A pedestrian bridge should appear light and slender in design and maximise Walker Street openness and vistas. The proposed pedestrian bridge over Walker Street is to meet the following requirements: • TfNSW and Sydney Trains specifications for access to a station (including design for growth and 24/7 access for the public) • Disability Standards for Accessible Public Transport 2002 • Vertical transport and commuter access to buses on both sides of the roads and station • In accordance to safety regulations set by NSW Police and their CPTED 'Safer by Design' principles
C21.	Proponents are to address the provision of cycle routes, crossings and parking facilities in relation to Station Gateway West, including at Rhodes Station and at key precinct destinations. Refer to section A.2 Cycle Strategy and to Figure K17-6 Rhodes West Cycle Strategy.
C22.	Restrict vehicular and servicing access to the midblock to ensure for a safe, pedestrian prioritised network of mid-block laneways and plazas to thrive.
C23.	Major truck and service vehicle access to Station Gateway West basements is preferably from Walker Street and Marquet Street at the preferred locations identified in Figure K17-12.
C24.	Consolidate wherever possible, vehicular entry points to Station Gateway West development and ensure good sight lines at pedestrian cross-overs.
C25.	Maintain fire and emergency vehicle access via one or more laneways, as required by emergency service authorities.
C26.	A minimum of 4,000 sqm of publicly accessible open space to be provided within the Precinct. The open space allocation shall be distributed as per Figure K17-4. New publicly accessible open spaces on Marquet St and Walker St must achieve 2h of solar access on 50% of its area between 9.00am and 3.00pm on the Winter Solstice.
C27.	Public plazas are required to be open to the sky and unobstructed, except for certain permitted obstructions such as planting, seating, and other plaza amenities.
C28.	The street interface of a public plaza is required to have a minimum 50% of its area free of obstructions. Plazas that front on a street intersection are required to maintain a clear area within 5m of the intersection. The remaining 50% of the sidewalk frontage may contain obstructions such as fixed and movable seating, plantings and trees, light poles, public space signage, litter bins or other design elements that are permitted within public plazas.

C29.	Marquet Street Forecourt must be designed to have: • A minimum width of 10m for the entire street frontage, • An average length of 20m, • A minimum clear usable space of 20 x 20m (the major portion) • 2hrs of sun over 50% of the space (9am-3pm) • Awning/ cover limited to 1m in addition to the 3m ground floor setback (establishing an in-built awning) on new building podiums. • The main portion of the space is termed the “major portion” of the public space and must account for at least 75% of the public area. The smaller areas are then considered to be “minor portions” and are limited to no more than 25% of the public area. Refer to Figure K17-25 for spatial explanation.
C30.	Walker Street Transit Plaza must be designed to have: • A minimum width of 6.5m for the entire street frontage, • Clear and direct link to the Gateway West Pedestrian Laneways • 2hrs of sun over 50% of the space (9am-3pm) • No additional awning/ cover to that of the 3m ground floor setback (establishing an in-built awning) on new building podiums Refer to Figure K17-25 for spatial explanation.
C31.	On site landscape replacement must be provided as the equivalent or more of the total site area. Landscape replacement can be provided through the following: - Vertical and facade greening. - Rooftop greening and greening of communal podium spaces. - Public open space, through site links within the site boundary.

C32.	All development must contribute to and demonstrate a 25% Green View Index using the methodology outlined in Figure K17-24 and described below. The Green View Index (GVI) is a numerical value given to the amount of green canopy and landscape perceived by an individual at street level. Tree canopies, understorey vegetation, and facade greening are the three primary contributors to the GVI. The GVI target for Station Gateway West (Precinct D) is 25%. To achieve this, the design of streets and new developments must include an objective assessment of the GVI value achieved, using the following method: • Where tree canopies and understorey vegetation do not achieve the GVI target, facade greening is required to the extent necessary to achieve the minimum requirement.
C33.	• NOTE: for the purposes for the purposes of calculation GVI at street level, a standard height of 14m above ground level has been set, consistent with the podium height. • A mix of small (<7m canopy), medium (7-15m canopy), and large (15m + canopy) trees is required, appropriate to the scale of spaces and building interfaces.



- Small full canopy trees, spaced at 5m centres
- Understorey planting at base of tree (understorey planting at 0.6m high)
- Extensive facade greening

- Medium trees spaced at 8m centres
- Understorey planting at base of tree (understorey planting at 0.6m high)
- Medium facade greening

- Large Tree spaced at 10m centres
- Understorey planting at base of tree (understorey planting at 0.6m high)

- Medium foreground trees spaced at 8m centres.
- Understorey planting at base of tree (understorey planting at 0.6m high)
- Possible where there is widened verge or open space to the streetscape

- Medium foreground trees spaced at 3-5 m centres for plazas and parks.

Figure K17-24 Tree Canopy Strategy

Public domain

The urban and landscape design of Station Gateway West is guided by the following Public Domain Principles:

C34.	Provide a raised threshold pedestrian crossing to Rhodes Station, across Walker Street, that: • Encompasses and connects the future bus interchanges on either side of Walker Street, • Has the same materiality and treatment as the future Walker Street Transit Plaza and is flush (no kerbs), • Integrates a cycleway along the eastern side of Walker Street connecting north and to the Station. Provide a raised threshold pedestrian mid-point, across Marquet Street, to Annie Leggett Promenade.
C35.	Provide generous through-site pedestrian links (as shown in Figure K17-25 Precinct D (Station Gateway West) Master Plan) with tree planting arranged to maximise views into the mid-block, and taking into account of access and safety considerations.
C36.	Wherever possible provide active edges along all pedestrian passageways and around the proposed plaza.
C37.	Central Oval Plaza – this is an opportunity for a flexible, simple and uncluttered space, with minimal and carefully chosen landscape, furniture, lighting and artwork. The plaza and laneways are a focus for cafes, small daytime events, community activities and temporary markets.
C38.	There is an opportunity to integrate a water feature within the Station Gateway West plaza.
C39.	Provide new street trees in surrounding streets – Gauthorpe, Marquet, Mary and Walker Streets.
C40.	Celebrate the Walker Street and Marquet Street entry plazas to the precinct with groves of distinctive palm trees.
C41.	Integrate Walker Street public domain generally in accordance with Council's Public Domain Concept Plan.
C42.	Integrate public art and feature lighting into the public domain – opportunities include embedded artwork in the paving or sculptural installations, as a focus in the entry plazas, and in the central oval plaza – to entice pedestrians to the 'heart' of the precinct.
C43.	Integrate sustainability and WSUD initiatives in the designated public domain.
C44.	Integrate the Station Gateway West paving, furniture, lighting and materials and finishes, seamlessly with the adjoining Rhodes Peninsula public domain.
C45.	Through-site links are crucial to creating a continuous pedestrian and green network within Gateway Rhodes West. The proposed through-site links must: • Provide uninterrupted views through the links between Marquet and Walker Street. • Allow for continuous 3m wide (minimum) pedestrian through zone within the minimum laneway width established within the Master Plan and this DCP. • Outside of the 3m pedestrian zone, provide trees along the length of link, spaced to achieve a continuous canopy of shade when mature. • Provide public furniture integrated into the space, co-located with building entries and key nodes where appropriate.

C46.	Assure CPTED principles are implemented to ensure reduced opportunities for crime. Public spaces: • should be designed to support natural surveillance Through-site links: • Must have uninterrupted views between Marquet St and Walker Street • Must provide direct visual connection to Annie Leggett Promenade • Must be provided as part of the public domain • Must provide visible, unobstructed and easily distinguished entries to buildings
C47.	All public space design must adhere to the Australian Standard Design for Access and Mobility (AS1428). • Public plazas should generally be located at the same level of adjoining public domain. Minor changes in elevation, not to exceed 0.6m above the level of the adjacent area, are permitted • Plazas should generally not be sunken below street level • Step risers must be no less than 100mm, and no greater than 150mm (exception can be made for vanishing steps) • Seating steps shall be in the range of 150mm-500mm
C48.	Circulation paths must be designed to ensure ease of access to and within public space. For optimal outcomes: • Circulation paths must be a minimum of 2.4m in width and extend to a minimum of 80% of the depth of the space • Trees planted flush-to-grade, light poles, public space signage, and litter bins are permitted within circulation paths, However, 1.8m of continuous path must remain clear of fixed furniture elements at all times • Circulation paths must have a cross-fall no greater than 2.5%
	• Garage entrances, driveways, parking spaces, loading berths, exhaust vents, mechanical equipment, and building bin storage facilities are prohibited within all public plazas • Any such elements located adjacent to a public plaza are required to be screened or concealed from view. Vents and mechanical equipment are prohibited on any adjacent building walls within 5m of the level of the public plaza. Air intake vents and intake shafts, are permitted within public plazas if they are incorporated into plaza design features and do not impair visibility within the plaza
C49.	Union Square must not receive any additional overshadowing from new development between 9.00am and 2.00pm on the Winter Solstice. Peg Patterson Park must not receive any additional overshadowing from new development between 12.00pm and 2.00pm on the Winter Solstice.

C50.	The configuration, location and diversity of seating available should be considered to ensure social interactions can be undertaken in a safe and comfortable manner. Seating requirements: • At least 1 linear metre of seating must be provided for every 30m^2 of plaza space. • Movable seating for cafes may constitute up to 50% of the seating requirement, and may be stored outside of trading hours • Up to 50% of seating may be informal (e.g. low walls/bleacher steps). To create an active street edge a portion of the required seating must be provided within 5m of the street boundary. A minimum 1 lineal meter of seating for every 2 lineal meters of street frontage is required. To ensure that this seating is comfortable and engages the public by being oriented toward the street, 50% of such seating is required to have backs, and 50% of the seats with backs are required to face the street. To provide variety, the public plazas are required to provide at least 3 different seating types, with moveable seating one of the three required seating types. A substantial proportion of seats in a plaza should have backs to facilitate comfort and usability by people of all ages and abilities. To ensure sufficient variety in seating types in the public plaza, seating steps and walls are limited to no more than 15% of the total required seating in the public plaza. Seating must be minimum 450mm depth, and in the height range of 400mm to 500mm. To allow for generous plantings, seating provided on planter ledges are required to be at least 550mm deep.
C51.	Spikes, rails, or deliberately uncomfortable materials or shapes, placed on any surfaces that would otherwise be suitable for seating are prohibited within public plazas. Devices incorporated into seating that are intended to prevent damage caused by skateboards are generally permitted. Such deterrents are required to be spaced at least 1.5m apart from one another, be constructed of high-quality materials that are integrated with the seating design, and should not inhibit seating.
C52.	Bollards should only be included where it is necessary to discourage vehicle movement. They must not be perceived as a pedestrian barrier. They should only be used as an element of access control. Bollards are recommended where trafficable areas adjoin flush with public spaces (e.g. plazas). In alignment with best practice, a variety of bollards can be used. This includes bollards that contain planting, removable bollards, fixed bollards and bollards as seating elements.
C53.	Requirements for general waste and recycling bins are to be as directed by Council. All waste facilities are to be located within 15m of seating and gathering spaces. Visual appearance and impacts of smell should be carefully considered when locating waste facilities.
C54.	All signage in public space must be visible and legible. Signage design (i.e. font, colour and shape) should be aligned with the greater public domain elements palette. Where required by Council, wayfinding and signage are to integrate digital technologies.

C55.	Public art can serve an important role turning spaces into places, giving people reason to stop and engage with the public domain. It can also celebrate cultural and environmental diversity and instill a sense of belonging. A site specific Public Arts Plan is to be prepared by an arts and cultural planner and will be required to address the following: • Identify opportunities for the integration of public art in the proposed development • Identify themes for public art • Durability, robustness and longevity of the public art • Demonstrate how public art is incorporated in the site and built form design • Demonstrating that the scale of the public art is appropriate and proportionate to the development and thoughtfully sited & integrated with the building to create a point of interest and define the location of area • The proposal should also provide a program for installation and integration with the construction program for the development Public art must be delivered in accordance with City of Canada Bay's Public Art Plan.
C56.	To ensure a vibrant and visually appealing public space consideration must be given to the treatment of adjoining walls and facades. • Any building entry must be clear and legible. The entries must be unobstructed within 5m of entry • Walls required for planters or to mitigate changes in grade must not be visually or spatially intrusive on the space, and most be designed to a comfortable seating height wherever possible • Blank building walls or facades facing onto public space must be treated with public art or screened with vertical planting to a minimum height of 5m above the ground
C57.	Large plazas can are to accommodate a more varied palette of design features. Potential additional amenities include water features, such as fountains or reflecting pools; children's play areas; game tables; and food service, such as open air cafés, kiosks, or food service in adjacent retail spaces. The design must consider incorporating at least 2 of these elements at a scale and location appropriate to each plaza space. Any proposals must take into consideration existing amenities in the surrounding area.
C58.	To encourage greater landscaping variety and to prevent plazas from being excessively hard-surfaced, public plazas are required to be comprised of at least 20% planted areas, in the form of planting beds, ground cover or accessible lawns. To ensure visibility throughout the space, bounding walls for planters or planting beds cannot exceed 450mm in height.
C59.	At least 50% of required trees should be planted either flush-to-grade or within at-grade planting beds. When planted flush-to-grade, the trees must be surrounded by a porous surface at least 1.5m in width that allows water to penetrate to the tree roots while at the same time accommodating pedestrian circulation. Trees provided in planting beds are required to have a minimum of 1.5m square of porous area, such as mulch or planted area to allow for water penetration. Trees must be located in deep soil areas wherever possible. If on structure, trees must be provided soil depth and volumes in accordance with the NSW Department of Planning Apartment Design Guide. Designs should consider the use of deciduous trees where appropriate for solar access in the cooler months.
C60.	All public open spaces should seek to integrate Water Sensitive Urban Design (WSUD) and other sustainability initiatives.

Additional Referral Requirement

C61.	Requirement for a Development Approval is subject to a Sydney Airport 'Operate Equipment' Approval. Information required by Sydney Airport prior to any approval is to include: • The location of any temporary structure or equipment, i.e. construction cranes, planned to be used during construction relative to Mapping Grid of Australia 1994 (MGA94); • The swing circle of any temporary structure/ equipment used during construction; • The maximum height, relative to Australian Height Datum (AHD), of any temporary structure or equipment i.e. construction cranes, intended to be used in the erection of the proposed structure/ activity; and • The period of the proposed operation (i.e. construction cranes) and desired operating hours for any temporary structures.

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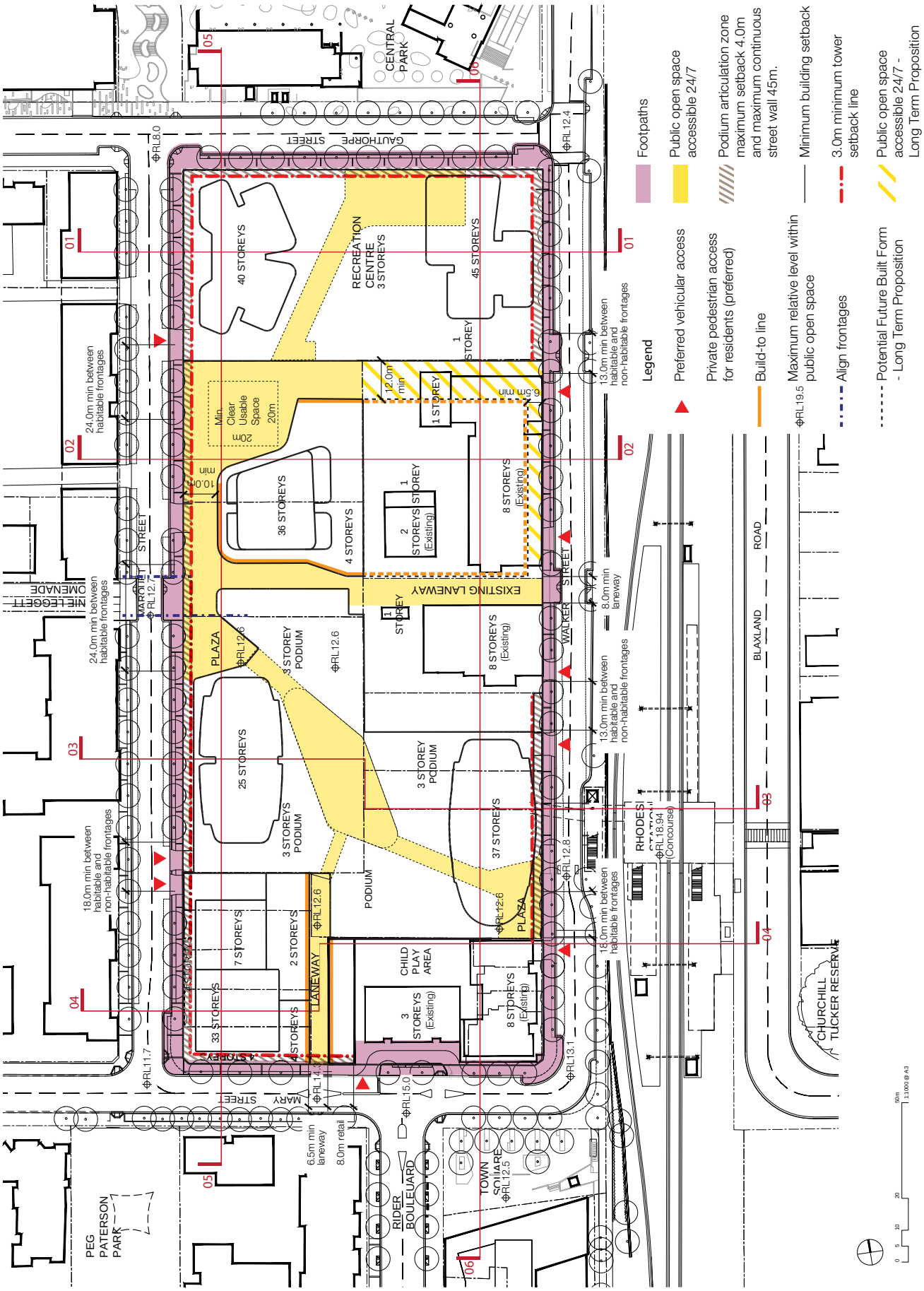


Figure K17-25 Precinct D (Station Gateway West) Master Plan

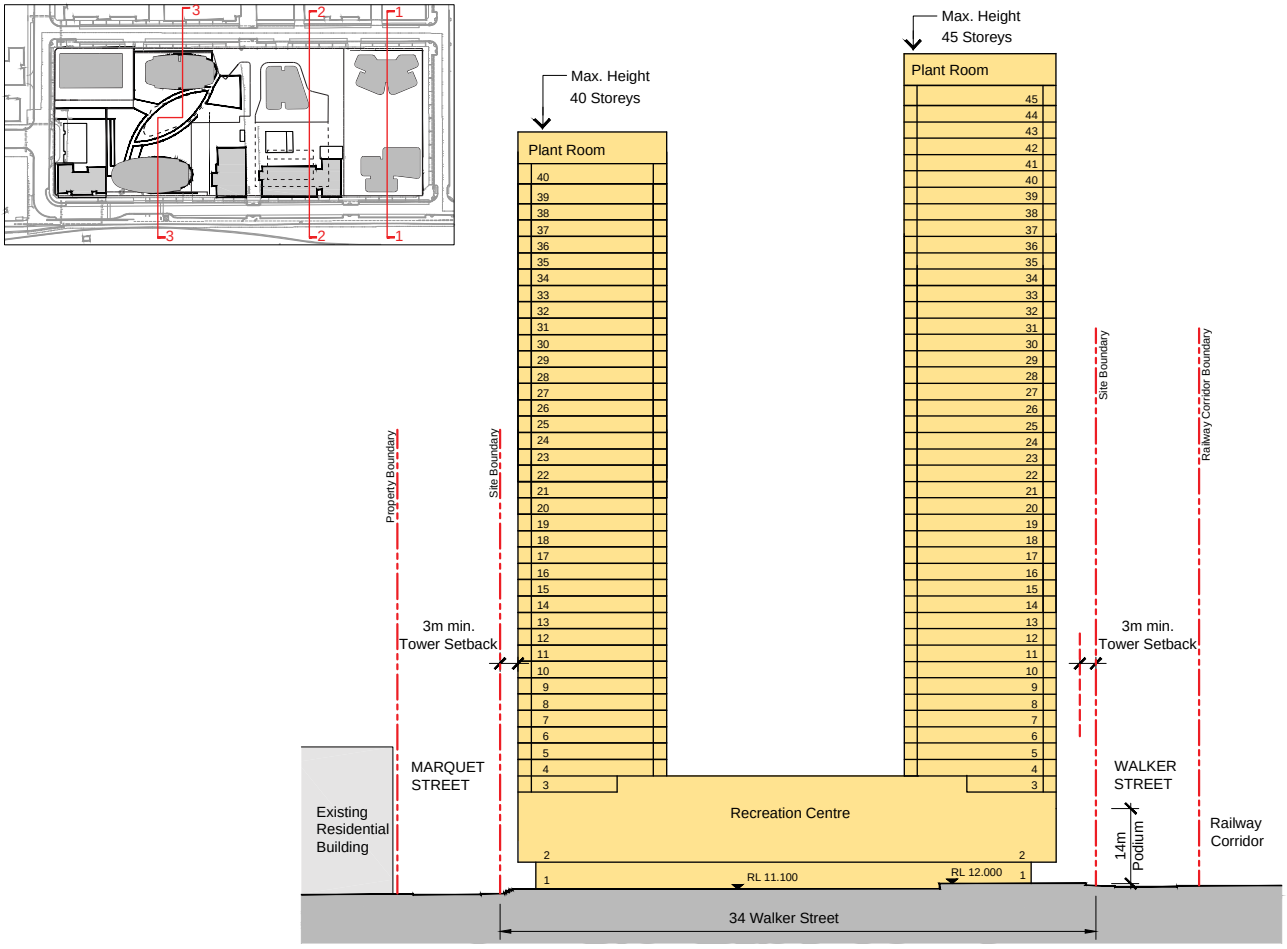


Figure K17-26 Precinct D - Section 1-1

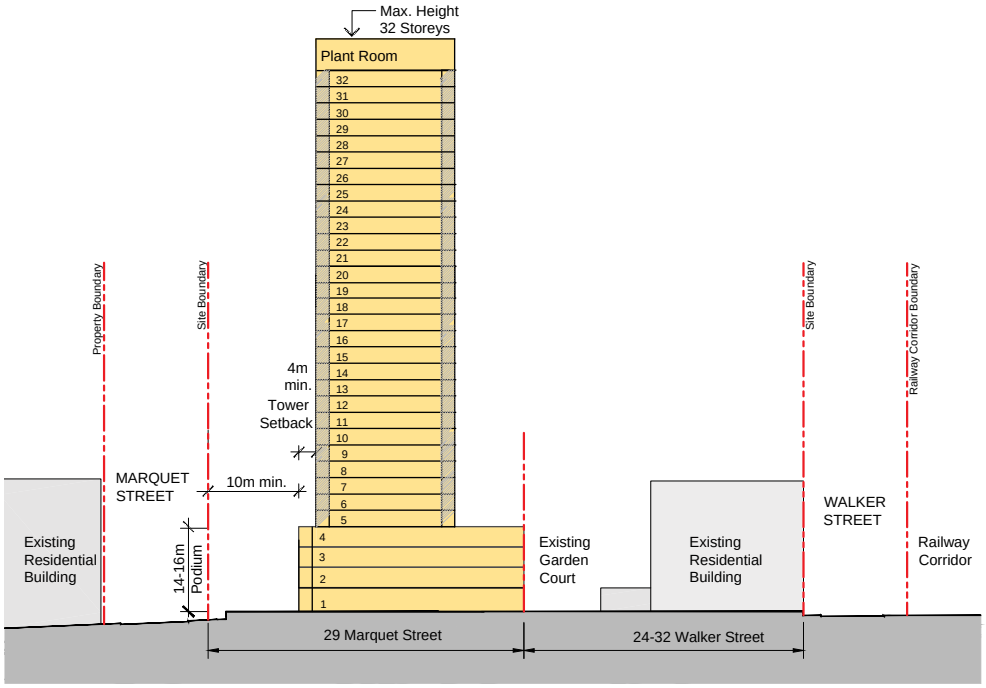
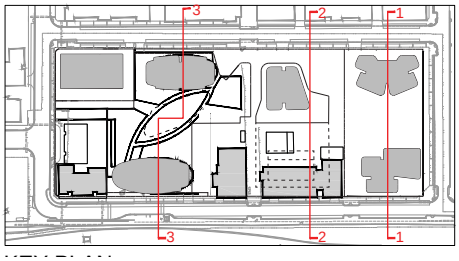


Figure K17-27 Precinct D - Section 2-2



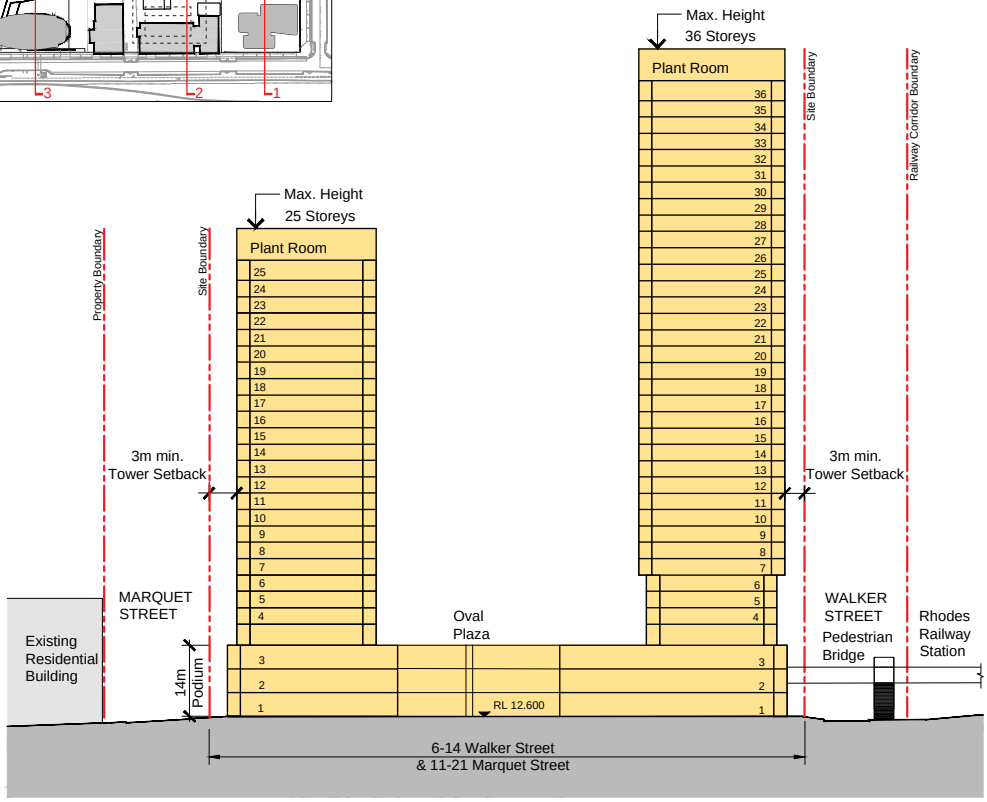


Figure K17-28 Precinct D - Section 3-3

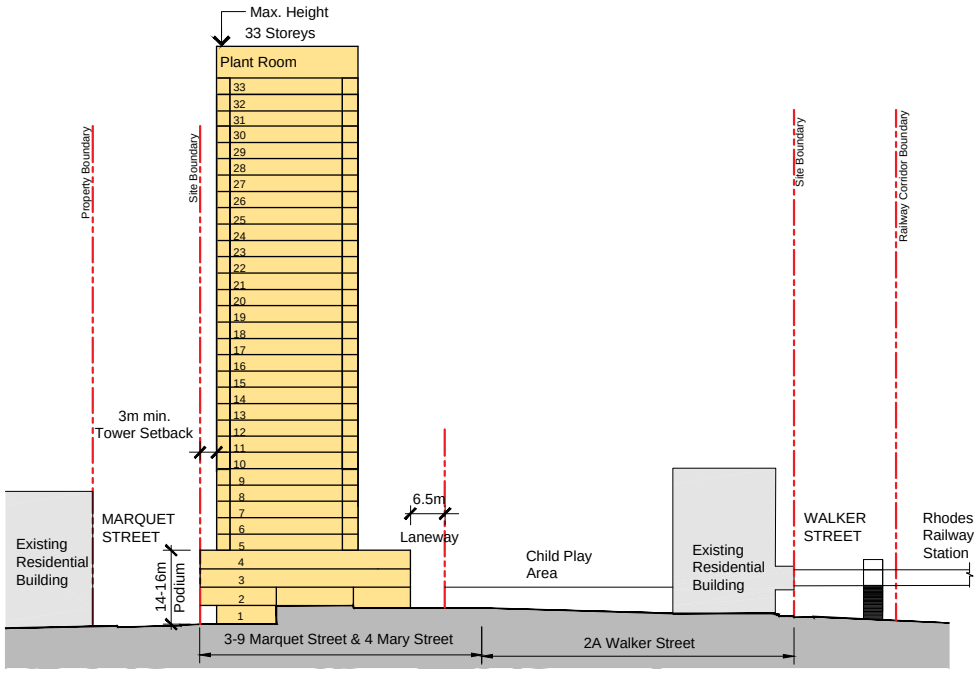


Figure K17-29 Precinct D - Section 4-4

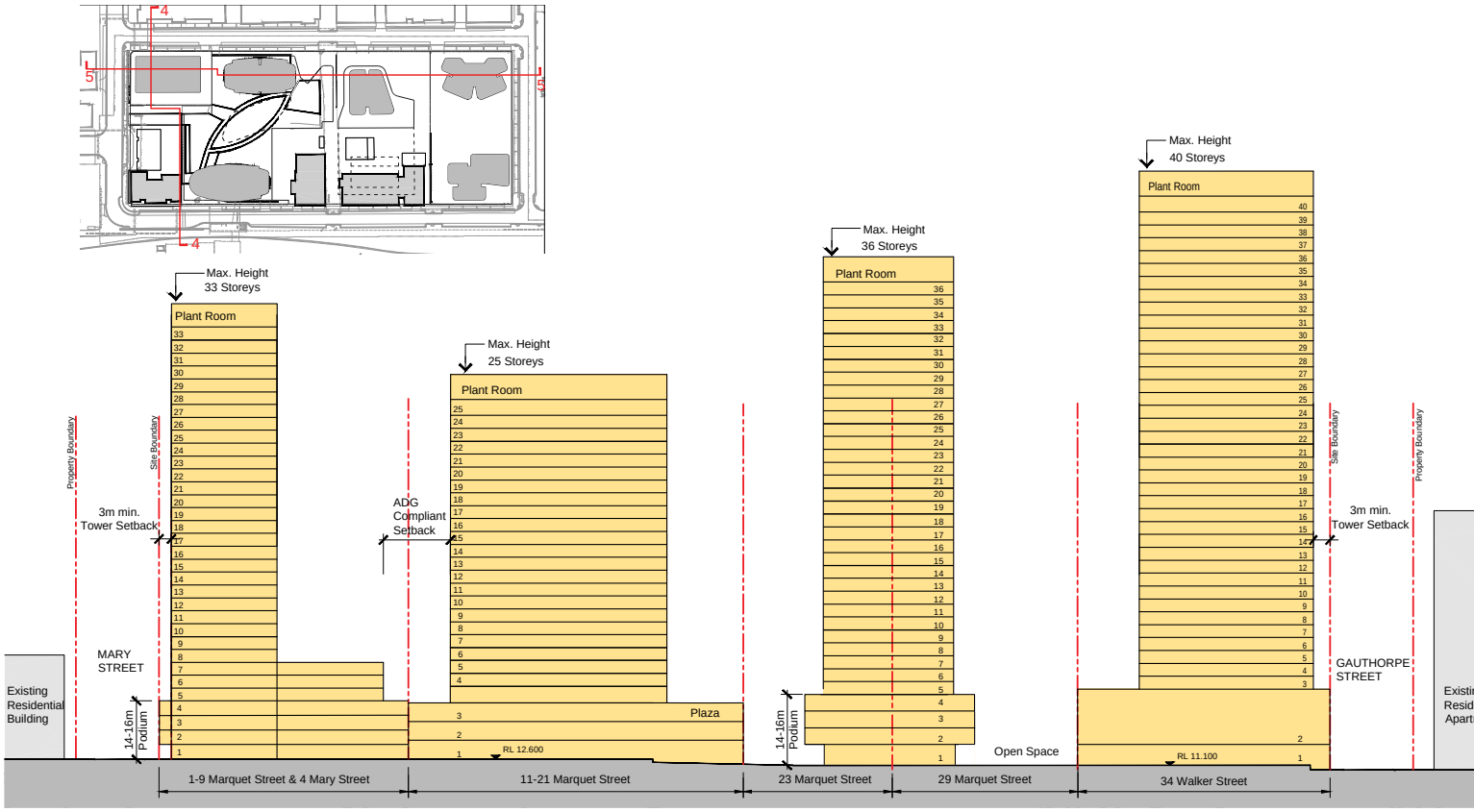


Figure K17-30 Precinct D - Section 5-5

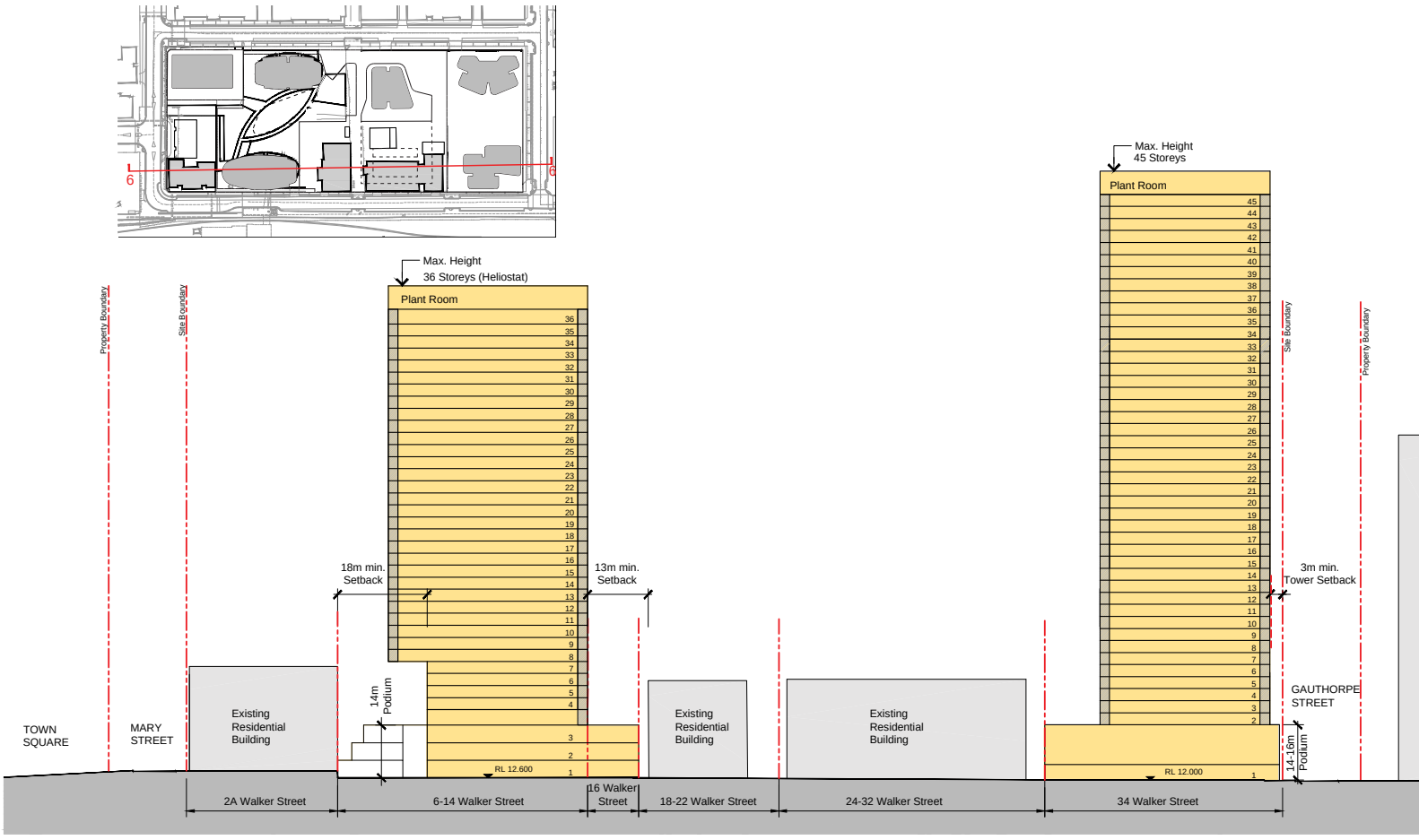


Figure K17-31 Precinct D - Section 6-6

Indicative development concept

This Indicative Development Concept reflects the principles embodied in this DCP and illustrates building footprints that can be achieved by developments that comply with the Station Gateway West Masterplan and the development controls of this DCP. Illustrated is the desired future character of development which complies with this DCP.

It is not the intention of the Indicative Development Concept plan to identify the exact form and design of future development proposals, however, it does illustrate the desired character of the built form and public open spaces. Developments must generally comply with the building envelope controls provided earlier in this section of the DCP.

Figure K17-32 Indicative Development Concept
Not to scale. The diagram illustrates the indicative concepts for built form and public domain

K18 Sydney Wire Mill site, Chiswick

Figure K18-1 Aerial photo (source: nearmap.com)

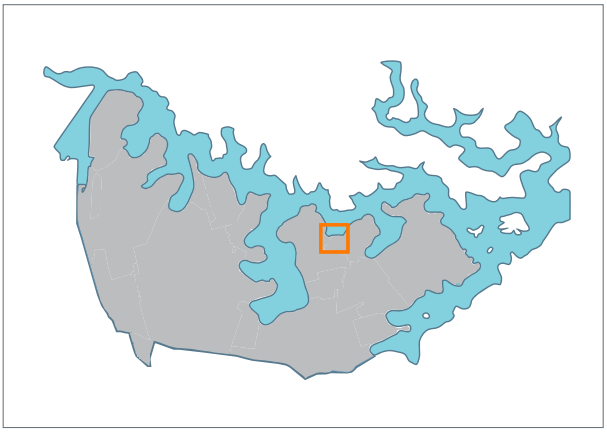


Figure K18-2 Council area map

Figure K18-3 Sydney Wire Mill, Chiswick - Location Plan

K18.1 General objectives

O1. To encourage and facilitate development on the site which, in terms of scale, bulk, form and character, reflects the physical context of the site, is sympathetic to surrounding development, particularly residential development, and does not dominate the landscape;

O2. To retain and incorporate, where possible, significant buildings, trees, natural and man made landforms and any other site features identified as having heritage values, to create a sense of place which respects and enhances those values;

O3. To minimise the impact of development in terms of overlooking, loss of view and loss of sunlight on adjoining and neighbouring properties;

O4. To provide unrestricted public access to the foreshore of Abbotsford Bay, linked to adjoining foreshore access systems and to existing parks;

O5. To provide for the active and passive recreational needs of the residents of the development; and

O6. To provide a publicly accessible street and pedestrian network as an extension of the existing street network.

K18.2 Specific provisions

Design Scale and Bulk

Objectives

O7. To ensure the scale and bulk of proposed buildings responds in a sympathetic and harmonious manner to the site and its context, including the waterway and the surrounding residential neighbourhood; and

O8. To provide a high standard of amenity and environmental quality for future residents.

Controls	
C1.	A four storey maximum height limit applies to most of the site with a two storey height limit on land located opposite existing residential development. The height of buildings, including any car parking levels, must not exceed the height limits specified for the precincts illustrated in Figure K18-5 Maximum Heights and Setbacks.
C2.	Buildings shall not occupy more than 30% of the total site area.
C3.	A 4.5m building line applies to that part of the site fronting Blackwall Point Road which faces existing residential development (see Figure K18-5 Maximum Heights and Setbacks).
C4.	Buildings adjacent to the central spine of public open space and Melrose Crescent shall be set back from this public open space or road reserve boundary as shown on the building envelope control included as Figure K18-4 Indicative 45° Building Envelope Control based on 2.7m wall height.
C5.	Buildings adjacent to the public foreshore open space boundary shall be setback from this public open space as shown on the building envelope control included as Figure K18-5 Maximum Heights and Setbacks.

C6.	Buildings elsewhere on the site should be setback progressively as wall heights increase to reduce bulk and overshadowing.
C7.	Visually the impact of the development of the site should make a positive contribution to 'the landscape and special scenic qualities of the Parramatta River'.
C8.	A gradation of building heights is desirable (see Figure K18-4 Indicative 45° Building Envelope Control based on 2.7m wall height).
C9.	Buildings are to be articulated and are not to present long unrelieved structures that dominate the landscape;
C10.	Buildings shall not be located so as to directly abut any public open space and must be setback as shown on Figure K18-4 Indicative 45° Building Envelope Control based on 2.7m wall height and Figure K18-5 Maximum Heights and Setbacks.
C11.	Buildings shall have a formal presentation to their street frontages, and where appropriate, to Abbotsford Bay and the waterway generally.
C12.	Development shall recognise the contours and natural and man-made landforms of the site and compliment surrounding areas.
C13.	Architectural elements, materials and colour schemes should blend with existing landscape forms and colours.
C14.	The preferable roof form for the bulk of development on the site should be pitched, providing the opportunity for innovative uses of roof spaces.

Open Space

Objectives

O9. To provide public and private open space that meets the needs of residents and the local community having regard for existing land forms, including historic modifications, and visual and functional links with adjoining open space.

O10. To produce a low maintenance landscaped outcome and a management plan for its future maintenance requirements.

Controls	
C15.	In addition to areas zoned RE1 Public Recreation, smaller, more intimate public, community and private landscaped open spaces shall be provided throughout the site, linked by and forming part of the pedestrian and cycle movement system.
C16.	Landscaped areas should generally be designed in plan to be dominated by vegetation rather than by masonry elements. Hard paved areas should be kept to a minimum, consistent with meeting standards for parking, disabled access and site drainage.
C17.	Private open space for each dwelling at ground level must have: a minimum dimension of 3m; direct access from a living area; a maximum gradient of 1 in 10; and screening where necessary to ensure privacy.
C18.	Private open space for each dwelling above ground in the form of a balcony or roof terrace should have: convenient access from the main living area; a minimum area of 10m²; and a minimum dimension of 2m.

Impacts on adjoining and nearby residential properties

Objective

O11. To provide safe, attractive streetscapes which link with and enhance the amenity of neighbouring development.

Controls	
C19.	The street reserves together with the buildings and landscaping defining them should be designed to create an attractive streetscape and establish a clear identity or 'sense of place' to the street, place or precinct.
C20.	Setbacks of buildings from their street frontage should be appropriate to the desired streetscape character and respond to features of the site in terms of views, vistas and existing natural features, including vegetation.

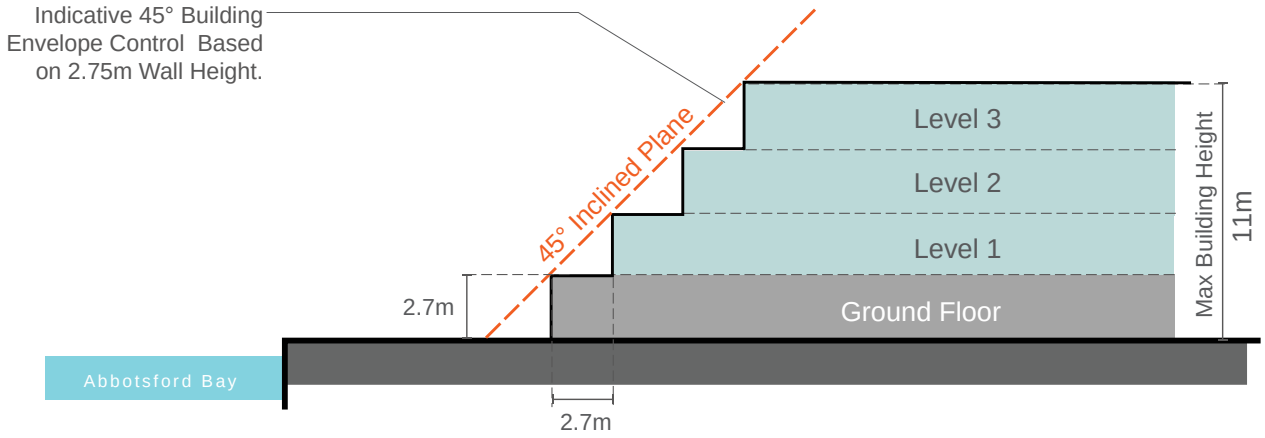


Figure K18-4 Indicative 45° Building Envelope Control based on 2.7m wall height

Figure K18-5 Maximum Heights and Setbacks

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Figure K18-6 Indicative Access Plan

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K19 Tuscany Court

Figure K19-1 Aerial photo (source: nearmap.com)

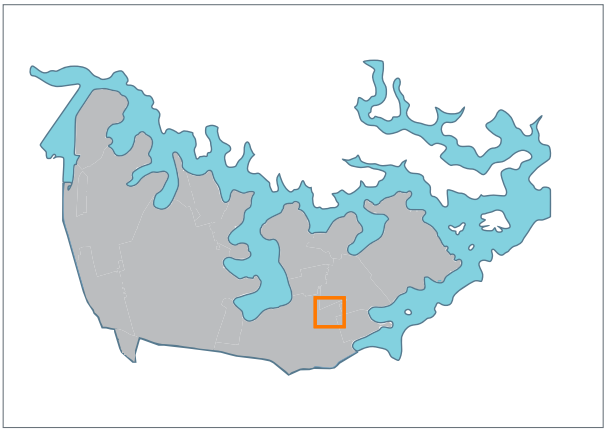

Figure K19-2 Council area map

Figure K19-3 Tuscany Court - Location Plan

K19.1 General objectives

O1 To encourage and facilitate development on the site which, in terms of scale, bulk, form and character reflects the physical context of the site and is sympathetic to surrounding residential development;

O2 To minimise the impact of the development in terms of overlooking and loss of sunlight from adjoining and neighbouring properties;

O3 To provide for the active and passive recreation needs of residents of the development and incorporate recreation facilities such as a swimming pool and tennis courts;

O4 To identify and retain any significant trees on the site; and

O5 To provide for safe access to and from the site.

K19.2 Specific provisions

Density, Design, Scale and Bulk

Objective

O6 To achieve a development outcome which, in terms of its density, design, scale and bulk, responds in a sympathetic and harmonious manner to the site and surrounding residential development.

Height

Controls	
C1.	The height of buildings, including any car parking, should comply with the height limits for the three precincts specified in Figure K19-4 Maximum Height.
C2.	Buildings should be sited within the building envelope from the eastern and western boundaries of the site as illustrated in Figure K19-6 Indicative 45° Building Envelope Control. This includes a minimum setback of 10m from the eastern and western boundaries with the upper two levels to be setback within a 45° plane to minimise overshadowing and overlooking of adjoining properties.

Setbacks

Controls	
C3.	Buildings located on the eastern and western boundaries of the site and the northern boundary adjoining 355 Lyons Road are to be located no closer than 10 metres at any point, from these boundaries (see Figure K19-4 Maximum Height and Figure K19-6 Indicative 45° Building Envelope Control).
C4.	The location of any building near a tree nominated in Figure K19-5 Significant Trees must take account of the drip lines and root systems of the tree.

Design and Form

Controls	
C5.	Buildings are to be articulated and are not to present long, unrelieved structures that dominate the landscape.
C6.	A diversity of accommodation is to be provided, including townhouses and small, medium and large units.
C7.	A pitched roof form is preferable for all development on the site as it provides the opportunity for innovative use of roof space.

Site coverage

Controls	
C8.	Buildings, excluding any community facilities should occupy less than 40% of the site area.

Landscaped and Open Space

Objective

O7 To provide for private open space that meets resident requirements for recreational and social activities and for landscaping;

O8 To ensure all significant trees are retained or relocated on the site; and

O9 To assist on-site drainage by the provision of at ground landscaped open space.

Controls	
C9.	To ensure adequate provision of open space the maximum permissible site coverage is 40%.
C10.	Landscaped open spaces should be provided to accommodate a range of communal and individual needs. There should be a primary open space area containing a recreation facility such as a pool/spa or similar, and this facility is to be easily accessible to all residents on site. Smaller, more intimate landscaped areas should be provided throughout the site and be accessible via a pathway system.
C11.	Landscaping on the eastern and western boundaries is to ensure the privacy of adjoining residential development.
C12.	In accordance with Figure K19-5 Significant Trees trees identified as “must be retained” should be retained on the site. Other trees nominated should be retained or relocated on-site where practicable. Buildings in the vicinity of these nominated trees must be setback from the drip line and root systems of these trees.
C13.	Landscaped areas should generally be dominated by vegetation and not masonry elements. Hard paved areas should, where possible, be kept to a minimum in order to reduce stormwater runoff, although wheelchair access and remediation requirements must be considered.

Access

Objective

O10 Adequate provisions should be made for access to and from the site.

Vehicular Access

Controls	
C14.	Access to the site is not to be provided by a ‘gatehouse’ security system which limits public access to the site.
C15.	Vehicular access is to be maintained to 347 Lyons Road.
C16.	The primary two-way access is to be from Barnstaple Road.
C17.	A secondary access is to be provided from Lyons Road with an island on Lyons Road installed to prohibit entry to the site from the west and exit from the site to the east.

Pedestrian Access

Controls	
C18.	Pedestrian access is to be maintained from Lyons Rd to Dalmeny Ave.

Streetscape

Objective

O11 To provide attractive streetscapes which enhance the amenity of neighbouring development.

Controls	
C19.	The street reserve together with the dwelling fronts and gardens are to create an attractive streetscape and establish a clear character and identity for the street or precinct.
C20.	The setback of buildings from the street frontages to be appropriate to the streetscape character.

Figure K19-4 Maximum Height

Figure K19-5 Significant Trees

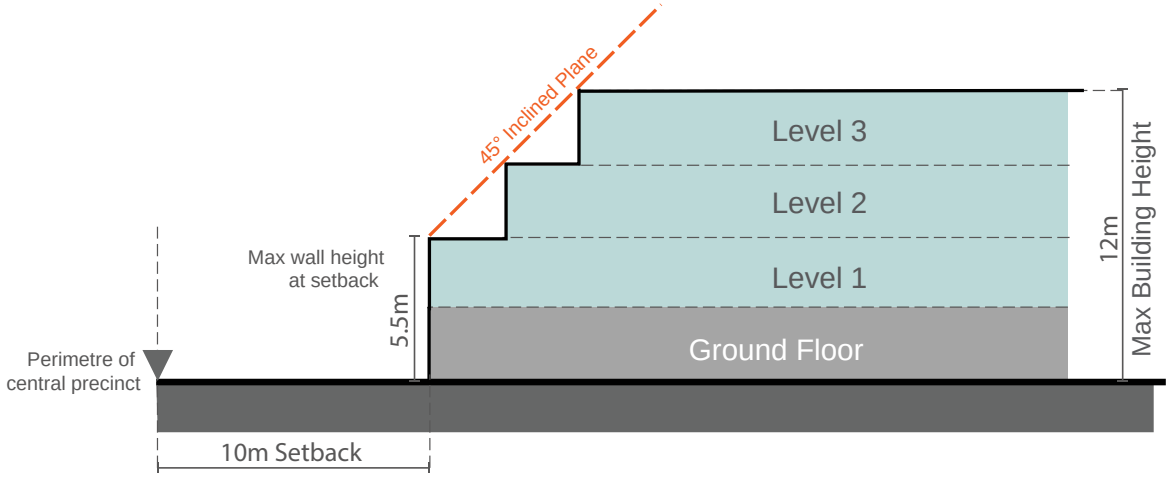

Figure K19-6 Indicative 45° Building Envelope Control

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L

PART L - DEFINITIONS

Definitions

Note: For additional definitions please refer to the Canada Bay Local Environmental Plan.

Acid sulfate soils

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Advanced tree

An advanced tree is one with a root ball of 90 litres (or larger), which is at least 2 metres in height and 2 years of age. Trees with a 25 litre root ball will be accepted in lieu of trees with a root ball of 90 litres, when local native trees are selected.

Annual exceedance probability (AEP)

The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage.

Arborist report

A report (including photographic evidence) prepared by a suitably qualified arborist to ascertain the Safe Useful Life Expectancy (SULE) of the tree and/or whether the tree presents an unacceptable level of risk that pruning will not resolve.

Articulation zone

Articulation zone means an area of a lot forward of the building line within which building elements are permitted to be located, being an area measured from:

a) one side boundary of the lot to the opposite side boundary of the lot, or
b) if the lot is a corner lot—the secondary road boundary of the lot to the boundary opposite the secondary road boundary.

Attic

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Basement

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Bicycle Parking Facility

Bicycle parking facility - is an area reserved or designed for short term parking of one or more bicycles. It includes a device to which the bicycle frame and wheels can be locked. It is mostly used by visitors to the development at which it is provided.

Bicycle Storage Facility

Bicycle storage facility - is an area reserved or designed for long term parking of one or more bicycles. It is usually enclosed to provide security. It is mostly used by employees or residents of the development at which it is provided.

Building Envelope

Building envelope - means the three-dimensional space within which a building is to be confined.

Building Footprint

Building footprint - means the area of land measured at finished ground level which is enclosed by the external walls of a building

Building Height (or height of building)

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Building height plane

Building height plane - means a plane projected at an angle of 45^{o} over the actual land to be built upon from a vertical distance of 5.0 metres above ground level at the side boundaries of the site.

Building identification signs

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Building line or setback

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Business identification sign

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Canopy

The uppermost branches of a tree, forming a more or less continuous layer of foliage.

Canopy cover

The proportion of land area occupied by the tree's canopy when visualised from directly above.

Canopy Spread

The diameter of a tree's canopy.

Canopy tree

A tree that is capable of forming a canopy that contributes to the urban forest and total canopy cover of an area. A canopy tree can be categorised as follows:

a) Small: 6-8 metres high
b) Medium: 8-12 metres high
c) Large: at least 12 + metres high

Ceiling Height

Ceiling height - in relation to buildings means the greatest distance measured vertically from the ceiling of the upper most habitable room, or in the case of raked or cathedral ceilings a line projected from associated ceilings, to the existing ground level, or the lowest habitable floor immediately below that point, whether or not at natural ground level, excluding chimneys, attic rooms, and non-habitable rooms which are entirely below natural ground level and have no visible external elevation whatsoever.

Child Care Centre

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Co-located facilities

Co-located facilities – means one or more facilities on or within an original facility or a public utility structure.

Co-Siting

Co-siting – means the siting of a number of telecommunication facilities, often owned by different carriers, in one location.

Collection Area

Collection area - is the location where garbage or recyclable material is transferred from a building's storage containers to a collection vehicle for removal from the site.

Communal Open Space

Communal open space - means useable shared open space for the recreation and relaxation of residents of a housing development and which is under the control of a body corporate or equivalent.

Conservation Plan

Conservation plan - means a document establishing the significance of a heritage item and recommending an appropriate policy to enable that significance to be retained.

Cumulative impact

Cumulative impact – in relation to Telecommunications and Radiocommunications infrastructure - means the impact of radiation from various sources or over time.

Council

Council - means the City of Canada Bay Council or any officer or delegated authority authorised to act on behalf of Council.

Deep soil zones

Deep soil zones are areas of soil that do not contain buildings or structures. They exclude basement car parks, services, swimming pools, tennis courts, rainwater tanks, on site detention tanks, and impervious surfaces including car parks, driveways and roof areas.

Development Control Plan (DCP)

A plan made to provide more detailed provisions than those included in a local environmental plan.

Domestic driveway

A vehicular path within a property comprising three or less domestic units where a single or shared driveway is provided.

Dormer Window

Dormer window - means a construction containing a vertical window framed into and projecting through a steeply sloping roof. It can be a window or a group of windows forming a bay or recess in a room projecting outward from the general line of the wall.

Dual Occupancy

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Dwelling House

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Ecologically sustainable development

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Electromagnetic radiation (EMR)

Electromagnetic radiation (EMR) – means the radiation in the microwave and radiofrequency band of the electromagnetic spectrum.

Flood planning area (FPA)

The area of land below the flood planning level (FPL) and thus subject to flood related development controls.

(Source: Department of Infrastructure, Planning and Natural Resources (2005) Floodplain Development Manual: the management of flood liable land).

Flood planning levels (FPL)

The combinations of flood levels (derived from significant historical flood events or floods of specific annual exceedance probability (AEP) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans

(Source: Department of Infrastructure, Planning and Natural Resources (2005) Floodplain Development Manual: the management of flood liable land).

Floor Space Ratio

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Freeboard

Freeboard represents a nominated additional height above a flood level to provide a safety factor against inundation. It is used to set minimum floor levels.

Frontage

Frontage - means the alignment at the public road reserve at the front of a lot and in the case of a lot that abuts two or more streets, the boundary of which, when chosen, would enable the lot to comply with the DCP provisions.

Garbage and Recycling Room

Garbage and Recycling Room - means a room where garbage and recycling receptacles are stored, awaiting reuse or removal from the premises.

Gross Floor Area

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Gross Leaseable Floor Area

Gross Leaseable Floor Area – the sum of the areas of each floor of a building that is taken to be the area within the internal faces of the walls, excluding stairs, amenities, lifts, corridors and other public areas but including stock storage area.

Ground Level (existing)

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Habitable Room

Habitable room - is a bedroom, living room or kitchen, dining room, study, play room and sun room.

but excludes:

a bathroom, laundry, water closet, food storage pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, ancillary storage or parking area and other spaces of a specialised nature occupied neither frequently nor for extended periods.

Heritage tree

Any tree that is identified individually or contained within a property identified in the Canada Bay Local Environmental Plan in Schedule 5 or shown on a Heritage Map.

High Flood Risk Precinct

An area of land that under 1%AEP conditions is either subject to a high hydraulic hazard or presents significant evacuation difficulties.

Injuring

Injuring - includes the administration to any part of a tree of any chemical or compound or substance which has the potential to harm the tree, irrespective of whether it actually harms the tree; “injuring” also includes altering the ground level in the near vicinity of the tree; “injuring” also includes changing the level of the water table so as to adversely affect the tree.

Internal lot

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Landscaped Area

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Lane

A public road, with a width greater than 3m but less than 7m, that is used primarily for access to the rear of premises, and includes a nightsoil lane.

Local Environmental Plan (LEP)

An LEP is a legal document and generally provides the land use zones, Council Objectives and development standards for different types of development.

Low Flood Risk Precinct

An the area above the 100 year flood and includes all area up to and including the 'Probable Maximum Flood (PMF)'.

Low Impact Facility (LIF)

Low impact facility (LIF) - a facility that is exempted from state and council local planning under the Telecommunications (Low-impact Facilities) Determination 1997.

Medium Flood Risk Precinct

An area of land that under 1%AEP conditions is not subject to a high hydraulic hazard and presents less than significant evacuation difficulties.

Multi Dwelling Housing

Note: Refer to the Canada Bay Local Environmental Plan for definition.

NatHERS or equivalent

NatHERS or equivalent - NatHERS (Nationwide House Energy Rating System) is a computer simulation tool developed by the CSIRO for rating the thermal performance of houses across Australia. The Energy Management Task Force is responsible for delivering a NatHERS compliance protocol. Any software or paper checklist which passes under this protocol is deemed “NatHERS or equivalent” (SEDA 1997).

North Facing

North facing - means the orientation within 20 degrees east and 30 degrees west of true north.

Outbuilding

Outbuilding - means a detached building or structure used for purposes ancillary to the main dwelling on an allotment and includes cabanas, gazebos, garden sheds, greenhouses, garages, carports and the like.

Parent lot

In relation to subdivision, means the lot that is being subdivided.

Private Open Space

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Protected tree

A protected tree is:

a) any tree with a height equal to or greater than 5 metres above ground level (existing); or
b) any tree that is under 5 metres in height that has a trunk diameter of more than 300mm at ground level (existing); or
c) has a canopy spread of over 4m; or
d) a native palm, cycad or mangrove, irrespective of its dimensions.

Radiocommunications facility

Radiocommunications facility – means a base station or radio communications link, satellite-based facility or radio communications transmitter.

Recycable

Recyclable - means capable of being reprocessed into useable material or re-used.

Removal and Cutting down

Removal and cutting down - means the cutting down of a tree so that the tree, including its branches, foliage, trunk, stump and root system will not regrow. This includes the poisoning of the stump and/or roots and/or removal or grinding out of its remains to prevent regrowth. “Transplanting” is “Removal” when a tree is relocated from one property to another.

Residential Flat Builidng

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Semi-Detached Dwelling

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Site Coverage

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Solar Access

Solar access - means the amount of direct access to sunlight enjoyed by a building, room or open space.

Statement of Heritage Impact (SOHI)

Statement of Heritage Impact (SOHI) - means a statement prepared in accordance with the requirements of the Heritage Manual that addresses the significance of the place or item; adequately describes the existing features of the item or place; describes the proposed works and its contribution to the significance of the item; and justifies any proposed works.

Streetscape

Refers to the view from the public domain, including but not limited to a street, road, laneway, public reserve, or the like.

Structural engineers report (tree removal)

A report (including photographic evidence) prepared by a suitably qualified structural engineer that demonstrates that the subject tree is causing damage to buildings, structures or underground services.

Special Waste

Special waste - means a waste that posed or is likely to pose an immediate or long-term risk to human health or the environment. This includes hazardous waste, clinical waste and contaminated waste. Special arrangements need to be made for the management of these wastes.

Storey

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Telecommunications facility

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Telecommunications Network

Note: Refer to the Canada Bay Local Environmental Plan for definition.

Tree

A perennial plant with at least one self-supporting woody or fibrous stem.

Urban forest

All trees and vegetation growing within urban areas on public and privately owned lands and includes the organisms for which they provide habitat.

Wall Height

Wall height - means the greatest distance measured vertically from the topmost point on an external wall of a building, other than a gable wall or the wall of a dormer window, to existing ground level immediately below that point.

Waste

Waste – means any substance that is no longer able to be used for the purpose for which it was originally intended, and defined under the Waste Minimisation and Management Act, 1995, as:

a) Any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume or manner as to cause an alteration in the environment; or
b) any discarded, rejected, unwanted, surplus or abandoned substance; or
c) any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or recycling, reprocessing, recovery or purification by a separate operation from that which produced the substance; or
d) any substance prescribed by the regulation to be waste under the Waste Minimisation and Management Regulation.

For the purpose of the DCP, a substance is not precluded from being waste merely because it can be re-processed, re-used or recycled.

Waste Management Plan

Waste Management Plan – means a checklist showing the volume and type of waste to be generated, stored and treated on site, and how the residual is to be disposed, re-processed, re-used or recycled.

Waste Storage and Recycling Area

Waste storage and recycling area – means a designated area or a combination of designated areas on the site of a building for the housing of approved containers to store all waste material (including recyclable material) likely to be generated by the occupants of the building.

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APPENDIX 1 - CONSERVATION AREAS

Statements of significance

CA.1 Birkenhead and Dawson Estates Conservation Area

History

This conservation area includes the subdivisions of two major estates. The first was the 1882 Birkenhead Estate subdivision that included the land bounded by Lyons Road, Victoria Road, Ferry Lane, Ferry Road, and Iron Cove Bay. That was followed in 1901 by two subdivisions of the Dawson Estate that included most of the land to the east of Ferry Lane. A third subdivision of the Dawson Estate in 1908 included the land between Albert Street, Alexander Street and Queen Victoria Road.

Development in this Conservation Area followed the subdivisions and houses from the Victorian period survive in Renwick Street and on Park Avenue, Thornley Street and Day Street. Most of the remaining development is from the Federation period, reflecting the continued development of the Birkenhead Estate and the rapid development of the Dawson Estate subdivisions.

Description

This area contains some of the earliest surviving buildings in Drummoyne with an interesting collection of buildings from the late Victorian period including a number of stone houses in Renwick Street. The area is also of historical interest with the very high retention rate of items of heritage significance in Renwick Street due to its long term road widening affectation which effectively prevented any development for over 20 years. This has resulted in this group of properties surviving as the most intact early and modest housing streetscape in the Municipality.

The styles of housing in the Conservation Area reflects the various subdivisions. Renwick Street was developed early in the development of Drummoyne, along with other streets close to Victoria Road. In contrast the adjoining streets released for development at a later period are more typical of the strong Federation character of Drummoyne.

The scale of building is modest with a large number of simple timber cottages, stone cottages and generally unpretentious buildings. This is particularly seen in Alexandra Street and Day Street.

The area falls into three distinct characters:

- Renwick Street with its late Victorian through to inter-war housing
- Alexandra, Albert and Day Streets which have a predominantly Federation character and
- Thornley Street and Park Avenue which have a mix of Edwardian, Federation and several late Victorian buildings.

The generally narrow allotments (15-16m frontages) has resulted in tightly packed development. Access to the rear of allotments on Alexandra Street and Renwick Street has allowed garages and carports to be built away from the main streetscape.

Statement of Significance

The Birkenhead and Dawson Estates Conservation Area is of high heritage significance for the very intact and complete streetscapes reflecting the intense development of Drummoyne in the late nineteenth and early twentieth century. The styles of housing clearly reflect the pattern of subdivision of the area.

This Conservation Area includes extensive groups of Federation and Edwardian housing interspersed with Victorian cottages and some larger two storey homes. The narrow allotments and generally consistent scale of development create a cohesive and interesting streetscape.

Analysis - Setting

This conservation area has narrow allotments. Setbacks are generally smaller closer to Victoria Road. Street trees are important in contributing to the character of much of this area. The angled junction of Ferry Lane and Thornley Streets gives additional interest to the streetscape in that part of the Conservation Area.

Scale

Most of the housing has single storey frontages to the street, consistent with the narrow allotments. Two storey housing is scattered through the area. Some semi-detached housing utilising double allotments is included in the area and gives the impression of larger scaled housing.

Form

Some of the earlier development has simple rectangular massing with simple hipped roofs and verandahs running across the full width of the houses. The dominant Federation period housing breaks up the overall massing with projecting wings and more complex roof forms. Gables are used either as decorative features or as the main roof form. The two storey housing on the smaller allotments generally has quite simple massing with the main bulk of the building set behind a verandah to help reduce the overall bulk in the streetscape.

Facades usually include verandahs and elements that step forward of the main part of the building. This often adds interest to the roof form as well as the street front of the house. Simple verandahs across the street facades help to soften the impact of the higher two storey facades on the streetscape.

Materials and Colours

Face brickwork is the most common original material. Sandstone and render is found on the earlier Victorian housing. Roofs of the Federation and Edwardian housing are usually terracotta or slate shingled. Some cottages have galvanised corrugated steel roofs.

Doors and Windows

Doors and windows are usually vertically proportioned. Larger openings, when they occur, are divided vertically.

Carparking

Parking is generally at the rear of the property, in some cases taking advantage of rear street access. On steeply sloping sites, some garages have been built into the retaining walls on the street front.

Fencing

A mixture of fencing is used and depends to some extent on the nature of the site and the character of the house.

Masonry retaining walls of face brick or stone are used on sloping sites. Low masonry fences of either face brick or stone are common on the early twentieth century development. On some late Federation and Inter-War housing, the brick piers are linked by a pipe rail. Timber picket fences are usually modern reproductions and are not original to the streetscape.

Garden Elements including Paving and Driveways

Hedges are often used where increased privacy is desired. Driveways are often a pair of concrete strips parallel to the side boundary of the house. Terraces provide a setting on steeply sloping sites where houses are located on the high point to maximise views.

Refer to Figure App1.1 to Figure App1.3

Figure App1.1 Birkenhead and Dawson Estates Conservation Area - Overview

Figure App1.2 Birkenhead and Dawson Estates Conservation Area - Sheet 1

Figure App1.3 Birkenhead and Dawson Estates Conservation Area - Sheet 2

CA.2 Bourketown Conservation Area

History

Bourketown was initially established in the 1840 period making it one of the first planned developments in the area along with Gipps Town at Five Dock. The subdivision had Bourke Square at its centre and was first offered for sale in 1841.

Although some land was taken up little development took place until the area was linked by the Iron Cove Bridge to the city in 1882. The new bridge resulted in further sales and was the start of the development that currently typifies the area. There appear to be no structures remaining from the pre-1880 period of development.

The area between Formosa Street and South Street was re-subdivided in 1883 as the Tranmere Estate. Further re-subdivision of larger blocks continued into the Inter-War period and is reflected in the housing styles.

The most intensive phase of development in the Bourketown area was the Federation period. Speculative developments of semi-detached houses are concentrated closer to Victoria Road and free-standing Federation period houses dominate other parts of the conservation area. A small number of late Victorian houses survive, primarily in the area closer to Bourketown Square. The dominant Federation phase of development is reinforced with a good range of Inter-War housing.

Statement of Significance

The Bourketown Conservation Area is of high value in reflecting the principal late Victorian and Federation period of development of the Drummoyne Area. The street layout survives from the original Bourketown subdivision, one of the earliest subdivisions of the area. The focal point of Bourketown is Bourke Square and it is in this vicinity that some of the finest individual buildings and groups of buildings are located, along with a small group of commercial buildings and the Drummoyne Public School.

Bourketown is important for its remaining Victorian housing, particularly in the vicinity of Bourke Square, which includes substantial houses on generous allotments as well as a scattering of worker's homes. This development is surrounded by the Federation housing that dominates the streetscapes and, importantly, includes a range of housing from semi-detached speculative development closer to Victoria Road, through to smaller freestanding houses, to large houses of high individual value. These are representative of most styles of residential development from the Federation period and include housing for a variety of social classes.

The conservation area includes a number of important urban buildings including four churches, a public school, commercial buildings and a major water reservoir all relating to the early twentieth century development of the precinct and all of high value both individually and for understanding the development of the area.

Future Character

The future character for this large and mixed area is principally to retain the strong overall heritage urban character of the streets with their mix of one and two storey houses on lots of mixed size.

Existing building stock is predominantly Victorian and Edwardian with some Inter-war pockets of housing and these characters should be retained. Buildings built prior to the Second World War should not be demolished and new buildings should retain the scale and overall character of the immediate area as it relates to bulk, form and use of materials. Given the large lot sizes for much of the area, additions and new buildings can be in a range of forms including good contemporary design with the emphasis on 'fit' into the setting. Garages and carports should not be added in front of the building line.

Analysis - Setting

The area falls into a number of separate zones or precincts that are related to groups of streets.

Firstly the major north-south streets linking to Lyons Road: Gipps; Thompson; Tranmere and College Streets. These streets are wide, have long vistas, established street plantings and strong heritage value. They have a strong suburban character with a sense of spaciousness that relates to the scale of houses. The central street, Thompson Street, contains Bourketown Square which is a major public space of high heritage value that represents the first development of the Drummoyne area and forms a focal point in the area. The location of important civic buildings of high heritage value, such as churches and public utilities on these streets adds to their importance in the townscape.

The secondary north-south streets are narrower and have a smaller scale of housing development, greater use of semi-detached forms and a tighter urban fabric. These streets are: Ullathorne, Henley, and Formosa Streets and South Street (for its northern section). Formosa Street in particular is noted for its fine streetscape of semi-detached Federation housing.

The east-west streets have a completely different character. They are narrow (except for Day Street and sections of Plunket and Broughton Streets which are of varying widths) and contain a much tighter sub-division pattern with generally small blocks and far less pretentious houses. This is particularly seen in Bowman and Polding Streets. The western blocks of Polding and Bowman Streets and Plunkett Street contain the largest scattering of Victorian cottages and houses outside Thompson Street.

The major houses are not confined to one location within Bourketown, but the major groupings are in Thompson Street, the south end of Tranmere and South Streets and Lyons Road. The precinct in Thompson Street from Broughton Street to Bowman Street contains the most substantial and significant group of buildings, but this does not devalue the smaller scale buildings around it.

Another distinctive area of the Bourketown Conservation Area is the Lyons Road frontage from Formosa Street to Thompson Street. This frontage, which effectively forms part of the main road frontage rather than the residential character of the rest of the precinct, contains:

- commercial buildings at both the Drummoyne shopping centre, Tranmere Street and Thompson Street corners, several of which are individually important and intact examples of Inter-war retail buildings
- Drummoyne Fire Station
- Drummoyne Presbyterian Church at a key visual location
- blocks of Inter-war apartments of very fine proportion and detailing set amongst a series of substantial Federation and later homes which indicate the predominant early character of this road frontage.

Scale

The buildings fall into a range of groups. The predominant form for Thompson Street, South Street and Tranmere Street is single residences of significant scale. Most of Formosa Street and its side streets have single storey semi-detached housing built as speculative development. Other streets have small single fronted cottages or large groups of semi-detached dwellings generally speculatively built as seen for much of the length of Formosa and Edwin Streets and part of Day Street and Bowman Street.

Single storey housing is dominant with two storeys housing usually only confined to freestanding homes on larger allotments or for buildings originally incorporating shops.

Form

The dominant Federation period housing in the Bourketown Conservation Area is noted for the use of interesting roof forms with decorative gables providing interest and rhythm to the streetscape.

Siting

The siting of buildings in Bourketown is related to the scale of the building and the size of the site. The closely spaced semi-detached groups have small setbacks. Setbacks generally increase on larger allotments.

Materials and colours

Red face brickwork is the dominant material in the Bourketown Conservation Area. A few surviving Victorian buildings are rendered but this is the exception and these contrast to the general streetscape. The red tones continue in the terracotta roof tiles used either as a main roof material or as a highlight to the grey slate roofs.

Timber is generally used for verandah framing and joinery elements.

Colours were selected from a limited palette and complement the natural tones and textures of the materials.

Doors and Windows

Windows on contributory buildings are almost exclusively timber framed. The dominant Federation period housing has either casement or double hung windows. Larger openings are created by grouping two or three sashes together or by using French doors.

Fencing

The small number of Victorian houses in the area had transparent fencing of either iron pickets between masonry posts or timber pickets. The iron picket fencing could be up to 1.8m high on larger blocks, but clear documentation of physical evidence of this would be needed before reproduction of fencing of that height was approved. Most picket fencing would be a maximum of 1.2m high.

The dominant Federation period housing usually had low masonry fencing with panels of timber pickets or wrought steel up to a maximum of 900mm high.

Inter-war period housing in the Bourketown Conservation area usually had face brick fencing with brick piers separated by low brick panels with horizontal steel pipe rails.

Subdivision

The late nineteenth and early twentieth century subdivision patterns are typically small allotments. Larger allotments are generally only found with surviving free standing houses or are the sites of churches, schools and other public buildings. The subdivision patterns in the Bourketown Conservation Area are closely related to the rhythm of the streetscape.

Refer to Figure App1.4 to Figure App1.8

Figure App1.4 Bourketown Conservation Area - Overview

Figure App1.5 Bourketown Conservation Area - Sheet 1

Figure App1.6 Bourketown Conservation Area - Sheet 2

Figure App1.7 Bourketown Conservation Area - Sheet 3

Figure App1.8 Bourketown Conservation Area - Sheet 4

CA.3 Creewood Street Conservation Area

History

Creewood was a prominent house facing Concord Road. The land to the east of the house was developed in two subdivisions creating Creewood Street. The southern and eastern sections were subdivided in 1926 with the northern part of the street subdivided in 1927. Development of Inter-War housing appears to have rapidly followed the subdivision.

Description

The development in this short street is characterised by intact Inter-War California bungalows. The houses feature multiple gables facing the street, verandahs across part of the front elevation, dark face brick walling and tiled roofs. The houses retain their landscaped setting with low brick fences with metal railing complementing the low horizontal lines of the housing. The turn in the street adds to the visual amenity of Creewood Street.

Statement of Significance

Developed in a short period from 1926, Creewood Street is one of the areas finest streetscapes of Inter-War bungalows. The streetscape is remarkable for the integrity of the landscaping and street fencing.

Analysis - Setting

Developed as a cul-de-sac, Creewood Street is a contained streetscape. The bend in the street contributes to the visual quality of the street. Intact fencing, contemporary with the houses is important to the setting of the houses.

Scale

Apart from infill development, the housing in Creewood Avenue is all single storey.

Form

The houses in Creewood Street are exemplars of Inter-War bungalows, incorporating strong horizontal lines created by the low-medium pitched gables, deep verandahs with simple brick balustrades and heavy verandah piers. Verandahs are always incorporated into the front elevation of the houses, giving depth to the façade.

Siting

Setbacks from the front boundary are consistent. Side setbacks include a generous setback on one side to allow driveway access.

Doors and Windows

Window openings are usually divided into sets of casement sashes, sometimes with a flat awning and a decorative brick sill. Doors may be multi-paned glazed leafs, sometimes with pairs of doors opening to the verandah.

Materials and Colours

Face brick walls of liver or redbrick with commons to side and rear walls. Roofs are usually of terracotta roof tile. The gables are often trimmed with shingles or weatherboards. Verandahs are trimmed with bands of cement render and stub columns.

Carparking

Garages and carports are set well behind the building line.

Fencing

Fencing has brick piers between panels of brickwork matching the houses. Pipe rails or wrought metal panels join the piers.

Refer to Figure App1.9

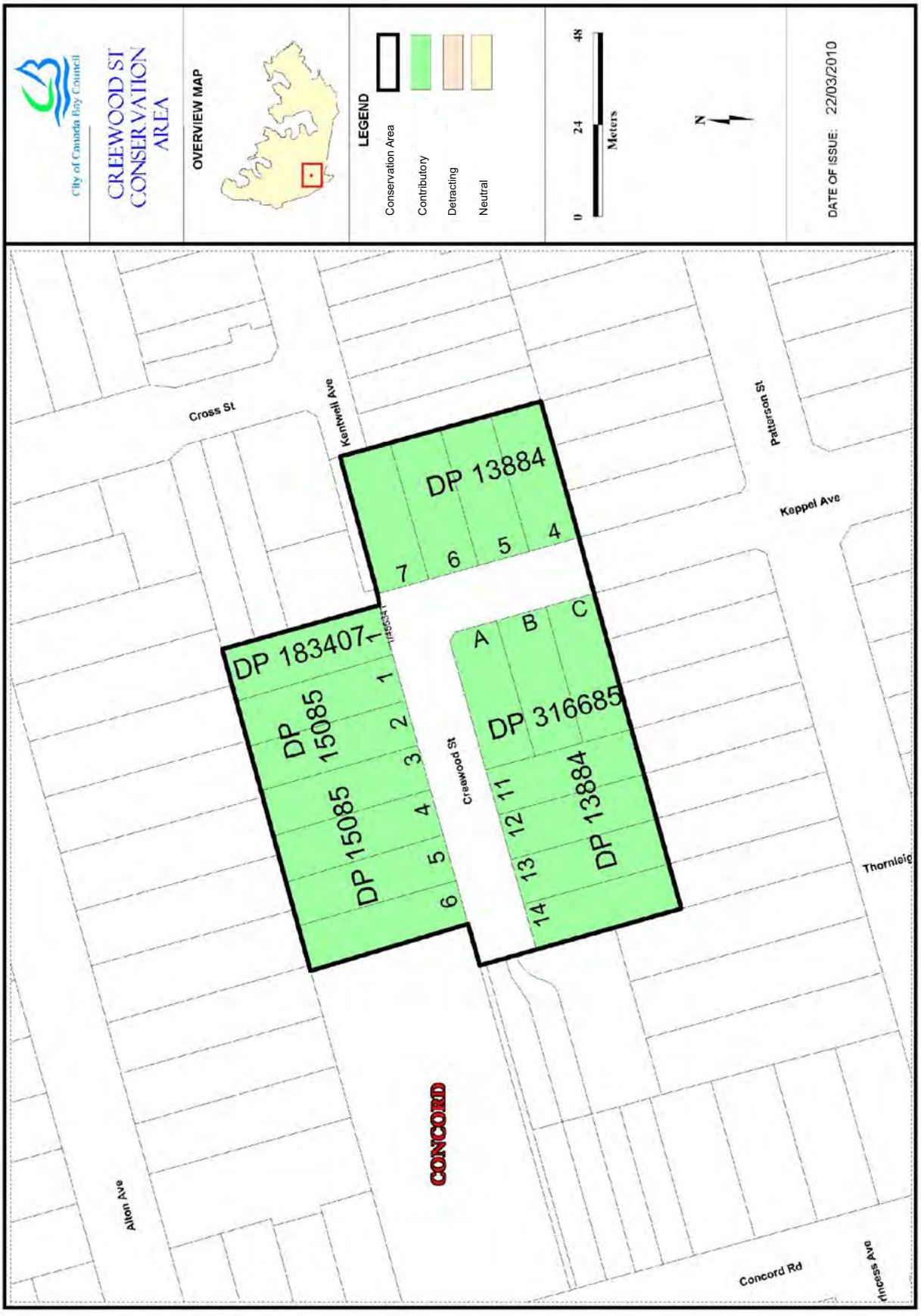

Figure App1.9 Creewood Street Conservation Area

CA.4 Drummoyne Avenue East Conservation Area

History

The subdivision of Drummoyne House in 1894 created suburban allotments at Wrights Point. The proximity to Parramatta River attracted purchasers who could afford to build fine homes, most of which were oriented to the water. This Conservation Area includes some of the finest waterfront houses to survive in Drummoyne. It also includes the house on the southwest corner of Wrights Road and Drummoyne Avenue that, due to its corner location and elevated position, provides a visual link to this group and to the Drummoyne Avenue West Conservation Area.

5 Drummoyne Avenue is the earliest house of the group, probably built soon after the subdivision in 1894. Other houses, with the exception of 8A Drummoyne Avenue, followed in the next 10-15 years.

Description

This Conservation Area includes some of the more significant waterfront houses to survive in the Drummoyne Area. They retain their setting with their major orientation to the water. Most of the group are large and notable examples of the Federation Queen Anne style.

Many of the houses retain important elements of their original gardens. Boatsheds and sea walls also contribute to the setting of the houses.

Statement of Significance

Drummoyne Avenue East Conservation Area forms one of the last intact groups of waterfront residences on the Parramatta River and has high regional as well as local value. They are indicative of the major development form along the eastern Drummoyne waterfront which has been almost completely obliterated by State Government Planning policies since the 1970's period. This is the last major waterfront group in the Canada Bay Council area and a key group of buildings at the entrance to Parramatta River.

Analysis - Setting

The houses in Drummoyne Avenue East Conservation Area respond to their proximity to the water with frontages to Parramatta River as well as to Drummoyne Avenue. Gardens are important to the setting of the houses. Large setbacks from Drummoyne Avenue are used to take advantage of water frontages.

Scale

These are generally large houses of one to two storeys located on large allotments that allowed appropriate setbacks from side boundaries.

Form

Generally interesting roof forms incorporating hipped and gabled forms. The larger houses also include tower and turret elements

These houses use elements such as bay windows, projecting gabled fronts and verandahs to break down the overall mass of the building.

Siting

The houses in this group are sited well back from the street frontage taking advantage of the site depth and river frontage.

Materials and Colours

Roofs are either slate or terracotta tiles or a combination of the two. Walls are generally face brickwork, originally unpainted.

Doors and Windows

A variety of window forms are often used in any one of the Federation houses in this group. Groups of casement windows, usually with toplights, are dominant and might be contrasted with bullseye or keyhole windows. French doors are also used to provide access to balconies.

Carparking

Garages for houses with river frontages have generally been located on the street to minimise impact on the garden setting. For other sites, garages are set back as far as possible from the street boundary.

Garages and carports may be allowed in front of the building line subject to the merit of the design. However they should be located where they will have minimal impact on original or early garden layouts and should avoid blocking important views of the houses from the street.

Garages should not be allowed where they occupy more than 40% of the street boundary.

Fencing

Fencing on the street boundary should generally be not more than 900mm high. Where higher fencing is used, it should be of a transparent design such as simple iron or timber pickets between brick piers.

Landscape Elements Including Paving and Driveways

The gardens are important to the setting of the house and incorporate curved paths, mature trees and areas of lawn. The paths often incorporate a focal element such as a fountain or urn.

Pools are generally located between the houses and the river.

Outbuildings

Outbuildings should be carefully located to avoid impacting on important views of houses from the street or the water. Where outbuildings are visible in important views, they should be designed to relate to the original house.

Small boatsheds are acceptable subject to design merit and approval of the relevant authority (N.S.W. Roads & Maritime Services).

Refer to Figure App1.10

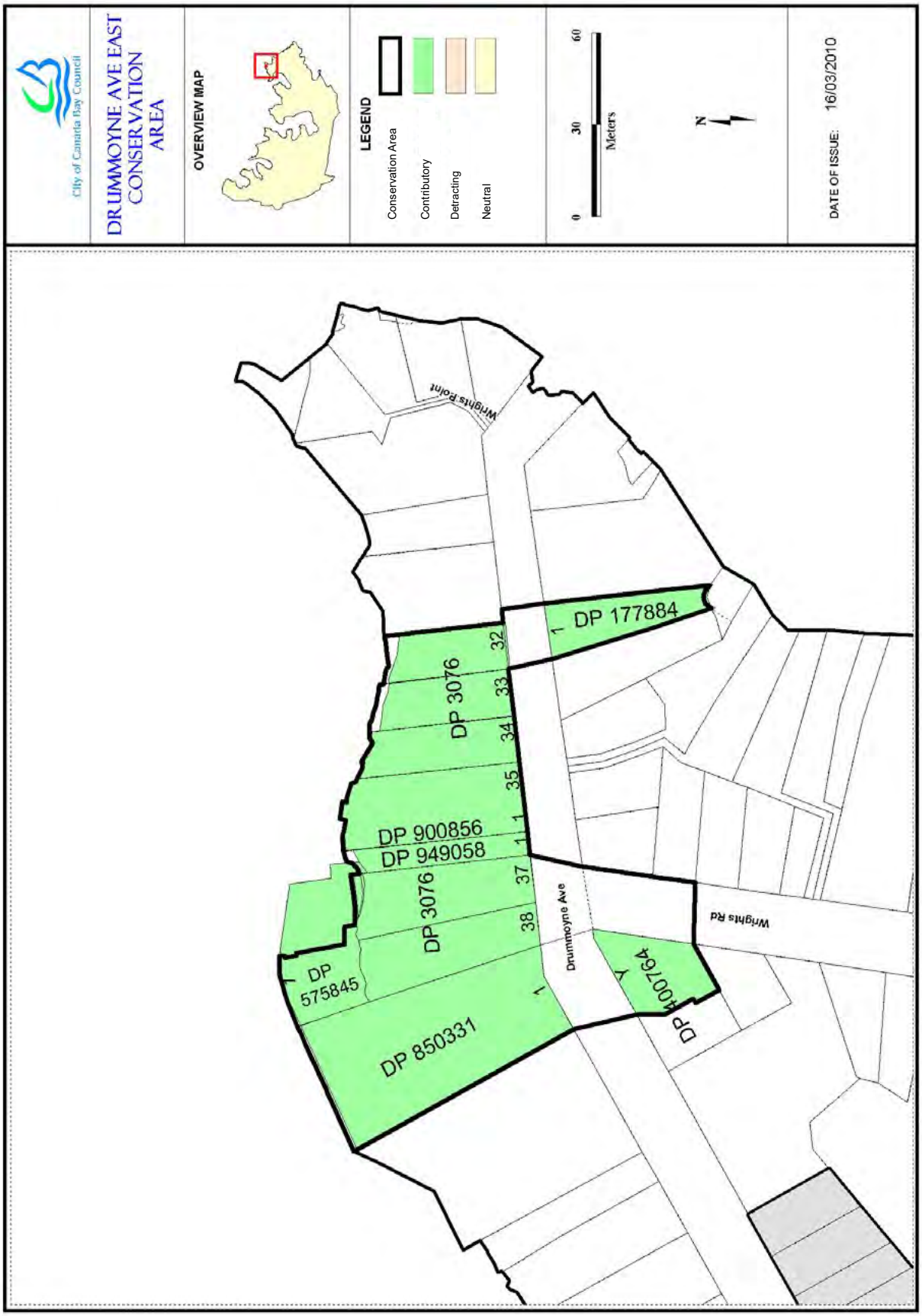

Figure App1.10 Drummoyne Avenue East Conservation Area

CA.5 Drummoyne Avenue West Conservation Area

History

The subdivision of Drummoyne House in 1894 created suburban allotments at Wrights Point. The land around and including Drummoyne House was re-subdivided in 1907 and housing was built facing the water and with its back to Drummoyne House. The present housing at 15-27 Drummoyne Avenue is an intact part of that prestigious sub-division. It is an important element in the streetscape and the continuous character of Drummoyne Avenue.

Description

This group of housing is from the Federation and Inter-War periods. The group has single storey fronts with high sub-floor spaces taking advantage of the slope of the sites. The four properties at the west end of this group date from the 1907 subdivision. The next house is Post World War II and the last two houses are very fine Inter-war houses with high quality detailing.

Statement of Significance

This group demonstrates the sub-division of one of the major Drummoyne estates and is representative of the prevalent form of housing built in east Drummoyne reflecting the importance of the area. This is a remnant of the once contiguous Federation character of the area.

Objectives

Retain the Federation and Inter-War character of this group and their garden settings.

Additions should be controlled to conserve the streetscape contribution of the group.

Analysis - Setting

The setting of these houses is elevated from Drummoyne Avenue. Low masonry retaining walls on the street boundary provide grassed terraces between the street and the house.

Scale

These houses are single storey with high sub-floor areas facing the street. First floor additions are possible subject to merit. These should generally incorporate the existing roof form facing the street.

Form

Overall bulk is generally broken up with projecting wings either under a gabled or hipped roof. Roofs of houses in this conservation area have medium pitches. Hipped and gabled forms are used on the earlier houses with more simple hipped forms on later houses.

Siting

Houses are set back from Drummoyne Avenue to take advantage of the elevated part of the site.

Materials and Colours

Roofs are either terracotta or glazed roof tiles or slate. Walls are generally face brickwork in red or dark colours. The sub-floor is usually of sandstone or brick.

Doors and Windows

Generally timber framed with pairs or groups of casement and double hung sashes.

Carparking

Garages in this conservation area were originally located to the rear of the site and this pattern continues for the majority of sites in this conservation area.

Fencing

Low masonry retaining walls on the street boundary

Garden Elements including Paving and Driveways

Grassed terraces between the street boundary and the house with low shrubs. Mature trees are placed to minimise interference with the views. Driveways are usually single width running past the house.

Refer to Figure App1.11

Figure App1.11 Drummoyne Avenue East Conservation Area

CA.6 Drummoyne Park Conservation Area

History

The land on the eastern side of the present Victoria Road, north of Lyons Road, was subdivided in 1881-2 as Drummoyne Park Estate. Subsequent development included a number of substantial and well detailed Victorian Italianate houses followed by large Federation Arts and Crafts and Federation Queen Anne style housing. Much of the earlier housing was located on sites where elevated land provided good views of the harbour. This late nineteenth century development was reinforced by smaller Federation and Inter-War housing both on the original allotments of the Drummoyne Park Estate and on the subsequent subdivisions of the larger landholdings in the area.

Statement of Significance

The Drummoyne Park Estate Conservation Area, developed from 1881, includes substantial late nineteenth century homes in prestigious locations, such as nos. 2, 8 and 45 Wrights Road and 5-11 and 23 Collingwood Street, interspersed among smaller early twentieth century housing. The smaller scale of the early twentieth century housing gives the Conservation Area an underlying consistency of scale, materials and form that highlights the larger houses of the late nineteenth century in the streetscape. Apart from the heritage items within the area most of the buildings and features within this precinct are of high local heritage value and a combination of representative and rare examples of their period and style in the Drummoyne context.

Analysis - Setting

Larger late nineteenth century houses have prominence in the streetscape. The surrounding streetscape is dominated by smaller scaled Federation period housing.

Scale

Two to three storey houses occupy larger sites and usually have a garden setting. On smaller sites, single storey houses dominate. Some semi-detached housing utilising double allotments is included in the area and gives the impression of larger scaled housing.

Form

Most of the housing that contributes to the heritage character of this Conservation Areas has prominent roof forms with terracotta being the dominant material followed by slate shingles. Facades usually include verandahs and elements that step forward of the main part of the building. This often adds interest to the roof form as well as the street front of the house. Many of the late Victorian houses incorporate bay windows.

Siting

Most groups of houses in this conservation area have regular setbacks from the front and side boundaries. Deeper setbacks on one side of many allotments has allowed for side driveways and provides space between houses. The earlier houses in the Drummoyne Park Estate sometimes have deeper setbacks relating to the larger scale of the buildings and the larger sites.

Materials and Colours

The majority of housing in the Conservation Area has face brick walling with render or cement sheeting used as a contrast. Rendered walls are restricted to the large Victorian homes in this Conservation Area.

Doors and Windows

Doors and windows are usually vertically proportioned. Wider openings, when they occur, are divided vertically.

Carparking

Parking is generally at the rear of the property, in some cases taking advantage of rear street access. On steeply sloping sites some garages have been built into the retaining walls on the street front.

Fencing

A mixture of fencing is used and depends to some extent on the nature of the site and the character of the house. Masonry retaining walls of face brick or stone are used on sloping sites. Low masonry fences of either face brick or stone are common on the early twentieth century development. On larger houses this might support a higher wrought steel fence. On many late Federation and Inter-War houses, the brick piers are linked by a pipe rail.

Landscape Elements including Paving and Driveways

Terraced gardens provide a setting on steeply sloping sites where houses are located on the high point to maximise views. Hedges are often used where increased privacy is desired. Driveways are often a pair of concrete strips parallel to the side boundary of the house.

Refer to Figure App1.12 and Figure App1.13

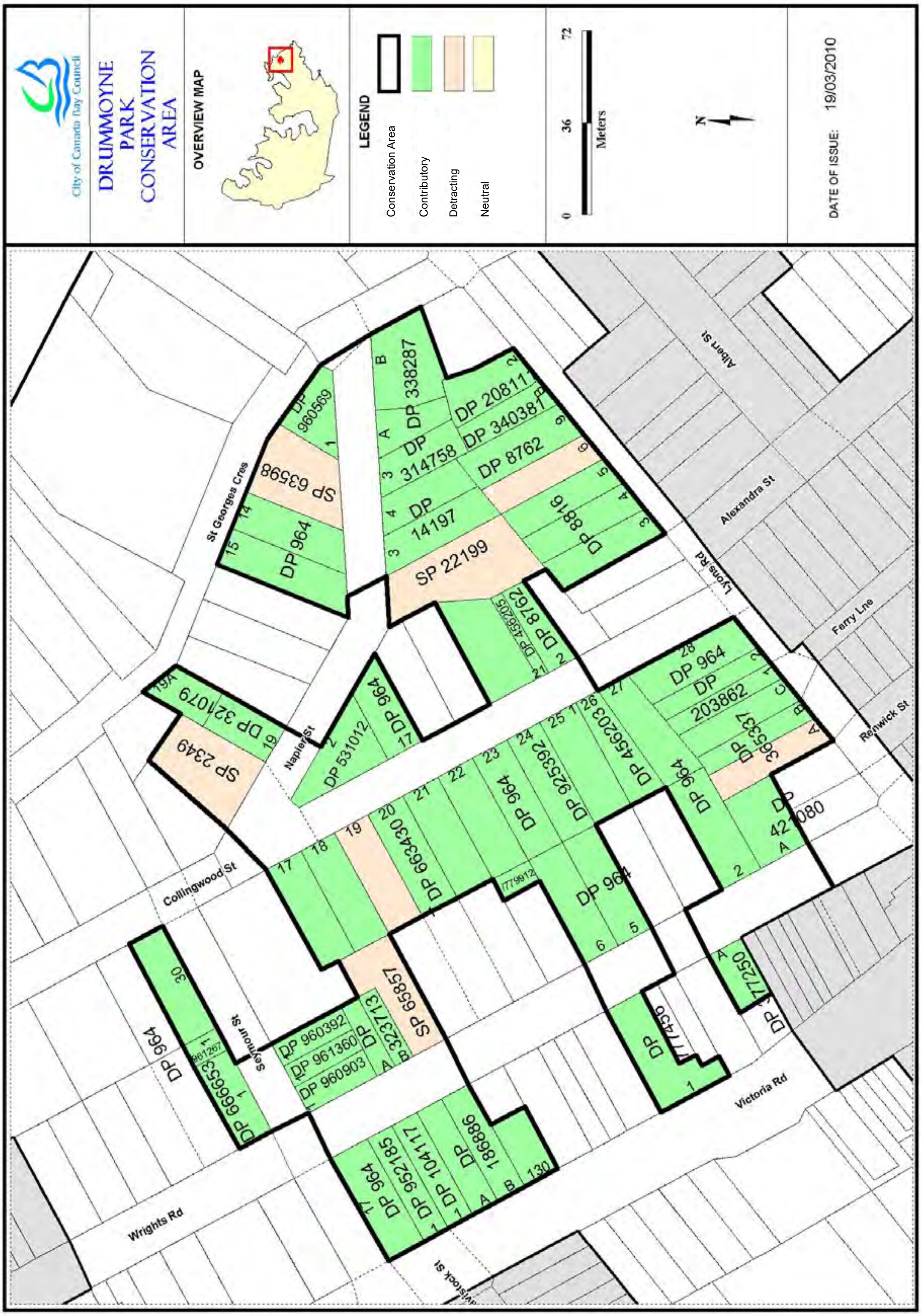

Figure App1.12 Drummoyne Park Conservation Area

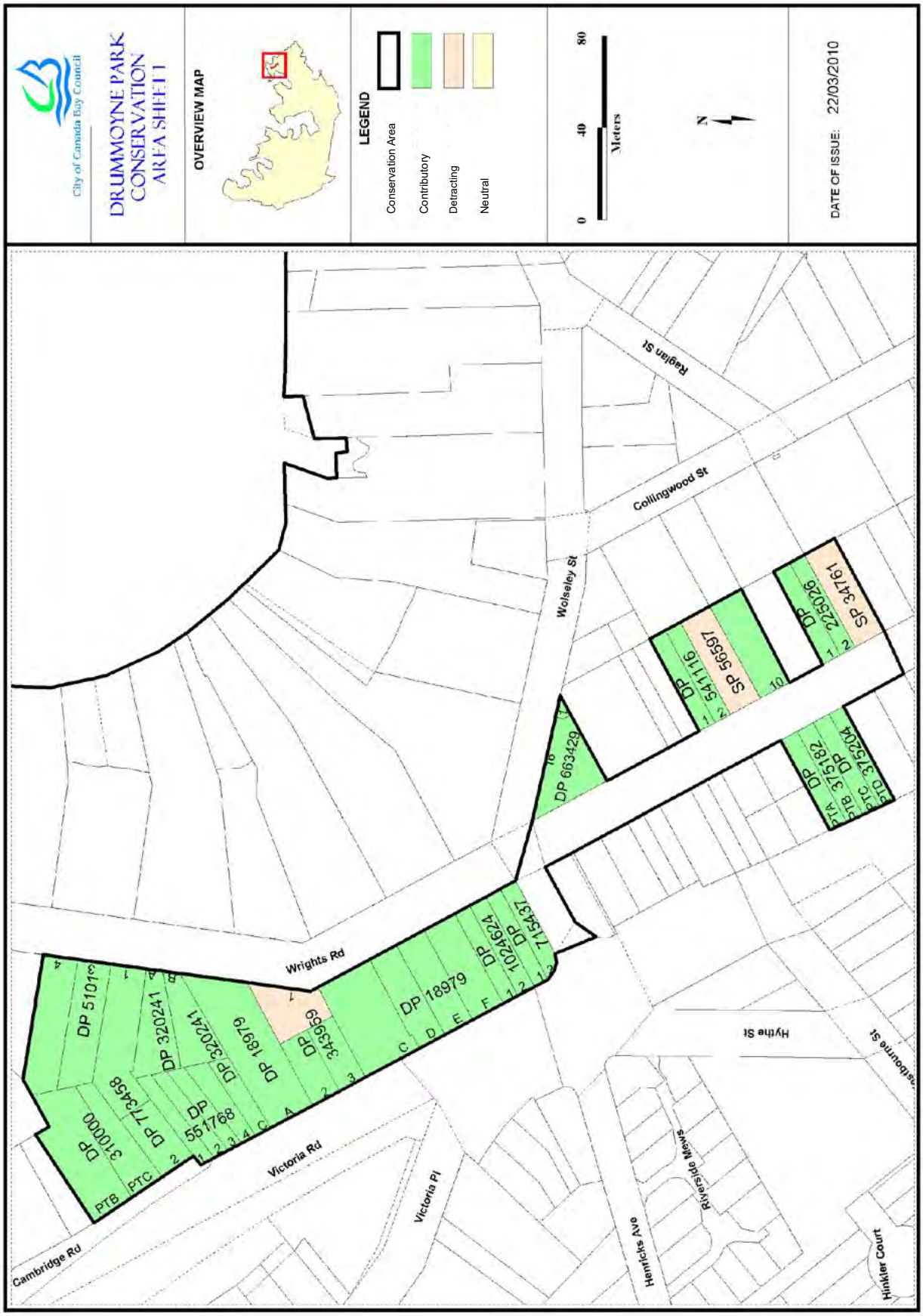

Figure App1.13 Drummoyne Park Conservation Area - Sheet 1

CA.7 Gale Street Inter-War Californian Bungalow Group

History

Mortlake township began with the establishment of the Australian Gas Light Company's works at Mortlake in 1886. Subdivision of the township took place in the following two years. The group of houses at 36-44 Gale Street were built in the 1920's and appear to have been a speculative development.

Description

The Gale Street Conservation area is a group of five Inter War Californian bungalows all designed to the same pattern with double gable to the front and an inset verandah. The houses have gardens to the front with low brick walls to the street. Most have been altered to some extent.

Statement of Significance

The Gale Street Conservation area is a good example row of five Inter-War Californian style bungalows that form an important group in the streetscape and that have historical associations with the AGL gasworks and the development of the Mortlake Township.

Analysis - Setting

The group is set on identical blocks along a tree lined street with rear lane access to garages and carports. The adjoining scale is predominantly single storey with a mix of Victorian and Federation cottages with some later infill development.

Scale

All the houses in the group are single storey with no second floor additions. There is some later two storey development close by.

Form

The group is in the classic Californian bungalow style in dark face brick with double gables, low pitched roofs and low, brick verandahs to the front.

Siting

The front setbacks are the same with a small garden to the front. The setback of adjoining houses varies.

Materials and Colours

The houses are predominantly in red face brick with terracotta tile roofs and painted timber casement windows. Some of the verandahs have been infilled and external walls rendered.

Car Parking

The rear lanes provide car access to garages and carports.

Fencing

The front fencing is not consistent, with a mix of low masonry walls, timber pickets of various styles and metal palisade fencing.

Landscape Elements including Paving and Driveways

Front gardens are dominated by lawns with perimeter shrub planting with some hedging. There are some street trees with Paperbarks predominant.

Refer to Figure App1.14

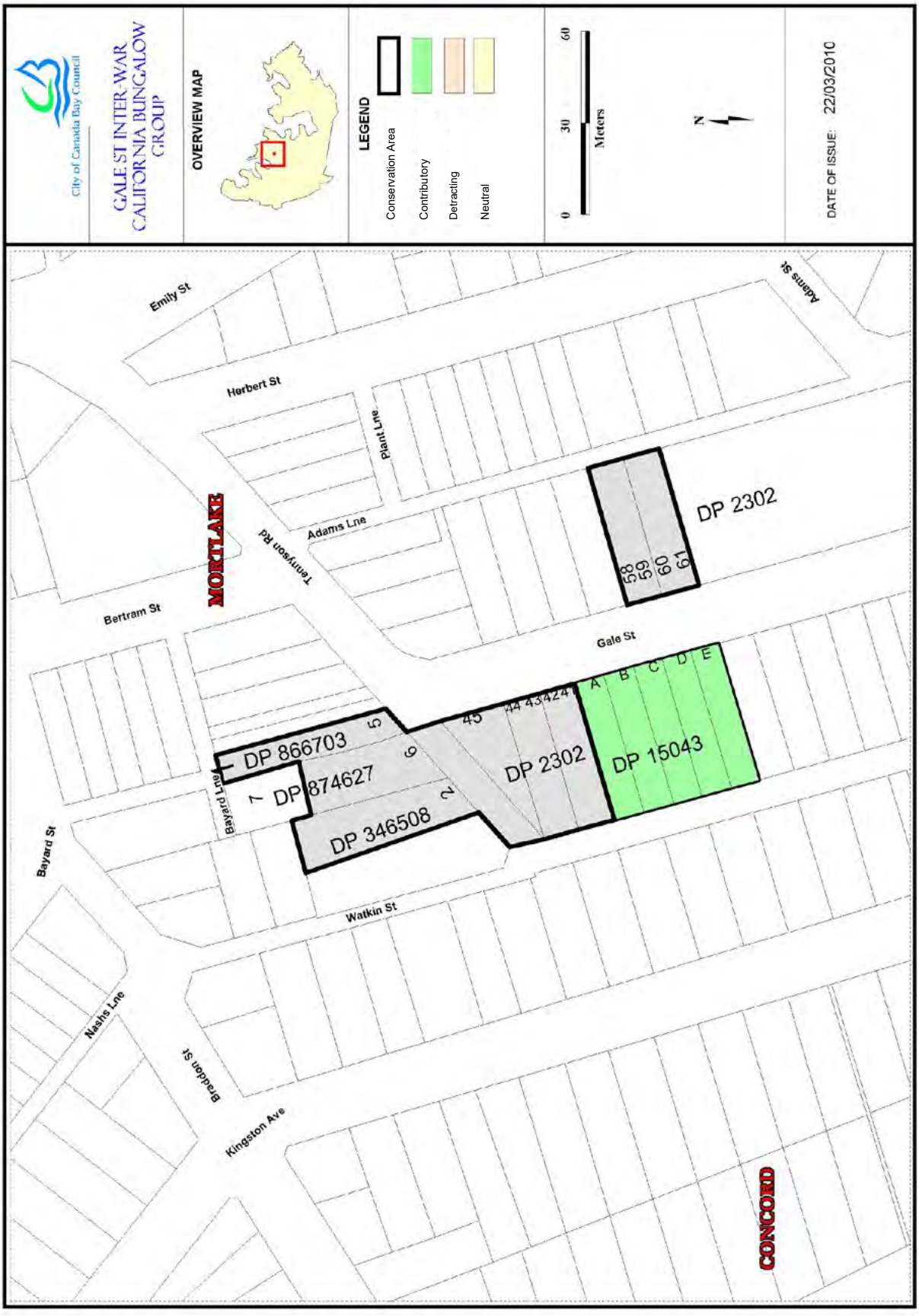

Figure App1.14 Gale Street Inter-War Californian Bungalow Group

CA.8 Gale Street Victorian Housing Group

History

Mortlake township began with the establishment of the Australian Gas Light Company's works at Mortlake in 1886. Subdivision of the township took place in the following 2 years. The houses at 37-39 Gale Street were built soon after the subdivision of the township.

Description

The Gale Street Conservation area is a group of two, single storey, Victorian cottages with symmetrical front verandahs.

Statement of Significance

The Gale Street Conservation area is a good example of two Victorian cottages that form an important group in the streetscape that have historical associations with the AGL gasworks and the subdivision of the Mortlake Township.

Analysis - Setting

The group is set on similar blocks along a tree lined street with rear lane access to garages and carports. The adjoining scale is predominantly single storey with a mix of Victorian and Federation cottages with some later infill development.

Scale

The houses are single storey with no second floor additions. There is some later two storey development close by.

Form

The group is in the Victorian cottage form style with double fronted elevations and front verandahs

Siting

The front setbacks are the same with a small garden to the front. The setback of adjoining houses varies.

Materials and Colours

The houses are in different materials. 37 Gale Street is in painted brick with high gables to the side and has a bullnosed verandah with a corrugated metal roof. 39 Gale Street is in weatherboard with a concrete tile roof.

Car Parking

The rear lane provides car access to rear garages and carports.

Fencing

The front fencing varies with a metal tube and wire fence to 39 Gale Street and no fence to 37 Gale Street.

Landscape Elements including Paving and Driveways

The small front gardens are laid to lawn with some shrub planting.

Refer to Figure App1.15

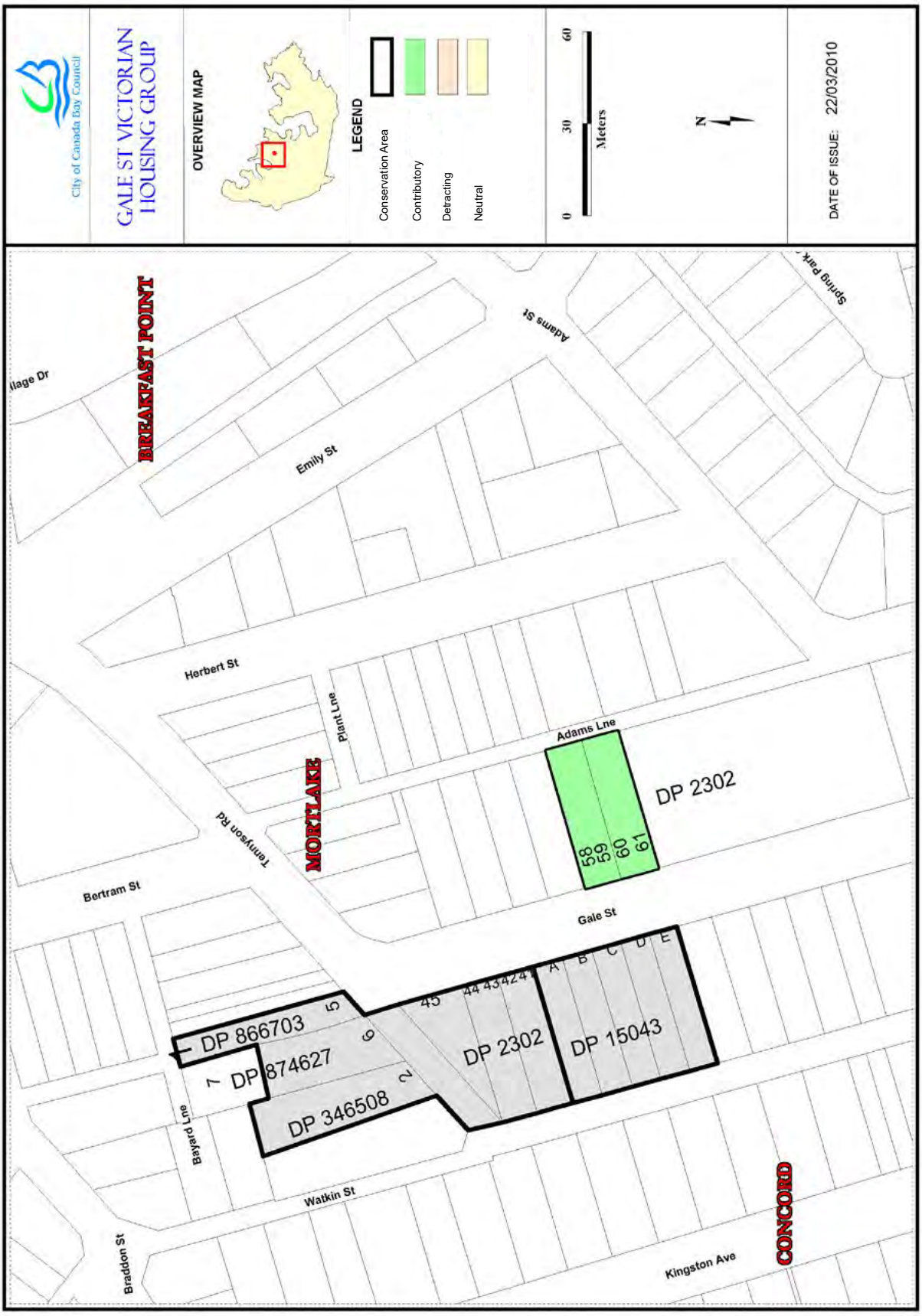

Figure App1.15 Gale Street Victorian Housing Group

CA.9 Gears Avenue Conservation Area

History

Gears Garden Estate was subdivided in 1924 creating lots generally with 50 foot frontages to Gears Avenue. The present 17-35 Gears Avenue were re-subdivided in 1926 to create allotments with 40 foot frontages. The housing in the Gears Avenue Conservation Area all appear to have been built in a short period following the subdivisions.

Description

This group of Inter-war houses is an intact group of predominantly bungalow influenced houses with one very good example of the Californian Bungalow style set high up on the rise and well above the street.

Statement of Significance

The Gears Avenue, Drummoyne Conservation Area is a very good example of housing from the Inter-War period and has survived intact with setting, fences and detailing. The vista down the hill towards the water typifies the development of Drummoyne with Lyons Road on the ridge and streets falling towards the water. The regular division of the allotments, consistency of materials and scale of the housing combines with the slope of the land to create an attractive streetscape.

Objectives

Original details of houses should be retained with fencing and garden settings to enhance the character of the street. Additions should reflect the character of the existing buildings in order to retain the streetscape and heritage value of the streetscape. Garages and carports should not be added in front of the building line.

Analysis - Setting

Housing has a consistent setback behind low street fencing and gardens. One side of each allotment has a greater setback to allow a driveway to go to the rear yard.

Scale

The housing in Gears Avenue is mainly single storey facing the street.

Form

The front of the houses are generally broken down with a verandah section and a projecting room with a gabled or hipped roof. The repetition of gables and hipped forms is an important part of the streetscape. The verandahs have low horizontal proportions with heavy masonry piers.

Siting

The houses in this group have regular setbacks from the street boundary. A deeper setback on one side boundary of most houses provides space between houses and vehicular access to the rear of the site.

Materials and Colours

Walls are generally of face brickwork with use of battened fibro on gables as a contrasting element. The roofs are typically glazed tiles.

Doors and Windows

Timber casements in pairs or groups of three or double hung windows in pairs.

Carparking

Single driveways with garages or carports located well behind the building line.

Fencing

Many original fences have survived in this conservation area. They are typically low street fences with brick piers and panels sometimes using pipe rails between piers.

Landscape Elements including Paving and Driveways

Single driveways with concrete driving strips typically run along the side boundary past the house. Gardens to these houses often include a curved path to the front door and hedge type plants behind the front fence.

Subdivision

This conservation area has a regular subdivision pattern of 40 and 50 feet frontages (12.192m and 15.25m).

Refer to Figure App1.16

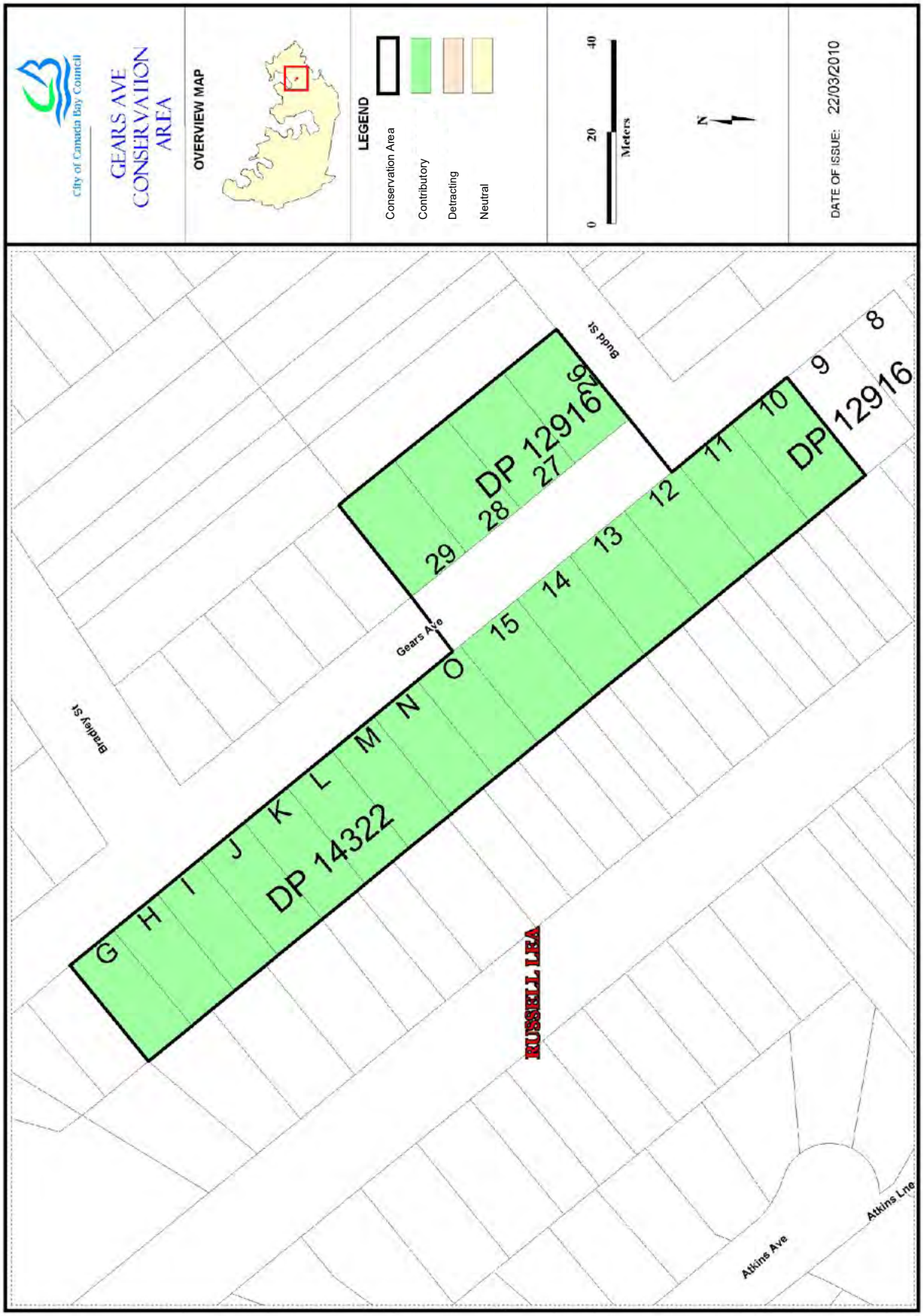

Figure App1.16 Gears Avenue Conservation Area

CA.10 Gipps Street Conservation Area

History

Of this small group of buildings, Euroka, at 9 Gipps Street, Drummoyne is the earliest, existing, with its tennis court, on the site in 1912 when the block bounded by Gipps, Therry, Miller and Market Streets was subdivided. The remaining houses in the group appear to have been built soon after the subdivision.

Description

This is a small group of very fine timber and brick dwellings that formed part of the major subdivision around Bourketown but which are now separated from the main conservation area by altered and unsympathetic development.

Statement of Significance

This group forms a fine group stepping down the slope towards the water, each sited with good views towards the city and set up from the road to maximise their setting. They form a complete block which adds to their integrity. They demonstrate the dominant form of the architectural style of Drummoyne and make a very fine contribution to the streetscape and the important views down Gipps Street to the water.

Objectives

All of the buildings in this small group should be retained in their predominant early twentieth century form. Additions should respect the character of the buildings and first floor additions should be controlled to retain the heritage value of the buildings. Garages and carports should not be constructed in front of the building line.

Analysis - Setting

The slope of Gipps Street towards Iron Cove Bay contributes to the setting of these houses. Euroka at 9 Gipps Street, as the house that preceded the subdivision, was the dominant building in the group until 2005.

Scale

The houses in this conservation area include one and two storey houses with the height relative to the size of the allotment.

Form

These are free standing houses with hipped roofs over the main rectangular block of the house. The hipped roofs are relieved in most of the houses by a projecting gabled wing facing the street. For all but one of the houses the roof forms incorporate hipped and gabled forms. Slate with terracotta tile trim is the dominant original roof material, although this has been replaced on some roofs. Glazed tiling to the roofs is not original and could in due course be replaced with more appropriate roofing materials. Verandahs are incorporated into the front elevation, usually offset by a gabled wing.

Materials and Colours

Face brickwork walls dominate, trimmed with battened fibro to the gables. Original roofs surviving in the group are slate with terracotta trim. Verandahs are framed with timber incorporating decorative fretwork and balanced by decorative timberwork to the gables.

Doors and Windows

Various forms of windows and doors are used but are not all combined in a single dwelling. The proportion of wall space to fenestrations is important, as is the vertical proportions of most of the openings.

Carparking

Carparking is set well behind the front building alignment. Driveways utilise side streets where possible, otherwise are restricted to single width.

Fencing

Original fencing is reasonably low and usually incorporates a masonry base of either face brick or sandstone. Transparent panels of either metal or timber pickets are used between piers.

Subdivision

Apart from Euroka at 9 Gipps Street that preceded the subdivision, the allotments of this Conservation Area were of regular size with 40-44 foot frontages.

Landscape Elements including Paving and Driveways

Front gardens are dominated by lawn with plantings of low shrubs.

Refer to Figure App1.17

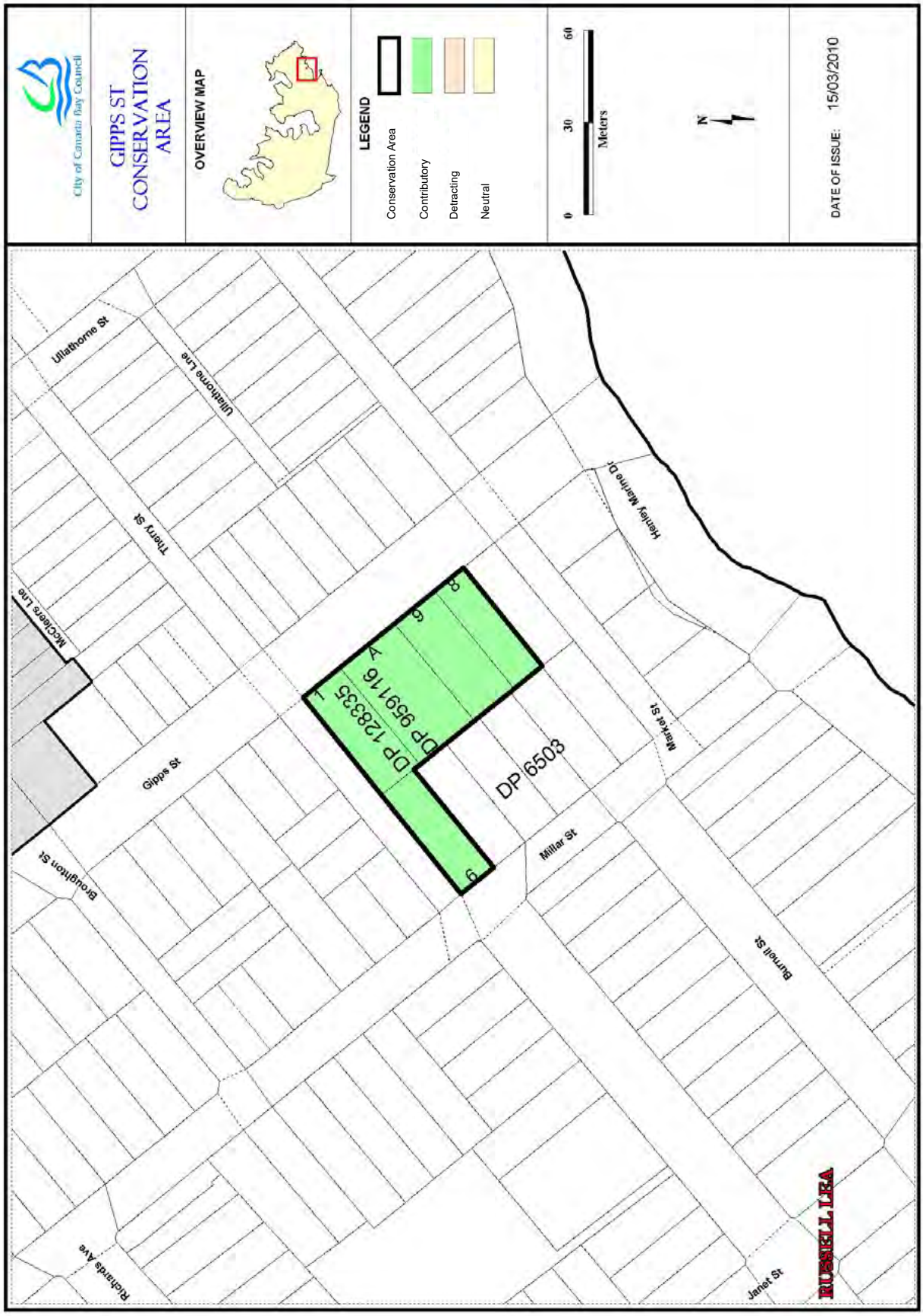

Figure App1.17 Gipps Street Conservation Area

CA.11 Hampden Road Conservation Area

History

The north and south sides of Hampden Road were subdivided in two separate subdivisions in 1915. The north side of the road was part of the Five Dock Estate subdivision and the south side was part of the Liryclea subdivision. Apart from the Victorian house Faleofa, facing Lyons Road, that preceded the 1915 subdivisions, most of the development of this conservation area followed soon after the subdivisions. Faleofa was further subdivided in 1928 prior to the construction of shops on the corner of Lyons and Hampden Roads.

Description

This is a predominantly residential group with largely intact houses from the late Federation and Inter-War periods as well as the Victorian house Feleofa and some Inter-War shops on the corner of Lyons Road.

The houses include a very fine group of c1915 houses of matching style with terracotta shingle roofs, well set back from the road in garden settings. The group represents the mix of development that took place in the Edwardian period with houses ranging from modest but well detailed semi-detached residences to more impressive two storey houses through to idiosyncratic arts and crafts cottages. The shops on Lyons Road are typical of the Inter-War period. As a substantial Victorian house, Faleofa provides a contrast to the group.

Statement of Significance

The Hampden Road, Drummoyne Conservation area is one of the rare surviving streetscapes on a main road in the municipality. Located on the main road through Drummoyne and Five Dock this group is of high visual value. The group also includes a substantial and attractive Victorian residence, Faleofa, illustrating the earlier development of the area. The commercial building on the corner of Lyons Road and Hampden Road demonstrates the importance of these roads in the local transport network.

Future Character

The Federation to Inter-war housing should be retained without demolition and in its historic form to the street with retention of facade materials and details. Additions should reflect the character of the existing buildings to retain the streetscape and the heritage value. Garages and carports should not be added in front of the building line.

Analysis - Setting

The houses in this group have reasonably deep setbacks from the street. Street trees and the slope of Hampden Road contribute to the setting of this group.

Scale

This conservation area has a consistent single storey scale to Hampden Road with the larger two storey residence Faleofa on a larger site fronting Lyons Road.

Form

The front of the houses are generally broken down with a verandah section and a projecting room with a gabled or hipped roof. Roofs include low to medium pitched hipped and gabled forms, most clad with terracotta tiles or slate. The commercial building contrasts with a solid parapeted form.

The facades typically incorporate verandahs with heavy masonry piers. Awnings are also used to provide interest in the street facades.

Siting

Houses fronting Hampden Road have regular front and side setbacks. The commercial building at the corner of Lyons Road contrasts with these and with Faleofa by having no street setback.

Materials and Colours

Dark face brickwork is almost exclusively used in this conservation area. This blends well with the terracotta and slate roofs.

Doors and Windows

Windows are usually timber casements in pairs or groups of three or double hung windows in groups.

Carparking

Single driveways with garages or carports located well behind the building line.

Fencing

Surviving original fencing is generally low brick or sandstone fencing.

Landscape Elements including Paving and Driveways

Most houses in the group have established gardens with trees and shrubs in the front garden.

Subdivision

The houses in this group fronting Hampden Road have a reasonably regular allotment size.

Refer to Figure App1.18

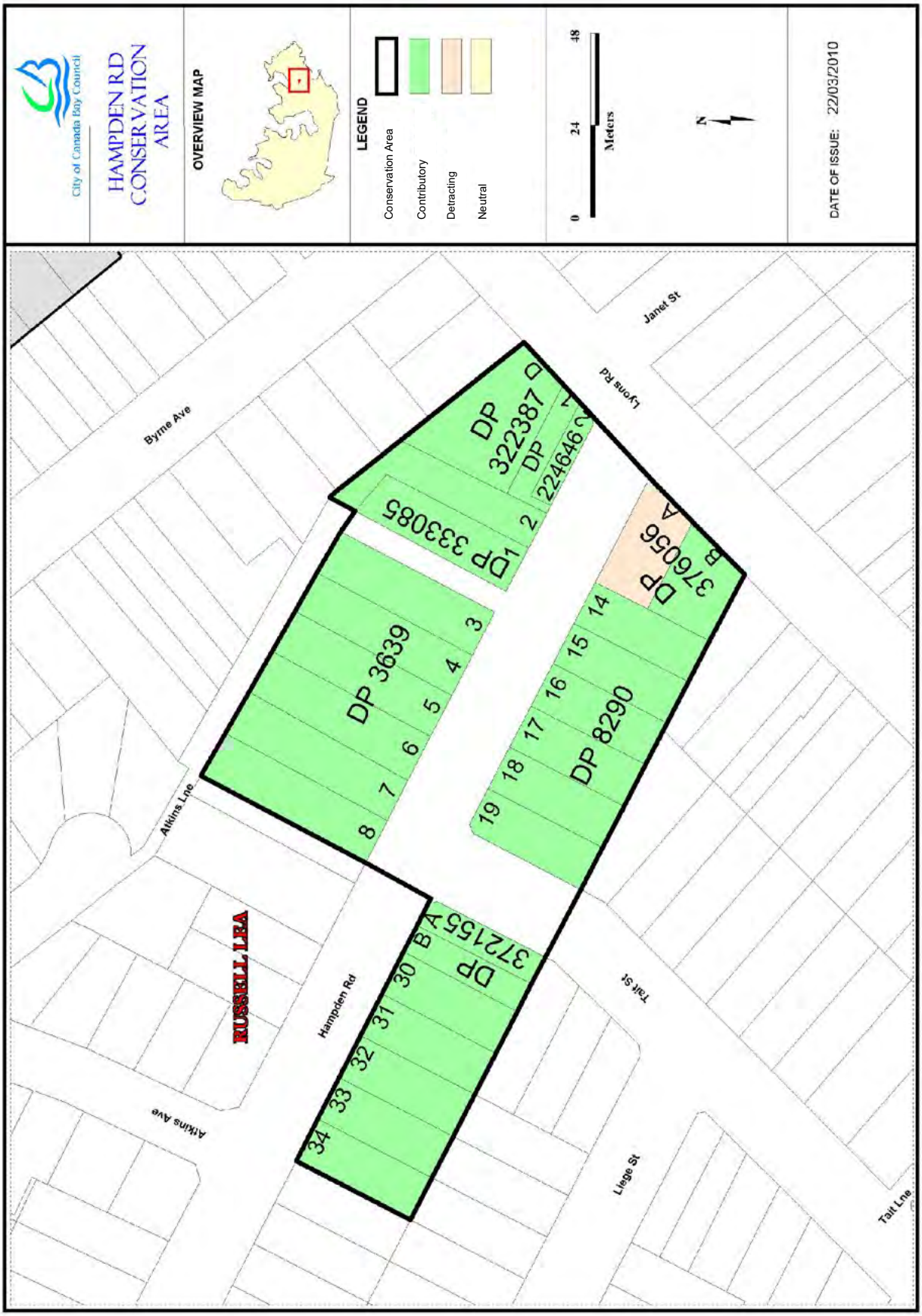

Figure App1.18 Hampden Road Conservation Area

CA.12 Lindfield Avenue Conservation Area

History

Lindfield Avenue was created by a 1928 subdivision and was originally called Ardath Avenue. The Inter-War California Bungalows that line this street were built soon after.

Description

Lindfield Avenue is a short cul-de-sac featuring facing rows of consistent Inter-War California Bungalows, set in period gardens. The buildings display a high degree of integrity, with one notable exception. The street facades of the buildings are remarkably intact, as are fences and period garden features.

Statement of Significance

The Lindfield Avenue Conservation Area is an excellent local example of an Inter-War subdivision, in an area noted for its 1920s and 1930s streetscapes. It is also considered one of the best examples in the Sydney region of a streetscape of Inter-War California Bungalows. The high consistency of design suggests development within a very short time span. The street facades of the buildings are remarkably intact, as are fences and period garden features. The subdivision consists of a street and is unusual locally for its cul-de-sac design.

Analysis - Setting

Designed as a cul-de-sac, Lindfield Avenue is an enclosed streetscape. Street plantings are mixed with some clipped hedges and more recent plantings of native plants.

Scale

Apart from one rear addition, this is a street of single storey houses.

Form

The Inter-War California Bungalow form is exclusively used in this area. It features low to medium pitched gables facing the street with a front verandah an important part of the main elevation of the house.

Siting

The houses have regular setbacks from the street. A deeper setback from one side allows vehicular access to the rear of the allotments.

Materials and Colours

Houses that have not been altered have face brick trimmed with render to lintels and battened fibro to the gables complemented by terracotta tiled roofs.

Doors and Windows

Windows are usually timber casements sashes in groups of two or three, often with horizontal sun hoods. Later houses have groups of double hung windows, sometimes in a chamfered bay. Doors are often glazed and sometimes are paired.

Carparking

Garages and carports are usually set well back from the front building alignment.

Fencing

Original fencing is usually low brick panels between brick piers. Metal rails or wrought metal panels are sometimes used between piers.

Landscape Elements including Paving and Driveways

Street trees are important in this conservation area. Front gardens are usually dominated by lawn with low plantings of shrubs to provide interest.

Refer to Figure App1.19

Figure App1.19 Lindfield Avenue Conservation Area

CA.13 Majors Bay Road Conservation Area

History

Commercial development in the early twentieth century tended to be in ribbons lining major transport routes. The development along Majors Bay Road followed this pattern, taking advantage of the importance of the road in connecting Queens Road to the industrial areas at Mortlake. It also relied on the importance of Wellbank Street to provide a direct link to North Strathfield Railway Station.

On the east side of Majors Bay Road between Wellbank Street and Jones Street the Terrabona Estate subdivision of 1915 appears to have provided the impetus for commercial development along Majors Bay Road. The precinct was planned as a commercial boulevard to complement the Inter-War housing boom in Concord.

Description

The commercial precinct of Majors Bay Road between 48-114 Majors Bay Road on the west side and 23-95 Majors Bay Road on the east side is dominated by Inter-War commercial development. The buildings are generally two storey with retail premises on the ground floor and offices or flats on the upper floor. Parapet walls front the street on most buildings and the floors are divided on the facades by cantilevered awnings. Some residential buildings survive on the west side of Majors Bay Road.

Statement of Significance

This commercial precinct reflects the importance of Majors Bay Road and Wellbank Street in providing connections from the main transport links of Queens Road to the south and Strathfield North Railway station to the west with the industrial area of Mortlake and with the growing residential development of Cabarita from the Inter-War period to the late twentieth century.

The Majors Bay Road commercial precinct is a good quality streetscape dominated by Inter-War commercial buildings. The consistent scale and rhythm of facades, and use of materials contributes to an attractive streetscape.

The Majors Bay Road commercial precinct provides a focal point for the local community and continues to function as a popular meeting place.

Analysis - Setting

This conservation area derives its importance from its location at the junction of two important local roads.

Scale

Two storey development is dominant with ground floor used for retailing and the upper floor for office or residential use. A few single storey shops and houses are scattered through the group.

Form

These are two storey buildings usually with no setback from the street or side boundaries creating a continuous wall to the street. The buildings are usually parapeted. Roofs are usually tiled. The buildings have engaged piers at regular intervals reflecting traditional structural spans.

Recessed verandahs were incorporated into the upper floor of many of the commercial buildings, some of these have been filled in. The lower floors of the earlier buildings in the group generally have commercial shopfronts.

The freestanding buildings in the conservation area are more residential in form with hipped and gabled roofs and usually with front verandahs.

Siting

Most buildings in this group have no setbacks from the front and side boundaries.

Materials and Colours

Masonry is used for most buildings. Face brickwork trimmed with rendered or decorative details was the most common wall treatment. Rendered panels in the parapet provide space for signs. Other buildings have rendered facades with decorative rendered details.

Doors and Windows

Windows to the upper floors are often in square or arched openings, infilling the original open verandahs. Some buildings retain the French doors opening to the upper verandahs.

Refer to Figure App1.20

Figure App1.20 Majors Bay Road Conservation Area

CA.14 Marlborough and Tavistock Streets Conservation Area

History

The South Hythe subdivision of the 1870s included all the land west of Lyons Road, between the present Victoria Road and Bayswater Road. It included Tavistock, Marlborough and Westbourne Streets, establishing the general street layout that survives to the present day. Many of the initial purchases were for a number of allotments. Speculative development and subsequent subdivision in the Federation and Inter-War periods created rows of housing of similar scale, form and materials.

The housing on the southeast side of Tavistock Street and from 21 to 39 Westbourne Street appear to have been groups of speculative development built in the Federation period. Groups of semi-detached houses have since been subdivided to allow individual ownership. 43 Marlborough Street also dates from this period.

The houses at 4-8 Tavistock Street were probably built soon after a re-subdivision of land fronting the present Victoria Road in 1915. Those at 10-12 Tavistock Street along with 26-28 Marlborough Street are also part of one development comprising detached and semi-detached houses.

Description

The character of the Marlborough and Tavistock Streets Conservation Area is defined by:

- a consistent row of speculative semi-detached Federation houses in Westbourne Street,
- consistent Federation housing, both semi-detached and free standing, on the southeastern side of Tavistock Street including a very good group of speculative semi-detached Edwardian houses towards Victoria Road.
- a group of Inter-War bungalows on the northwest side of Tavistock Street between Victoria Road and Marlborough Street, extending along Marlborough Street.
- consistent Federation housing on the northeast side of Marlborough Street.

The housing in the Conservation Area is predominantly of c.1910 to 1930 construction. It has a consistent character dominated by single storey housing of dark face brick, terracotta and slate roofing, hipped and gabled roof forms and front verandahs.

Statement of Significance

The Marlborough and Tavistock Streets, Drummoyne Conservation Area is of significance for its largely intact early twentieth century residential development. The group has an overall homogeneity due to consistent use of materials, scale, setbacks and forms. Groups of speculative development also contribute to the regular rhythms in the streetscape.

Objectives

To retain the high level of integrity and homogenous character of the group.

To ensure new development does not detract from established rhythms in the streetscape created by the group.

Analysis - Setting

Groups of houses within each block have regular setbacks. The setbacks of the groups of semi-detached houses are usually less than for the free standing houses.

Plantings of street trees as well as trees in front gardens adds to the amenity of this conservation area.

Scale

This conservation area has a dominant single storey scale facing the street.

Form

The groups of houses within this conservation area have regular form and massing. Front verandahs are an important element of the front of the houses. Gabled elements are used in most of the roofs as either a complement to the main hipped roof or as the main roof form facing the street.

Materials and Colours

Terracotta and/or slate are the dominant materials for roofs and are complemented by face brick walls with some rendered and/or battened fibro sheet for contrast. Verandahs have face brick piers and balustrades with timber posts. Driveways are formed with concrete strips.

Doors and Windows

Casement windows are common with some use of double hung sashes. French doors are also used to provide access to verandahs. Front doors usually have toplights and, where space permits, might have sidelights.

Carparking

Some freestanding houses have space for parking at the rear of the allotment. Many of the semi-detached houses have no space for on-site parking that does not intrude on the front garden.

Fencing

Original fencing is usually low allowing good views from the footpath to the houses. Fencing often incorporates masonry elements including sandstone and low face brick walls, often with pipe rails. More recent fencing has a variety of picket fencing.

Landscape Elements including Paving and Driveways

Street trees are important to the character of this area and are reinforced with mature trees in front gardens. Front gardens should incorporate low shrubs and lawn areas.

Refer to Figure App1.21

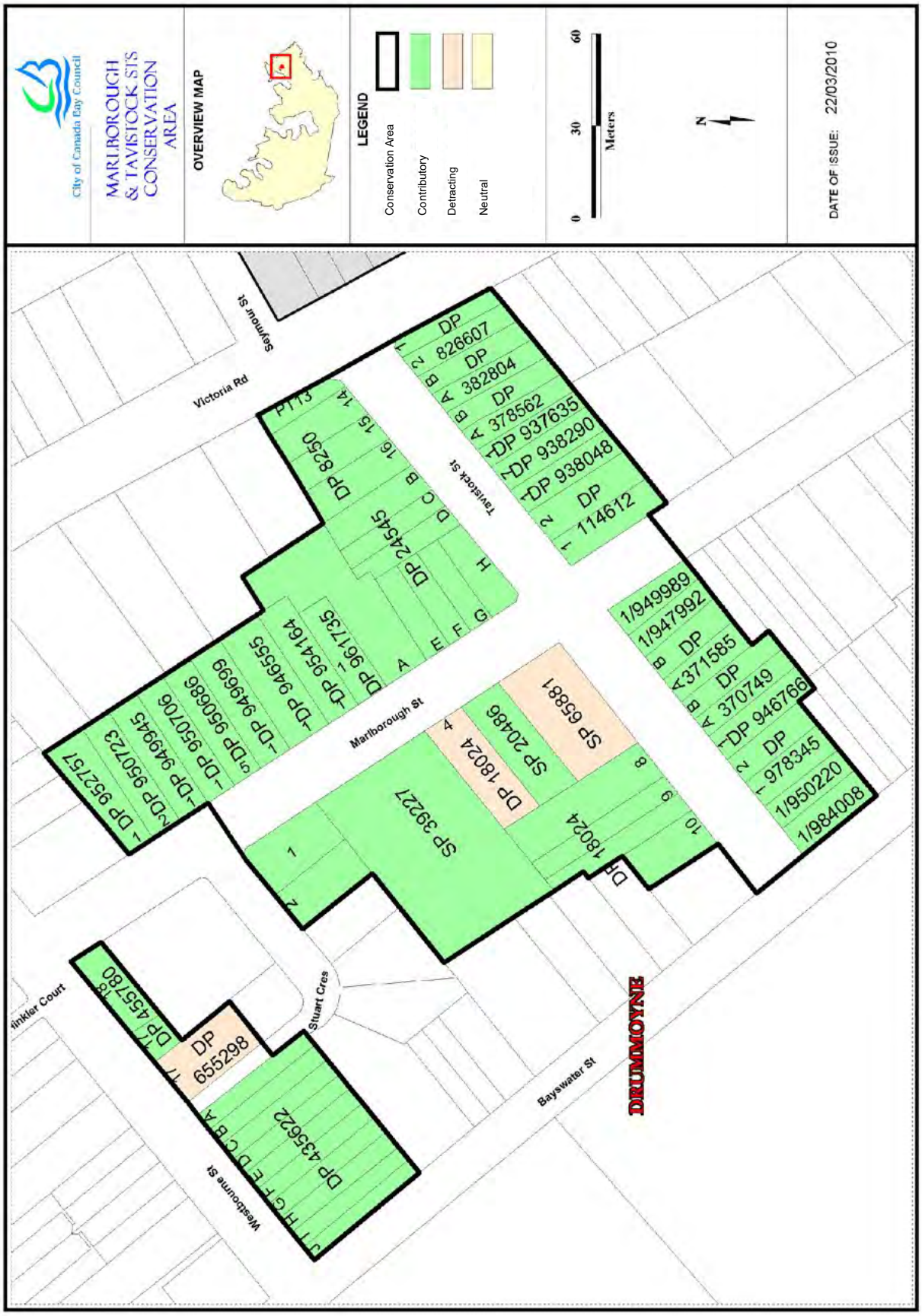

Figure App1.21 Marlborough and Tavistock Streets Conservation Area

CA.15 Mons Street and Boronia Avenue Conservation Area

History

This conservation area comprised two subdivisions; the Sunlight Estate subdivision of 1926 creating Mons Road and the Boronia Avenue subdivision of 1927.

Description

The Mons Street and Boronia Avenue Conservation Area is dominated by Inter-War California Bungalow style housing creating a regular rhythm of gables in the streetscape. Street plantings of box hedge in Mons Street have been pruned ensuring the houses have a close relationship to the street.

Statement of Significance

The Mons St and Boronia Avenue Conservation Area contains a very intact group of Inter-war houses representing the major sub-division of the Municipality that took place during this period. The group is one of a small number of excellent groups in the Five Dock/ Russell Lea area that demonstrate the pattern of sub-division of the Municipality and which contain a very fine representative group of houses from one period, mostly with intact settings and detailing. Most houses in the area have not been substantially altered.

Objectives

The high level of integrity of this group is a key feature, which should be retained. With only one or two significant alterations to significant properties there should be no demolition of existing early housing, controls on first floor additions to retain the character of housing and retention of façade details such as windows and wall treatments. Garages and carports should not be added in front of the building line.

Analysis - Setting

The houses in this conservation area have regular setbacks from front boundaries. Side setbacks are wider on one side to allow vehicular access.

Street trees are restricted to clipped box hedges.

Scale

The housing in this conservation area was originally single storey development, consistent with the low horizontal character of the Inter-War California Bungalow style.

Form

The Inter-War California Bungalow style that dominates this Conservation Area has strong low-medium pitched gabled roof forms facing the street. Verandahs are incorporated into the front elevations and emphasise the low horizontal lines of the houses.

Materials and Colours

Face brick walls trimmed with rendered lintels and battened fibro gables. Original roofs are of terracotta tiles.

Doors and Windows

Windows facing the street are grouped sets of casement sashes, often with horizontal sunhoods. Front doors are simple glazed doors, sometimes in pairs.

Carparking

Carparking is provided well behind the building line of most houses.

Fencing

Original surviving fencing is low face brick fencing of piers and panels. The low brick panels usually had a metal pipe or panel above.

Landscape Elements including Paving and Driveways

Single driveways to the side of the house. Front gardens are dominated by lawns with low shrubs providing interest. Street plantings are restricted to clipped hedges.

Refer to Figure App1.22

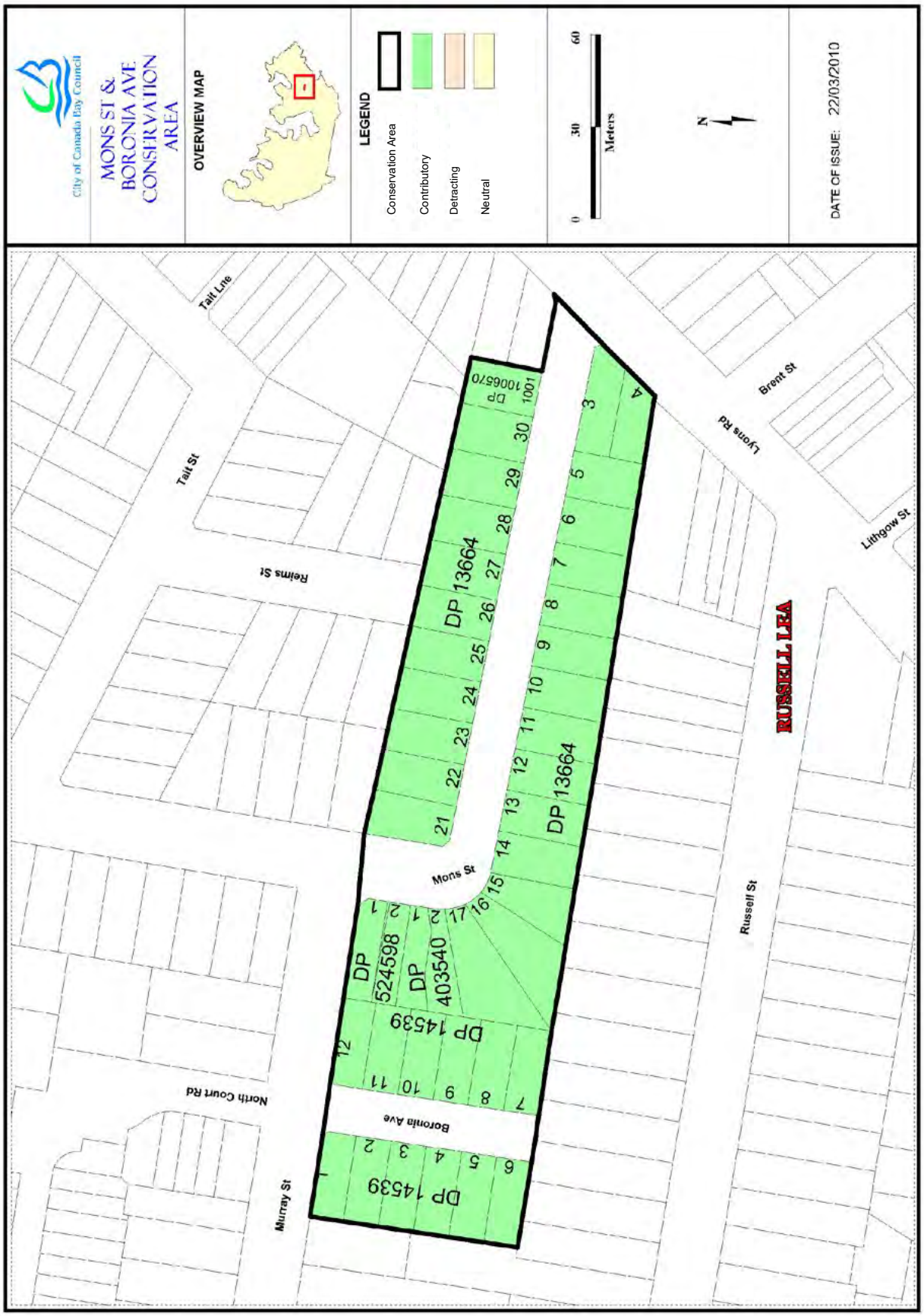

Figure App1.22 Mons Street and Boronia Avenue Conservation Area

CA.16 Moore Street Conservation Area

History

The Lyonsville subdivision of the 1880s created Moore Street and Short Street. Development of small cottages followed through to the Inter-War period.

Description

The Moore Street Conservation area encompasses a range of building styles and periods of construction, typifying the pattern of development of the central areas of Drummoyne. The earlier development relates to waterfront activity and extends from late nineteenth century through to the Inter-War period with several fine bungalow influenced cottages and semi-detached buildings. The street also contains a very good range of timber buildings from the first decade of the twentieth century or possibly earlier. On the corner of Short Street is a two storey store and commercial building that provides a focal point in the streetscape.

Statement of Significance

The Moore Street Conservation Area includes a variety of houses that, while modest, display fine detailing and varied forms that are not generally seen in Drummoyne. Buildings of particular interest in this conservation area are the large timber house at no 40, the two storey corner store and residence, one of three very good examples in the municipality, the fine timber houses, and several very modest timber and fibro cottages. Together, these buildings represent the early development of the street and its lower status than the south side of Lyons Rd.

Analysis - Setting

Moore Street has a gradual slope down from Lyons Road. Groups of cottages have fairly regular setbacks from the street. The two storey shop at the corner of Short Street provides contrast with no setback from the street frontages. Street trees also contribute to the amenity of the street.

Scale

Single storey scale is dominant in this conservation area.

Form

Most houses have simple rectangular forms with hipped roof forms relieved by gabled elements. Verandahs provide depth to the front elevations of the houses.

Materials and Colours

Weatherboard and face brick are the common wall materials in this group. Roofs were originally either corrugated steel or terracotta tiles.

Doors and Windows

Windows are usually in vertically proportioned openings. Double hung windows are most common with sets of casement windows used in some later houses. Front doorcases usually incorporate toplights and, on larger houses, sidelights.

Carparking

Where space allows, car parking has been set behind the building line. Few carports and garages have been located in front of the main building line in this conservation area.

Fencing

Original surviving fencing includes low masonry fencing of either sandstone or face brick. Some reproduction picket fencing has been introduced.

Landscaping Elements including Paving and Driveways

Front gardens are usually dominated by lawn with low plantings of shrubs to provide interest.

Refer to Figure App1.23

Figure App1.23 Moore Street Conservation Area

CA.17 Mortlake Workers' Housing Group

History

Mortlake township began with the establishment of the Australian Gas Light Company's works at Mortlake in 1886. Subdivision of the township took place in the following 2 years. The houses at 46-50 Gale Street were built soon after the subdivision of the township closely followed by the houses at 4-8 Tennyson Road.

Description

A group of single storey houses from the late Victorian and Federation periods.

Statement of Significance

The Tennyson Road conservation area is an interesting group of workers' housing from the late Victorian and Federation period directly relating to the development of the AGL gasworks and the establishment of the Mortlake township. The group makes an important contribution to the streetscape and forms a precinct of great charm and character.

Analysis - Setting

The group is set on various size blocks at the corner of the two streets with rear lane access to garages and carports. The adjoining scale is predominantly single storey with a mix of Victorian and Federation cottages with some later infill development.

Scale

The houses are single storey with no second floor additions. There is some later, two storey development close by.

Form

The group is in the Victorian and Federation cottage form style with double fronted elevations and front verandahs or gables.

Siting

The front setbacks vary due to the angled nature of the lots with small gardens to the front.

Materials and Colours

The houses are in a variety of materials with timber weatherboards, rendered masonry and stone. Roofs are in tile and corrugated metal. 8 Tennyson Street is unusual in being in timber with the boards cut to appear as stone. 48 Gale Street is in sandstone with an Italianate style verandah with decorative lacework.

Car parking

The rear lanes provide car access to rear garages and carports.

Fencing

The front fencing varies with masonry walls, picket and timber fences or with the garden open to the footpath.

Landscape Elements including Paving and Driveways

Small front gardens generally laid to lawn with some shrub planting

Refer to Figure App1.24

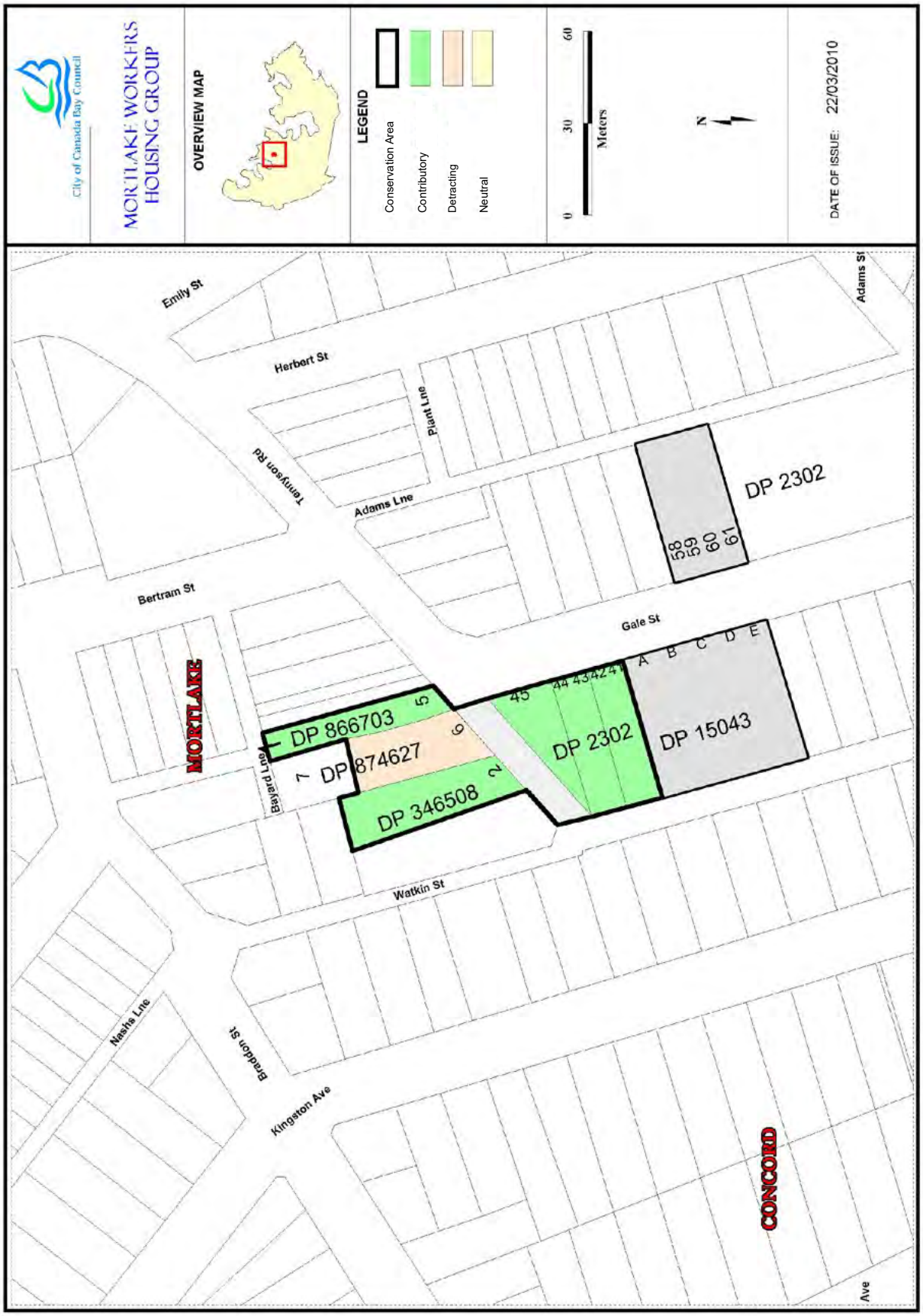

Figure App1.24 Mortlake Workers' Housing Group

CA.18 Park Avenue Conservation Area

History

Longbottom Stockade was established in the eighteenth century as an overnight detention centre for convicts on their journey between Sydney and Parramatta. From 1840 to 1842 it was used to house 58 French speaking Canadian rebels. A ramshackle settlement gradually grew around the stockade that was gradually falling into disrepair. In 1843 the Village of Longbottom was laid out to formalise the settlement and included the south side of the present Park Avenue. The large allotments from this settlement generally survive on the south side of Park Avenue, although the west end was re-subdivided in 1927.

Description

A grouping of early homes on large allotments, generally well set back from the street. The group includes a number of Victorian villas, all enjoying an outlook over the park opposite.

Statement of Significance

Park Avenue, Concord is a notable group of heritage homes on large allotments, enjoying an outlook over public parkland. It includes a number of outstanding Victorian villas with large front gardens, rare for Concord. The large lots and deep setbacks are unique in the Council area. The group has considerable aesthetic and historical significance.

Analysis - Setting

Goddard Park on the north side of Park Avenue provides a setting for this conservation area. Street plantings and large front gardens reinforce the amenity provided by the park.

Scale

Park Avenue includes larger one and two storey houses, usually on large allotments.

Form

The houses in this conservation area have a variety of forms. Most of the original houses in the group were built with generous verandahs on the front of the house taking advantage of the northerly aspect and view of Goddard Park.

Siting

Most of the contributory houses in this group have generous setbacks from the front boundaries.

Materials and Colours

Masonry is the dominant wall material with render used on some of the earlier homes. Roofs are either slate or tiled.

Doors and Windows

Vertically proportioned double hung windows are most common in this conservation area. Front doorcases incorporate toplights and sidelights. French doors are also used with verandahs.

Carparking

Garages and carports have usually been set behind the front building line of contributory houses.

Fencing

Only one original fence survives in this group, an iron palisade fence with sandstone gateposts at 2 Park Avenue.

Landscape Elements including Paving and Driveways

Street trees add to the amenity of the area. Gardens are usually generous and incorporate lawns with mature trees and shrubs.

Refer to Figure App1.25

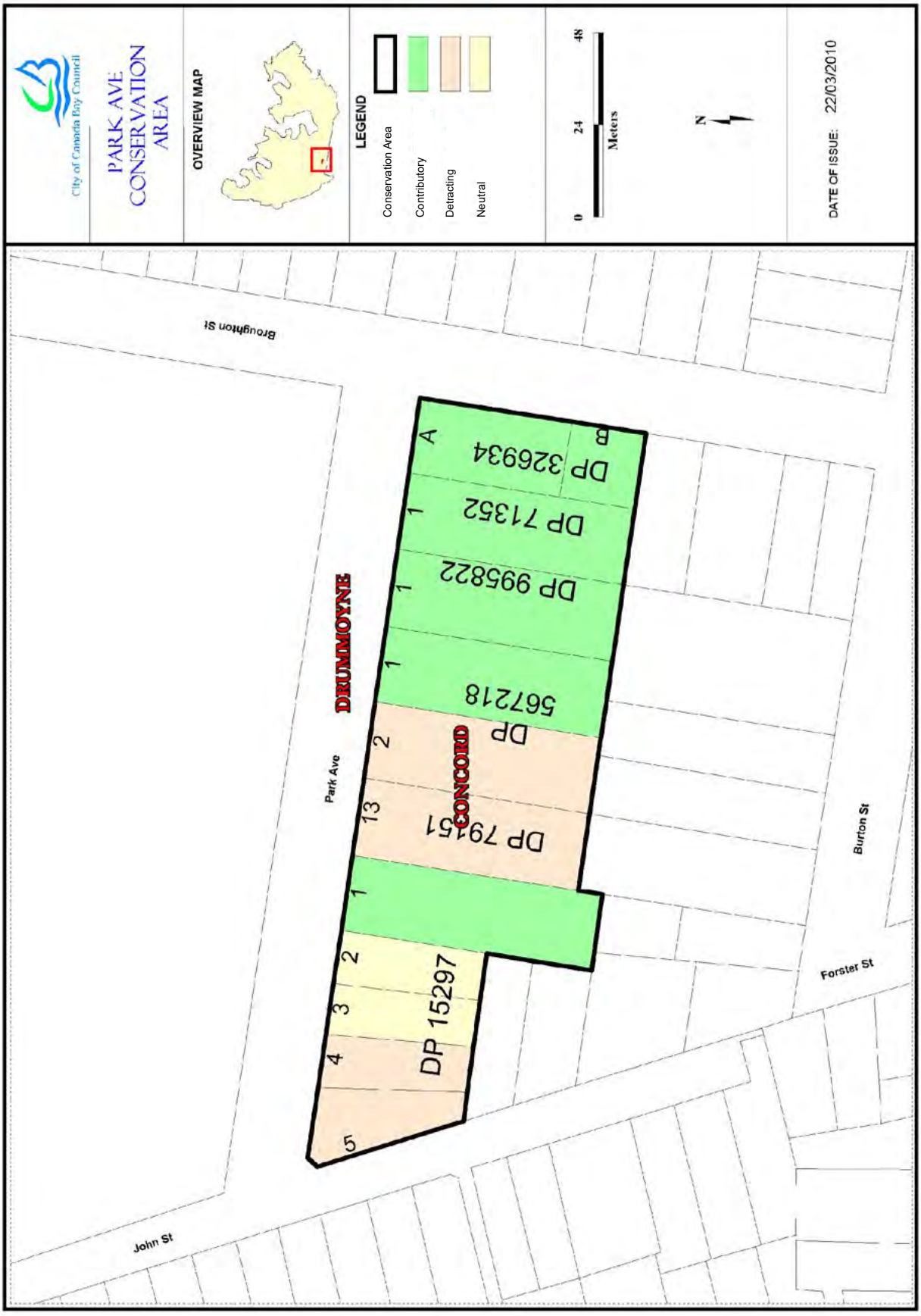

Figure App1.25 Park Avenue Conservation Area

CA.19 Parklands Estate Conservation Area

History

Parklands Estate, between Lyons Road and Barnstaple Road, was subdivided in 1927 creating Bennett Avenue and a cul-de-sac, Mitchell Street. This small group of houses were developed between 1927 and the late 1930s.

Description

The buildings stylistically are predominantly derivatives of Californian Bungalows with several later houses from the immediate post World War Two period at the end of the cul-de-sac which add to the group. All are fine if modest examples of the style and reflect the pattern of further sub-division that took place as larger estates were gradually broken up.

Statement of Significance

Developed in a short period from 1927, Parklands Estate has high heritage value locally as an intact group within an intact streetscape setting reflecting an excellent range of Inter-war housing types. The group is complemented by street planting, fencing and gardens.

Future Character

The high level of integrity of this group is a key feature which should be retained. With only one or two significant alterations to significant properties there should be no demolition of existing Inter-war housing, controls on first floor additions to retain the character of housing and retention of facade details such as windows and wall treatments. The important street planting should be retained. Garages and carports should not be added in front of the building line.

Analysis - Setting

The Parklands Estate has a relatively enclosed streetscape dominated by mature street trees.

Scale

Single storey scale is dominant, consistent with the low horizontal emphasis of the Inter-war housing styles in this estate.

Form

The houses in the Parklands Estate usually have multiple gables and include a deep verandah to offset a projecting room on one side of the street front.

Low-medium pitched roofs of terracotta tiles with multiple gables provide rhythm to the streetscape. Houses in the group from the later part of the Inter-war period have simple hipped roofs with glazed tiles.

Siting

Development in the Parklands Estate has a regular street setback. Side setbacks include a wider setback on one side to allow for vehicular access.

Doors and Windows

Windows are usually arranged in groups with bungalows having sets of casement windows. Later houses in the Parklands Estate have grouped double hung sash windows.

Materials and Colours

Terracotta roof tiles and dark face brick walls with light coloured rendered trim are typical of this streetscape. Windows are generally timber framed.

Carparking

Garages are usually located well behind the building line so that they are not visible in the streetscape.

Fencing

Many houses have reproduction picket fencing which, while not authentic to the Inter-war character of the houses, provides cohesion to the streetscape.

Landscape Elements including Paving and Driveways

Front gardens incorporate large areas of lawn with some planting of shrubs. Driveways are single width usually located to the side of the allotments.

Subdivision

The regularity of the original subdivision is important in establishing the rhythm of the streetscape.

Refer to Figure App1.26

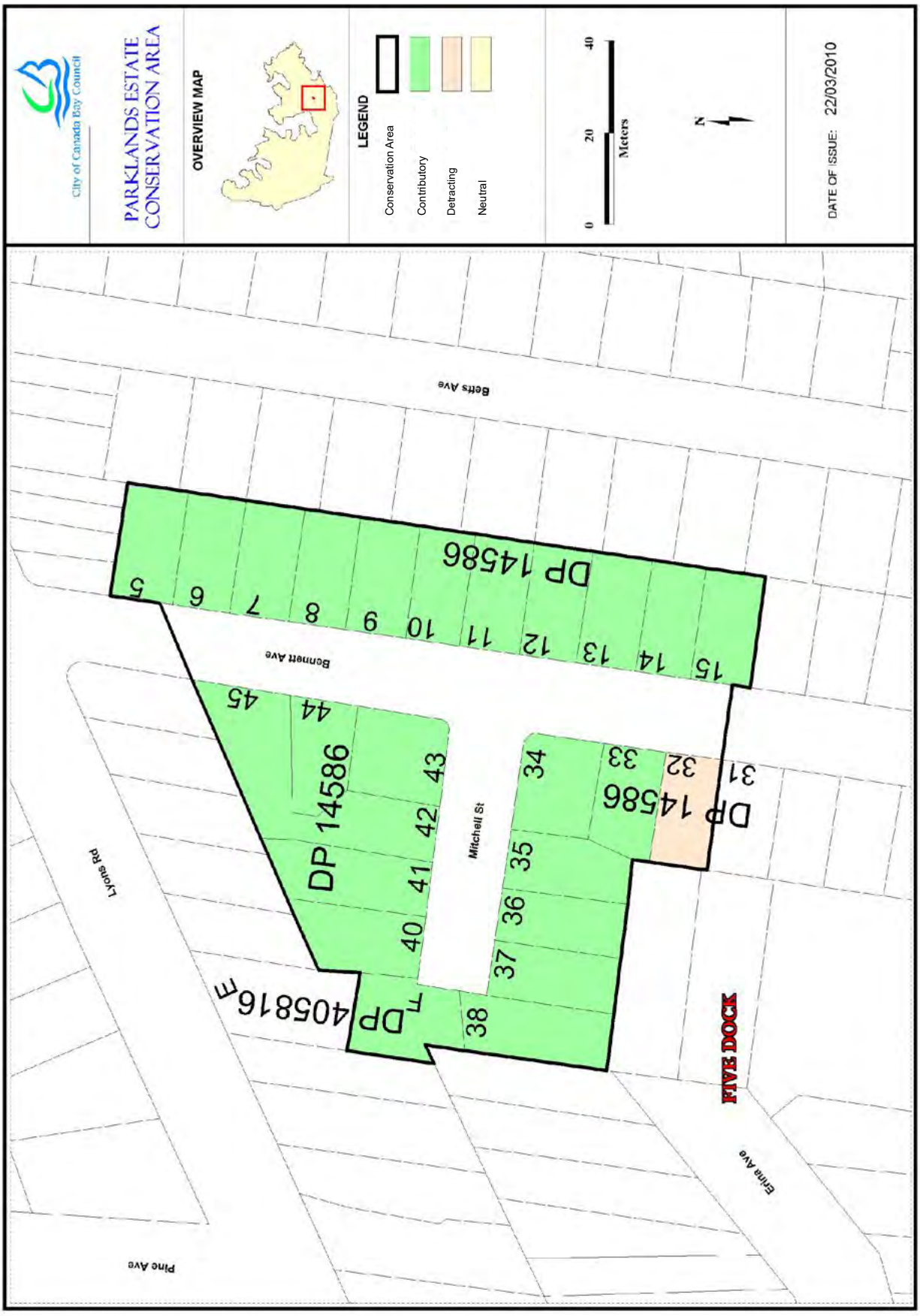

Figure App1.26 Parklands Estate Conservation Area

CA.20 Powell's Estate Conservation Area

History

Powell's Estate was subdivided in 1886 and included housing allotments with regular frontages. The allotments were wider further away from Parramatta Road. Rear lanes were incorporated into the subdivision, originally providing access for night soil collection. Due to the narrow allotment width (20 feet), many houses were built on double allotments. The main period of development of the estate continued through the late Victorian and Federation period. Much of this housing has survived through to the twenty-first century, except where removed to make way for the development of the M4.

Description

Powell's Estate is an area of late Victorian housing interspersed with Federation and Inter-War period housing on small allotments. The development includes a mixture of large individual homes and semi-detached housing. Street plantings add to the amenity of the area.

Statement of Significance

The Powell's Estate Conservation Area is a rare local example of Victorian period development. A number of the original Victorian homes survive, including some fine villas. The area retains considerable historical significance.

Analysis - Setting

The Powell's Estate has regular sized allotments on a rectilinear street layout. Street trees provide amenity to the area. Lanes now allow vehicular access to the rear of the allotments.

Scale

Single storey housing is dominant. A few one and a half and two storey houses are located on double allotments. A notable one and a half storey group faces Concord Road.

Form

The houses in this conservation area include free standing and semi-detached forms. Most have a simple rectilinear footprint to the main front wing and incorporate a verandah in the street elevation. Roofs are usually hipped, sometimes incorporating a gable as a feature.

Siting

Front setbacks are reasonably uniform along each street. Some larger houses have greater setbacks. Side setbacks are small, possibly as a result of the small allotments.

Materials and Colours

Rendered masonry is used for most of the Victorian houses and is complemented by slate roofs (where the original roofing survives). Later houses are face brick with tiled roofs. There are a small number of weatherboard houses with corrugated steel roofs.

Doors and Windows

Windows are vertically proportioned usually with timber double hung sashes. Some of the Victorian houses incorporate bay window elements. A few later homes have sets of timber casement sashes. Front doors usually incorporate a toplight and, in larger homes, sidelights.

Carparking

The rear lanes provide access for parking at the rear of the properties.

Fencing

Few original fences survive. Iron palisades might be expected for some of the larger Victorian houses. Smaller cottages could be expected to have timber picket fences. Later houses appear to have used brick fencing with low brick panels between brick piers.

Landscape Elements including Paving and Driveways

Front gardens are dominated by lawns with plantings of low shrubs.

Refer to Figure App1.27

Figure App1.27 Powell's Estate Conservation Area

CA.21 Sailsbury Street Housing Group

History

This group of houses is located on the 1886 Beaconsfield Square subdivision. They include cottages built soon after the subdivision through to the Inter-War period.

Description

This is a group of single storey verandahed cottages from the 1880s to the Inter-War period. The narrow setback from the street and the consistent scale and simple forms of these houses creates a cohesive streetscape.

Statement of Significance

This is a cohesive streetscape of cottages built soon after the 1886 Beaconsfield Square subdivision. They include cottages built soon after the subdivision through to the Inter-War period.

Analysis - Setting

The group is set on similar blocks with narrow setbacks from the street. The group contrasts with the open space and larger scale building of the public school on the opposite side of the street.

Scale

The houses are originally single storey, with one now having a first floor addition. This is consistent with the narrow width of the street

Form

The group have a range of cottage forms. All are based on simple rectangular cottages with hipped roofs and a front verandah. The later examples have a gabled element on the front elevation to provide interest.

Siting

The front setbacks are quite narrow. Some have a wider setback on one side to allow vehicular access.

Materials and Colours

The houses are in different materials. Traditional materials of weatherboard or face brick is used for walls and, originally, corrugated steel or terracotta tiles for the roof.

Car parking

Some of the cottages have sufficient side setbacks to provide access for rear garages. The narrow street setbacks limit parking in front of the houses.

Fencing

No original fencing survives. Fencing is low to medium height.

Landscape Elements including Paving and Driveways

The small front gardens are laid to lawn with some shrub planting.

Refer to Figure App1.28

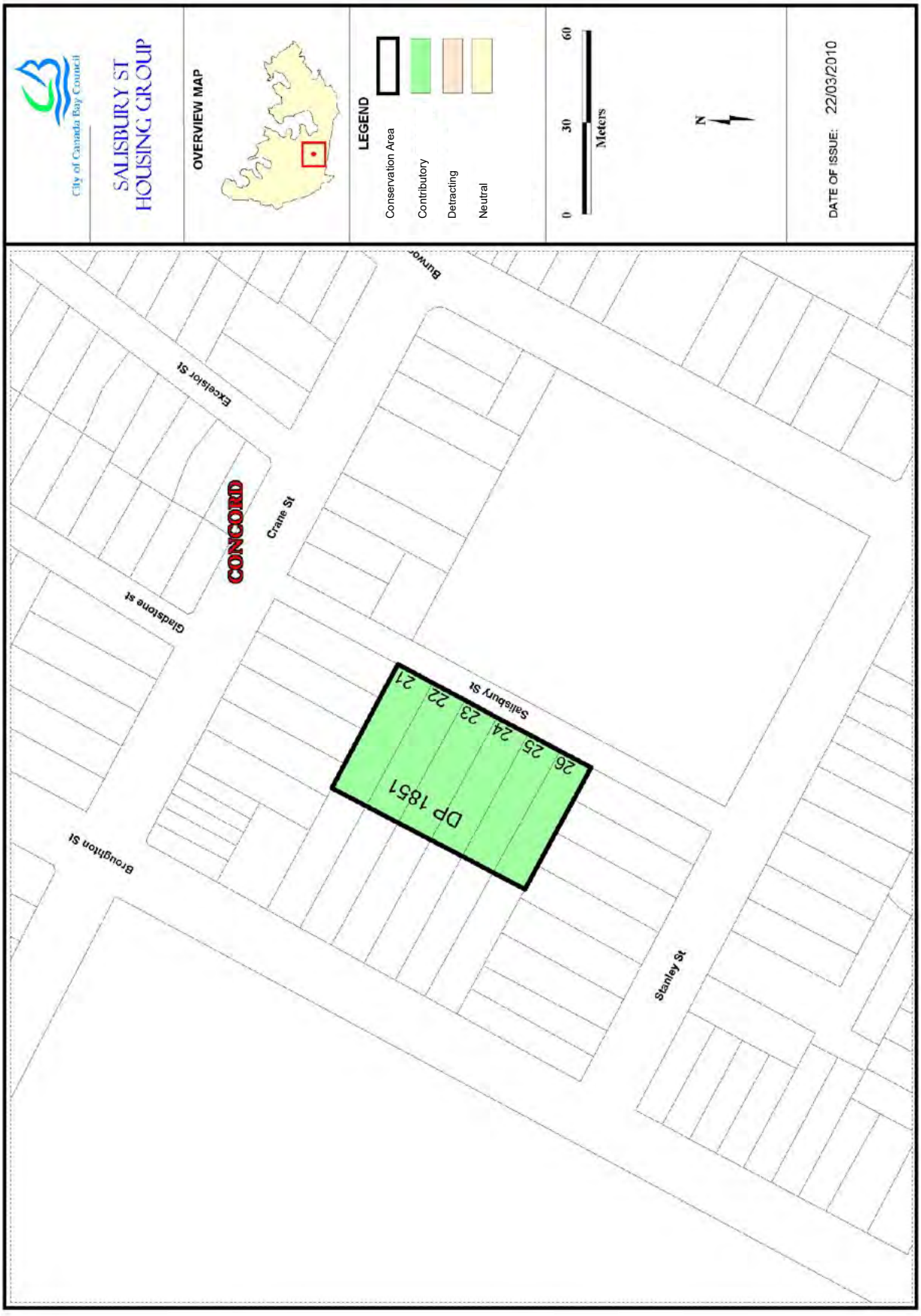

Figure App1.28 Sailsbury Street Housing Group

CA.22 Thompson Street Conservation Area

History

This terrace of seven houses was built on the 1904 subdivision of the Cometrowe Estate. The terrace remained under one title until 1958 when it was subdivided into individual allotments for each house.

Description

This small group comprises a row of single level terrace style housing with narrow frontages and matching facades. They have a strong Federation Queen Anne character.

Statement of Significance

The terrace of seven houses in Thompson Street is a very rare building form in Drummoyne. This is the only significant terrace in the Canada Bay Council area and is a strong form in the Thompson Street streetscape and illustrates one of the major stages of Drummoyne's development.

Objectives

The integrity of this row is to be retained without any alterations to the street elevations. No further painting of face brick walls should take place and timber joinery details should be retained.

Analysis - Setting

This terrace has a narrow setback from the street. The slope of Thompson Street away from Lyons Road adds interest to the group.

Scale

This is a single storey group.

Form

The houses have a repetitive pattern of verandahs and gabled fronts in front of a main roof slope.

The terracotta tiled roof is a regular gabled form parallel to the street with individual houses separated by parapet walls. Transverse gables are used on the projecting bays.

Siting

This terrace has a small setback from Thompson Street.

Materials and Colours

The face brick walls of this group have been painted. The roof is of terracotta tiles with crenellated ridging and rams horn finials.

Windows

Double hung windows are used in the projecting gabled fronts.

Carparking

No off-street car parking is provided with these houses.

Fencing

The street boundaries are marked by consistent low reproduction picket fencing.

Landscape Elements including Paving and Driveways

The houses have small front gardens sometimes incorporating shrubs and hedges. Paving is restricted to pedestrian paths.

Subdivision

The subdivision pattern of this group related directly to the individual houses.

Refer to Figure App1.29

Figure App1.29 Thompson Street Conservation Area

CA.23 Victoria Road Retail Conservation Area

History

Victoria Road can be clearly seen with its two phases of development; the earlier eastern side from the early years of the twentieth century and the western side which is predominantly post World War II development except where buildings were set well back from the street alignment. The eastern side of Victoria Road is of particular interest as it has survived the numerous road widenings that have removed much of the building stock on the opposite side of the road.

Description

This small group of retail buildings are a very fine example of Edwardian shopping centre development and form an almost intact streetscape across the crown of the hill. The buildings vary in style but the predominant form is the two storey building with shopfront below and residence over. A number of these have cantilevered balconies to the street of design interest and rarity. The other buildings are the post office, several well detailed buildings originally used for banks and the Inter-War commercial building on the northwestern corner of Lyons Road.

Statement of Significance

This Victoria Road, Drummoyne Retail Conservation area is a very good example of early twentieth century retail development, incorporating Edwardian, Classical Revival and Art Deco designs. With the Sutton Place shopping centre and the hotel on the opposite corner, these buildings create a significant townscape at this very busy and prominent corner. All of these buildings form a gateway to Drummoyne and establish a strong and key character. The survival of cantilevered verandahs on a number of the buildings adds particular interest to the group.

Objectives

The strong Federation to Inter-war character of these retail buildings should be retained with their masonry facades, often intact shopfronts, upper floor verandahs, parapet forms and overall consistent and intact streetscape setting. Original shopfronts should be retained. Infill buildings should respect the overall scale of the street development.

Analysis - Setting

This is an urban group with buildings abutting or separated by narrow walkways. They have visual prominence due to the location at the crest of a hill and the absence of a setback from the street alignment.

Scale

Generally two storey buildings, usually divided horizontally by an awning.

Form

Continuous street facades are modulated by cantilevered and recessed verandahs, regularly spaced shopfronts, fenestration patterns, use of piers to divide first floor façade and articulation of the parapet walls. Cantilevered balcony roofs are generally corrugated steel and use a skillion form. The main roofs are generally concealed behind parapet walls. This group is distinctive for the incorporation of cantilevered balconies to a number of the buildings. The first floor façade is generally articulated with engaged piers and a shaped parapet.

Siting

These commercial buildings usually have no setback from the street boundary and little or no setback from the side boundaries, forming a continuous wall to Victoria Road.

Materials and Colours

Walls of masonry contrasting with render. Some Inter-War buildings are finished with render incorporating decorative details. Face brick is important to the character of the Edwardian buildings.

Doors and Windows

A range of window openings are used, generally with a vertical emphasis. Larger window openings are avoided ensuring a regular proportion of wall and windows in the facades. Ground floor shopfronts are generally modern, although a few buildings in the conservation area are notable for being designed as a cohesive façade over both floors, undivided by an awning or balcony.

Carparking

Where available, car parking is at the rear of the site.

Refer to Figure App1.30

Figure App1.30 Victoria Road Retail Conservation Area

CA.24 Yaralla Estate Conservation Area

History

The Yaralla Estate conservation Area comprises a major part of the 1920 release of the Yaralla Park Estate. This was the largest single release of land for urban subdivision in the former Concord Municipality's history. It included the main entrance driveway to the old Walker Estate, retained on its original alignment as The Drive. The rapid development of the subdivision, closely associated with the Main Northern Railway, produced highly consistent Inter-War streetscapes.

The 1920 subdivision extended from Colane Street to the northern side of Wilga Street. The southern side of Wilga Street was developed shortly afterwards.

Description

This is an area of regular subdivision and generally uniform Inter-War housing. The repetition of the gabled roof forms of Inter-War bungalows create a strong rhythm in the streetscape and is reinforced by consistent use of dark brick and tiled roofs. Iandra Street at the north of the Conservation Area and Wilga Street at the south of the Conservation Area include groups of Inter-War cottages.

It includes significant street planting, most notably along The Drive. The area's original 1920s townscape character survives essentially unaltered. Subtle bends in the parallel street system add visual interest. The area includes a small neighbourhood shopping centre on Concord Road.

Statement of Significance

This 1920s precinct is representative of Concord's major developmental period. It is one of the best preserved examples of Inter-War streetscapes in the Council area and includes some of the Sydney region's best examples and some outstanding rows of typical 1920s bungalows, for which Concord is noted. The Drive has special significance as the alignment of the original entry to the Walker family's Yaralla estate.

The inclusion of subtle bends in the streetscape and of street planting adds to the distinctive qualities of this Conservation Area.

Analysis - Setting

The Yaralla Estate Conservation Area has long streetscapes of wide streets with subtle bends. Street plantings add to the amenity of the residential streets.

Scale

Single storey housing dominates the residential development in this conservation area. Two storey commercial development and flats facing Concord Road reflect the importance of that road as a main traffic route.

Form

The Inter-War California Bungalow style with its strong gabled form dominates this conservation area. Verandahs on the front of the house provide depth to the street facades. Later housing has a similar scale with verandahs incorporated below hipped roof forms.

Siting

Housing in the Yaralla Conservation Area has regular front setbacks from the streets. Most houses include a wide setback to one side to allow for vehicular access. This provides space between houses and helps reinforce the rhythm in the streetscape.

Materials and Colours

Face brickwork trimmed with render below terracotta or slate roofs is almost uniform in the Yaralla Conservation Area.

Doors and Windows

Windows are usually timber casement sashes in groups of two or three, often with horizontal sun hoods. Later houses have groups of double hung windows, sometimes in a chamfered bay. Doors are often glazed and sometimes are paired.

Carparking

Garages and carports are usually set well back from the front building alignment.

Fencing

Original fencing is usually low brick panels between brick piers. Metal rails or wrought metal panels are sometimes used between piers.

Landscape Elements including Paving and Driveways

Street trees are important in this conservation area. Front gardens are usually dominated by lawn with low plantings of shrubs to provide interest.

Refer to Figure App1.31 to Figure App1.33

Figure App1.31 Yaralla Estate Conservation Area - Overview

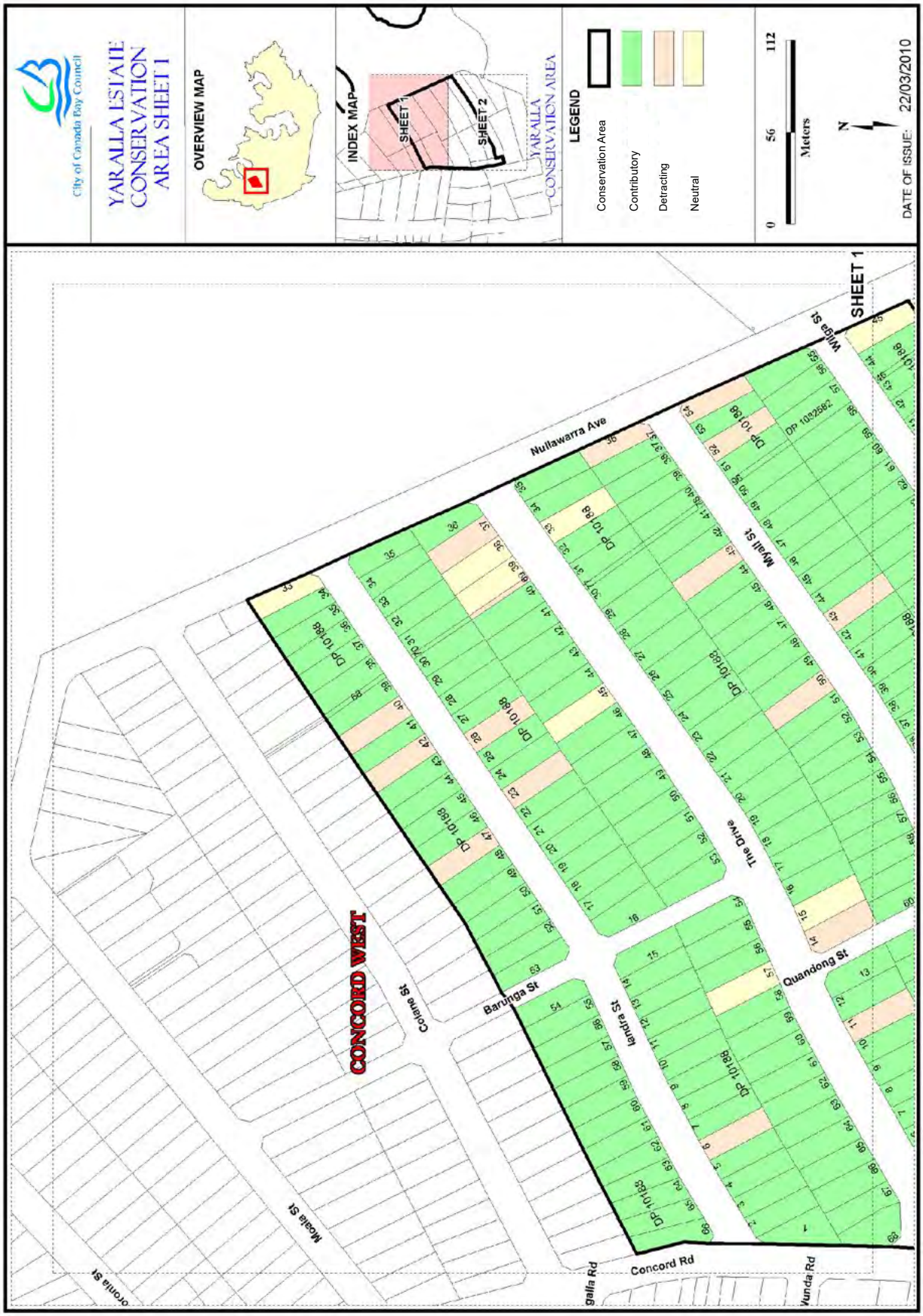

Figure App1.32 Yaralla Estate Conservation Area - Sheet 1

Figure App1.33 Yaralla Estate Conservation Area - Sheet 2

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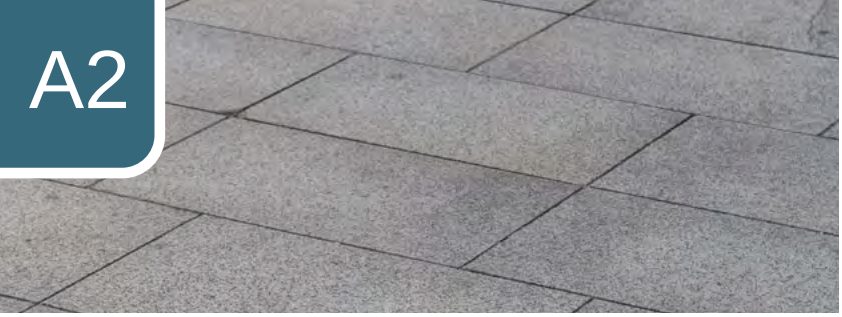
A2



APPENDIX 2 - ENGINEERING SPECIFICATIONS

ES1 Road and Footpath Works

Objectives

O1 Engineering Standards - To provide adequate engineering standards for public domain areas, public road reserves and private access roads.

O2 Uniformity - To ensure that there is a benefit to the public resulting from developments and the result is that the public is catered for by uniform infrastructure. Such infrastructure includes the road carriageway, footway, footpath, pavement, kerb and gutter, street trees, utility services, ancillaries and the like.

Definitions

D1 Components - The road reserve is defined by the following components:

- Footway - the section of land between the kerb face and the property boundary
- Footpath - the section of pavement within the footway dedicated for pedestrian and/or bicycle access
- Kerb and gutter - the separation or interface between the footway and vehicular (road) carriageway
- Road carriageway - the section of land dedicated for vehicular traffic
- Ancillary items - any stormwater drainage asset, road/street furniture, edging, lighting, poles, services, signage etc., that forms part of the road reserve

D2 Significant Developments - Major commercial and industrial developments, developments which occupy more than three sites across a street frontage, three or more allotment sub-divisions would be considered as "significant developments".

Controls

C1 Requirements - All development involving demolition and/or construction will be required to satisfy the requirements of this Engineering Specification.

C2 Footway Area Minimum Standards - The footway area shall be reconstructed to satisfy the following minimum standards.

Development	Requirement
1. Demolition only	Repair/ reinstate damaged areas not reported in the Damage Report Form or Dilapidation Report
2. Alterations and additions	Repair/ reinstate damaged areas not reported in the Damage Report Form or Dilapidation Report
3. New dwelling with existing footpath along frontage	Repair/ reinstate damaged areas not reported in the Damage Report Form or Dilapidation Report
4. New dwelling with no existing footpath	Repair/reinstate damaged areas not reported in the Damage Report Form or Dilapidation Report. Construct new footpath
4a. Dual Occupancy (duplexes, town homes, etc.) with no existing footpath	Repair/ reinstate damaged areas not reported in the Damage Report Form or Dilapidation Report. Construct new footpath
5. Residential Flat Building, commercial and mixed developments	Repair/ reinstate damaged areas not reported in the Damage Report Form or Dilapidation Report. Construct new footpath
6. Development under SEPP Housing for Seniors or People with a Disability	Repair/reinstate damaged areas not reported in the Damage Report Form or Dilapidation Report. Construct new or reconstruct existing footpath from site to nearest transport facility to ***AS1428.1*** compliance
7. Significant Development other than those listed herewith	Construct new footway, footpath, road carriageway and ancillaries
8. Subdivision of one into two allotments	Repair/ reinstate damaged areas not reported in the Damage Report Form or Dilapidation Report. Construct new footpath, ancillaries and access road/s
9. 'Greenfields' site, subdivision of more than two allotments	Construct new footway, footpath, road carriageway and ancillaries. Construct access road/s. For Rhodes Peninsular Developments refer to Appendix 5F for additional requirements

Footway

Re-grading the grassed verge within Footway

FW1 Footway Re-grading - The grassed verge within the footway is to be re-graded across the entire property frontage, for development types 7, 8, and 9, and in the following circumstances regardless of the development type:

- Grassed verge has cross-fall of more than 5% (1 vertical: 20 horizontal).
- Matching in with constructed and existing driveway/s.
- Existing grassed verge is difficult (undulating) for pedestrians to negotiate.
- The construction of a vehicular crossing into the site results in unreasonable undulations in the footway or steep level changes.
- The construction of a footpath pavement and/or re-alignment of the road carriageway require the footway to be raised or lowered to match.
- Access difficulties for both pedestrian and vehicular traffic would occur without adjustment of the verge.
- Walls and fences within the property boundary must match in with the new levels.

Minimum Footway Design Requirements

FW2 Constraints - When adjusting footway levels, factors such as the levels of adjoining properties, the degree of pedestrian usage, existing trees, rock outcrops and other physical features and the alignment of existing road, must be taken into consideration.

FW3 Minimum Design Criteria - The minimum design criteria are set out as follows:

- The longitudinal gradient of new footways shall not exceed 10%.
- The longitudinal change in gradient along footways shall not be greater than 1 in 10 with a minimum ease of 4.0 metres.
- A concrete footpath shall be constructed along the entire section of new footways.
- Where it is necessary to raise or lower the section of footway at the front of properties, the adjoining sections shall be re-graded to provide a smooth transition to the new levels.
- The construction of steps is generally not permitted unless the footway transition will extend more than 5.0 metres beyond the property frontage along the footway in order to achieve smooth transition.
- Where a footpath is to be installed and its longitudinal gradient exceeds 10%, over a distance of not less than 5.0 metres, steps may be installed subject to Council's approval.
- Grassed footway cross-fall shall be graded at 10% adjacent to the property boundary, where there is no formal or concrete footpath. The grassed verge near the kerb side shall not have a cross fall exceeding 5%. The absolute minimum footway cross-fall shall be at 1.0% (for grassed surfaces only). A footpath shall be constructed at all times. The footway shall be graded such that there will be no localised depressions which may cause water to pond or to allow the concentration of stormwater or directing stormwater into private property/s or creates a step or height difference which makes it difficult for the 85th percentile vehicle (B85) to open its doors on the verge side.
- Where access to properties is affected by re-grading of the footway, all work necessary must be done to ensure that satisfactory pedestrian and vehicular access is provided. This may necessitate transitions within the development. Where works are required on adjoining property/s, such as driveway adjustments, written consent from the property owner/s must be obtained.

Footway Material

FW4 Material - Material to be used for filling of the footway shall be of clean fill consisting of granular material of not less than 70%, free of vegetation, stumps, roots, rubbish, construction waste and other deleterious material.

FW5 Rock Excavation - Where excavation is in rock, the rock shall be removed to a depth of 300mm below the finished surface level and replaced with clean fill.

FW6 Topsoil - Minimum 100mm thick layer of topsoil shall be placed over the footway. Topsoil shall not contain more than 40% clay content. Clods in the topsoil shall not be greater than 50mm in diameter.

FW7 Ground Cover - The footway shall be protected with couch, kikuyu or buffalo or other types of ground cover to match the existing surface type which provides good protection from surface erosion.

FW8 Ground Cover Maintenance - The ground cover shall be maintained by the Developer for a minimum two (2) months after placement or laying.

FW9 Developer Responsibilities - The Developer shall be responsible, at his expense, for the replacement of dead ground cover during the first two (2) month period after placement.

FW10 Footway Acceptability - The footway will not be considered satisfactory if:

- The finished level of the footway adjacent to the kerb is below the top of the kerb or edging.
- There is a step-down or uneven transition from any foot paving or driveway crossing to the finished level of the footway.
- There are localised depressions in the footway which would cause the ponding of water or the concentration of stormwater runoff.
- There are areas of eroded or dead ground cover.

Footway within Private Property

FW11 Requirements of Footways - Generally footways for private access roads are not required unless access into the property/s, for example, as part of land subdivision including community title subdivision, requires the construction of an access road where its length exceeds 30 metres and no other safe access is made available for pedestrian thoroughfare.

FW12 Width of Footways - Where a footway is required, the width of the footway shall not be less than 1.2 metres with service corridor/s located within the footway area, where possible.

Footpath

Where Footpaths Required

FP1 New Concrete Footpath - Full concrete footpath construction is required across the entire property frontage for development types 4, 5, 6, 7, 8, and 9 and beyond the development frontage for development type 6.

FP2 Footpath Reconstruction - Full sections of footpath are to be reconstructed for development types 1, 2 and 3, replacing broken pavements to ensure safety for pedestrian thoroughfare.

Footpath Minimum Widths

FP3 Minimum Widths - Minimum footpath pavement widths are given in the following table.

Development type	Minimum Width (metres)
1, 2 and 3	Width to match existing but not less than 1.2m unless constrained by site conditions such as footway width being less than 1.2m
4	1.5
5, 6, 7, 8 and 9	2.0
Regardless of above development type, the footpath is a shared route	Width as per Aust Roads Guidelines

Footpath Design Requirements

FP4 Construction Material - All footpath pavements are to be constructed in plain full concrete. Pavers, bitumen, patterned concrete, coloured concrete, any other form of cosmetic treatment of concrete pavement or a combination of pavement types is not acceptable unless it has been approved as part of the streetscape planning of the area or the pavement is a replacement of an existing slab of similar material, pattern or colour.

FP5 Footpath Cross fall - Footpath pavement cross-fall shall be a minimum of 0.5% and a maximum of 2.5% (1 in 40 for disabled access) or absolute maximum 5.0% (where disabled access is not required).

FP6 Grading of Footpaths - Footpath cross-falls shall be graded away from the property boundary, towards the kerb and gutter or to an approved drainage system. Cross-fall must not be graded into private property/s.

FP7 Concrete Minimum Strength - The minimum concrete strength shall be 25 MPa at 28 days and 80mm slump in accordance with ***AS3600 – 1994, Concrete Structures Code.***

FP8 Concrete Thicknesses - Concrete shall be installed at the minimum uniform thicknesses as given in the table below (except where footpath is across driveways, in which case, it shall be the same thickness as the driveway slab). Concrete footpath shall be laid on a minimum 100mm thick road base (compacted to minimum 98% maximum dry density) or 50mm thick and well compacted sand (compacted to a density index of not less than 65%).

Footpath Width (metres)	Slab Thickness (mm)
1.2 to 1.5	75
2.0	100
2.5	130
> 2.5	150

FP9 Sub-Grade - The sub-grade shall be compacted and checked for uniformity and all irregularities made good prior to the pouring of concrete.

FP10 Finish - The concrete shall be broom or coving trowel finished. All edges shall be rounded with a 75mm edging tool, with a 5mm radius.

FP11 Joint Material - Contraction/expansion or construction joints shall be formed from 10mm thick compressible bituminous cork filler board (mastic jointing material).

FP12 Joint Installation - Contraction/expansion joints shall be installed at the full depth of the slab at each side of vehicular crossing slabs, against concrete structures and at intervals given in table below.

Width of Slab (metres)	Distance C/E Joints (metres)
1.5	6.0
2.0	8.0
3.0	12.0
3.5	14.0

FP13 Weakened Plane Joints - Weakened plane joints shall be 3mm wide and formed at intervals as given in the table below except for integral kerbs where they are to match joint locations in the slab.

Width of Slab (metres)	Distance WP Joints (metres)
1.5	1.5
2.0	2.0
3.0	3.0
3.5	3.5

FP14 Concrete Curing - Concrete shall be cured for at least seven (7) days. Any damage or unsatisfactory finish of the slab shall be replaced at the Developer's expense.
The footpath slab up to 75mm in thickness and 1.5 metres in width will not require any reinforcement. The footpath thickness between 75mm and 100mm and more than 1.5 metres in width will require SL62 reinforcement and the footpath slab between 100mm and 150mm and more than 1.5 metres in width will require SL72 reinforcement. Reinforcement shall be placed centrally in the slab.

Location of Footpaths within the Footway

FP15 Footpath Location - New footpaths shall be abutted against the property boundary or in the same alignment or continuation of the existing footpath or as deemed appropriate by Council's Asset Engineer, where no existing footpath is present. For reconstruction of existing footpaths, the same location as the adjoining footpath.

FP16 Extension of Footpath - If the installation of a footpath results in the grassed verge to be less than 600mm in width, then the footpath shall be extended for the full width of the footway, that is, the concrete footpath shall be constructed from the edge of the property boundary to the back of kerb.

Signage

FP17 Signage - Where footpath is to be used for both pedestrians and cyclists, adequate signage shall be installed at the commencement of the footpath indicating that the footpath is for shared pedestrian and bicycle usage.

FP18 Signage Location - Signage shall be provided both on stems and painted onto the pavement at the appropriate locations, in accordance with the RTA ***Aust Roads Bicycle Design Guidelines.***

FP19 Signage Clearance - Signage stems shall have at least 600mm clearance from the face of kerb.

Kerb and Gutter

Where Kerb and Gutter is Required

KG1 Kerb and Gutter Requirement - Regardless of the development type, kerb and gutter shall be constructed in the following circumstances:

- The proposed works includes the reconstruction or construction of an existing road or new road for access.
- Kerb and gutter along an existing paved carriageway servicing the development is in an unsatisfactory condition or at unacceptable or non-standard level. For example, kerb height is more than 150mm or less than 150mm.
- Kerb and gutter along an existing paved carriageway servicing the development does not exist.
- Kerb and gutter along the property frontage is in an unsatisfactory condition or at unacceptable or non-standard levels.
- Kerb and gutter along the property frontage does not exist.
- The construction of kerb and gutter provides protection to the property/s from the inflow of stormwater off a public road or reserve.
- The construction of kerb and gutter would prevent the likely erosion of the road shoulder as a result of vehicular and/or pedestrian traffic outside the proposed development.
- Kerb and gutter is to be reconstructed as part of the footway and/or carriageway reconstruction.

Minimum Design Standards

KG2 Minimum Design Criteria - Kerb and gutter shall be constructed to the following criteria:

- The minimum longitudinal gradient along the gutter shall be at 1%, where practical.
- Cross fall from the centreline of the road to the invert of the gutter shall be at 3%.
- The road maximum cross fall from the centre line of the road to the shoulder shall not exceed 5%.
- The proposed kerb and gutter shall match in with existing kerb and gutter.
- A section of not less than 1.0 metre of the existing kerb and gutter need to be reconstructed to ensure that there is a smooth transition between new and old works.
- Existing crossovers and drainage outlets affected by the proposed works shall be replaced and extended to the new kerb face.
- Kerb and gutter refers to standard 150mm high concrete kerb with integral gutter.
- Other types of edge treatment such as rolled kerb and gutter, mountable kerb and gutter, dish crossing, sandstone blocks or brick kerbs may be used if it has been approved as part of the streetscape planning of the area or the edging type is a replacement of an existing material, pattern or colour.
- Kerb only is not to be used where the cross fall of the road diverts stormwater to the kerb.

Road Carriageway

General

R1 Reference - The road carriageway refers to the section of the road reserve dedicated for vehicular traffic flow. This includes any private access roads (e.g. right-of-ways).

When road carriageway is to be reconstructed

R2 Carriageway Construction - The road carriageway is to be reconstructed in the following situations:

- Half road reconstruction for development type 7 and full road construction for development types 8 and 9.
- Regardless of the development type, a Damage or Dilapidation Report confirms that the road has been significantly damaged as part of the development or is in very poor condition or failure at the time of construction/development, half road reconstruction will be required.
- Regardless of the development type, the existing road carriageway outside the property frontage is at a cross fall which results in the scraping of vehicles when a vehicular crossing has been installed for the property.
- Full road slab construction will be required for local road concrete pavements or as per specification form the Roads and Maritime Services (RMS) where it is an RMS controlled roads, unless noted otherwise.

Road carriageway construction

R3 Cross-fall - Construction of the road carriageway is to have the following cross-falls:

- Cross-fall to be graded from the centre or crown of the carriageway to the gutter.
- One-way cross-falls may only be permitted for narrow roads and one-way trafficked carriageways of less than 5.0 metres in width.
- Offset crowns are not acceptable.
- Super-elevation is not normally provided but shall be a maximum of 6% at bends.
- The minimum cross-fall for asphaltic concrete carriageway pavement shall be 2.5% to 3% (with absolute maximum of 5%).

R4 Longitudinal Gradient - Longitudinal gradient of the road carriageway shall be as follows:

- For bitumen pavements, the minimum longitudinal gradient of the road carriageway shall be 1%.
- For concrete pavements, an absolute minimum fall of 0.5% is allowed, construction accuracy permitting.
- For all pavement types, the general maximum longitudinal gradient shall be 12.5% for residential (local) roads. For other road classification, in accordance with the RTA's ***Aust Roads Pavement Design Manual***.
- For all pavement types, the general maximum longitudinal gradient shall be 8.5% for local distributor roads.
- An absolute maximum longitudinal gradient of 16% may be permitted depending on adequate sight distance of vertical curves.

R5 Matching in with Existing - The proposed road pavement shall match in with the existing pavement with regard to adequate vertical eases and horizontal transitions. This may require the reconstruction of a portion of the existing road pavement to match in smoothly with the new works.

R6 Pavement Design - Pavement design shall be as follows:

- All roads shall be designed based on traffic classification counts and traffic loading as specified in AUSTROADS Guide to Pavement Technology Part 2: Pavement Structural Design AGPT02-12 or Roads and Maritime Services Form 76 – Supplement to the Austroads Guide to the Structural Design of Road Pavements or ARRB Structural Design Guide for residential street pavements as applicable, except where specified elsewhere in this document.
- Road pavement constructed in concrete shall be minimum 50MPa compressive strength at 230mm uniform thickness with two layers of reinforcement fabric (SL81) top and bottom 50mm cover over a 150mm lean mix slurry of 5MPa compressive strength.
- Road pavement shall be designed for a traffic loading of not less than 2.5 x 10^6 ESA for all roads except roads with bus routes which shall be designed for minimum 1.23 x 10^7 ESA and in accordance with the ***Aust Roads Pavement Design Guidelines***.
- Verification of sub-grade suitability shall require submission of a geotechnical report with relevant core sampling tested and reported.
- Collector, local distributor, commercial and industrial pavements shall be designed by a qualified Geotechnical Engineer in accordance with the ***Aust Roads Pavement Design Manual***.

Ancillaries

Pedestrian Crossing Ramps

A1 Location - Pedestrian crossing ramps shall be constructed at each kerb return opposite the extension of the main footpath and in the kerb opposite the extension of a public pathway.

A2 Design and Installation - Pedestrian crossing ramps shall be designed and installed as per ***AS1428.2***.

A3 Raised Tactile Pavers - Raised tactile pavers shall be installed on pedestrian ramps and positioned as per ***AS1428.2***.

A4 Tactile Paver Material and Colour - Raised tactile pavers shall be of grey coloured concrete or black coloured polyurethane type material or as specified as part of the streetscape planning for the area or the tactile paver is a replacement of an existing paving of similar material, pattern or colour.

Vehicle Crossings and Laybacks

A5 Minimum Standards - The minimum standards for the construction of driveways and laybacks across the footway are provided in Section ***Vehicular Access***.

Stormwater drainage

A6 Installation of Piped Drainage - For development types 7, 8, and 9, piped stormwater drainage must be installed to cater for at least the minor system flows as described in Section ***Stormwater Management***.

A7 Minimum Standard - The minimum standards for stormwater drainage system design are given in Section ***Stormwater Management***.

Traffic Calming Devices

A8 Minimum Standards - Traffic calming devices such as thresholds, slow points, speed humps, chicanes, and the like are to be designed in accordance with ***Aust Roads Guide to Traffic Engineering Practice, Part 10, Local Area Traffic Management***.

Steps

A9 When Steps Required - Steps should be avoided whenever possible. However where necessary, they shall be installed along all pedestrian-only footpaths where the longitudinal gradient of the pathway is sufficiently steep to warrant its installation or that the installation of a transition ramp cannot be extended adequately to achieve a smooth transition due to site constraints. "Steepness" is measured in accordance with the Building Code of Australia requirements or as determined by Council's Asset Engineer, where BCA requirements cannot be met.

Steps are also to be installed where the longitudinal gradient of the footpath exceeds 1 in 4, over a distance of not less than 5.0 metres.

A10 Material - Steps shall be constructed in reinforced concrete, pre-cast units or prefabricated metal and supported on-ground and are to be painted in highly visible paint to delineate change in height. Suspended types are not preferred.

A11 Preference of Ramps over Steps - Ramps are favoured over steps whenever possible. To permit access for disabled persons, steps are considered as a last resort and only when ramps cannot be installed to comply with the disabled access code due to physical constraints.

A12 Handrails - Where the level change between the steps and/or footpath and the adjoining surface level, at a distance of 1.5 metres or less, exceeds 500mm, handrails are to be installed. Handrails are to be designed in accordance with ***AS1428.2***.

Utility services

A13 Satisfactory Provision of Services - Satisfactory arrangements for sewer, water, gas, electricity and telecommunication services must be provided for all developments including "greenfield" sites and land subdivisions.

A14 Approval - Approval will not be granted unless satisfactory service provisions can be provided.

A Section 73 Certificate under the Sydney Water Act 1994 must be obtained for "greenfield" sites and new land subdivisions. This Certificate must be provided prior to the release of the Subdivision or Occupation Certificate.

A15 Provision of Electricity Services - Direct access to electricity supply must be provided for all "greenfield" sites and new land subdivisions. New electrical sub-stations, generators, kiosks, and turrets servicing the development must be located wholly within the property boundary. New electrical sub-stations, generators, kiosks and turrets must not be located on public land.

A16 Undergrounding of Electrical Services - Development types 7, 8 and 9 including "greenfield" sites and new land subdivisions must have electricity supply provided underground. Including public domain areas, existing overhead power lines are to be re-installed as underground cables.

A17 New Light Poles and Power Poles - New light poles and power poles are to be provided for development types 7, 8 and 9. These shall be installed at a minimum offset distance of 300mm between the face of the kerb to the face of the pole, unless specified otherwise. The minimum spacing between light poles will be based on the required luminance for the area.

A18 Gas Services - Reticulated gas supply, where available, must be provided for all "greenfield" sites and new land subdivisions.

A19 Certification - A Compliance Certificate from each utility service authority must be provided certifying that its requirements for the satisfactory provision of the service have been met before release of Subdivision or Occupation Certificate.

A20 Dedicated Service Corridor - For "greenfield" sites and new land subdivisions, a dedicated service corridor, conduit and easement shall be provided to service each allotment created.

A21 Relocation of Services - If, as part of the proposed development, mains, services and poles need to be relocated, it shall be carried out at the Applicant's expense to the satisfaction of Council and the relevant utility authority, as required.

A22 Developers' Responsibility - It is the responsibility of the Developer to ensure that all care has been exercised to prevent damage to any public utility, e.g. gas, water, sewerage, electricity and telecommunication. The Applicant will be responsible for any damage caused by him or his agents, either directly or indirectly.

A23 House Service Alterations - Alterations to house services shall be carried out only by qualified tradesperson.

A24 Location of Utility Services -The locations and depths of utility services under a road reserve shall be installed in accordance with the ***New South Wales Streets Opening Conference 1997*** resolution.

A25 Liaising with Relevant Utility Service Authorities - In particular relation to "greenfield" sites, new land subdivisions, and where a new or existing public road is to be reconstructed or constructed, the Developer must liaise with the relevant authority, arrange and pay all costs and fees associated with providing street lighting, underground electrical power, telecommunication services, and adjustment of surface fittings, pits, etc. affected by the propose works.

A26 Engineering Plans - All underground services and services in general must be detailed on engineering plans, submitted and approved by Council prior to development approval.

Street Trees and Landscaping

A27 Installation of Street Trees - Street trees are to be installed across the entire property frontage, for development types 7, 8, and 9 and where the footway and road is to be reconstructed regardless of the development type.

A28 Suitable Species - Council's Landscape Architect is to be consulted in regards to suitable plant species.

A29 Location - Street trees are to be planted at an offset distance of not less than 600mm from the face of kerb to the centre of the tree. Trees are to be planted at the distances tabulated below.

Location	Distance (metres)
From any road intersection (tangent point/kerb return)	10
Between tree centres	6
From the top of driveway wings	2
From signs, poles, posts	1

A30 Edging - For concrete pavements, no timber edging is required around the landscape islands. For surface types other than concrete pavements (e.g. turf or bitumen), the perimeter edging around the landscape island, shall be timber 30mm wide by 100mm deep. Landscape islands shall be square in shape, 1200mm wide by 1200mm long.

A31 Bedding Material - For concrete pavements, bedding material shall be "arboresin" or equivalent. For bitumen pavements or grassed areas, bedding material shall be mulch. Colour shall be as specified by Council's Landscape Architect at the lodgement of the Development Application (DA).

A32 Submission of Detailed Landscape Plans - Detailed landscape plans are to be submitted and approved by Council prior to development consent.

ES2 Vehicular Access

Objectives

V1 Uniformity - To ensure uniformity in the design and construction of vehicular crossings in the City of Canada Bay Local Government Area.

V2 Safe and Convenient Access - To ensure that safe and convenient vehicular access can be provided to and from parking spaces for all properties.

Definitions

V3 General - Vehicular access or driveway crossing refers to the formal access for vehicles (85th percentile vehicle in accordance with ***AS/NZS2890.1:2004 Off Street Car Parking Code***).

V4 Formal Access - Driveway refers to the formal platform between the kerb line and the property boundary by which vehicular access is provided.

V5 Exclusions - In this Section, vehicular access does not include internal access roads, (both vehicular and pedestrian access) within the property boundary, suspended structures and the like, which would be assessed separately on its merits and will require separate Development Application (DA) approval.

V6 Ancillary Works - Ancillary works refers to any works other than driveways and laybacks such as footpath construction or reconstruction, pavements, stormwater drainage pipes and pits and the like within the road reserve. These works could be undertaken in conjunction with or separately from driveway construction.

Application

V7 Applications to Council for the Location and Construction of a Vehicular Crossing or Ancillary works must be submitted.

No construction work will be permitted until formal written approval is obtained from Council following the submission of the Application.

An Application for Driveway Construction and Ancillary Works must be submitted for all proposed construction and reconstruction of vehicular access and this applies to:

- All Developments Applications involving residential, commercial, and industrial development, and
- Where a stand alone formal crossing(s) or cross-over (layback) is proposed.

V8 Consultation - Prior to the lodgement of a Driveway Application, please ensure that:

- The Applicant has consulted with Council's Planning Section, in regards to heritage, LEP and DCP matters and has been given advice that a driveway at the specified location is permissible; and that
- The Applicant has read this Specification and is fully aware of any limitations and/or constraints, which may preclude the approval of a driveway.

Statutory and Design Requirements

Persons who can undertake Construction

V9 Approved Persons - Vehicle crossings can be constructed by either Council's Construction Team or a Private Contractor, to ensure that works are built to a reasonable standard and uniformity.

Property owners may appoint their own Private Contractor to construct the driveway. However, to ensure that the quality of the work is maintained and public safety is not compromised, the nominated Contractor must have extensive experience in concrete works especially in the construction of vehicle crossings with current public liability insurance cover and must be approved by Council.

A Private Contractor, nominated by the Property Owner, may be approved by Council to carry out the works following submission of the following:

- A copy of the current public liability insurance is provided to Council. The insurance cover shall be for a sum not less than $A20,000,000 for a period of six (6) months, and nominating on the policy the City of Canada Bay Council as indemnifying them against public risk claims, arising during the construction of the crossing or as a result of the construction of the crossing;
- A copy of the Contractor's current concrete license and record of previous work are provided to Council; and
- A Security Deposit is paid to Council by the Contractor, as set down in Council's Fees and Charges lodged prior to any works commencing. This Deposit is refundable upon satisfactory completion of the works, at the discretion of Council.
- An additional non-refundable administration fee, as set down in Council's Fees and Charges shall also be paid. This fee covers the processing of the driveway application and three (3) site inspections. Note this fee applies to each driveway applied for per property. If more than one driveway is to be constructed, the same fee must be paid for any additional driveway to be processed.

If all of the above requirements are not satisfied, the application may be rejected and a further fee (10% of the Security Deposit) will be required before reconsideration.

For ancillary works such as the construction of a concrete footpath, an administration fee is payable. A refundable deposit is also required.

Issuing Driveway Levels

V10 Written Permission - No work shall commence without written permission from Council.

The Contractor is to submit a driveway design appropriate for the site, complying with ***AS/NZS2890.1:2004***. This design must be approved by Council in writing before any construction can be carried out.

In exceptional circumstances, e.g. due to omission of information on the part of the applicant and notwithstanding the above advice, Council may consider that the construction of a driveway at the proposed location or site is inappropriate or impractical. The Applicant will then be advised accordingly and all but $A50 will be refunded.

Supervision and Inspections

V11 Supervision - Works are to be carried out in accordance with this document, relevant Council Specifications and Australian standards.

No work is to be carried out except under the supervision and approval of Council or its nominated representative.

Council shall meet with the nominated Contractor and/or Owner to carry out mandatory inspections for the purpose of:

- Formwork inspection - at least forty-eight (48) hours notice must be given for checking timbering for alignment, reinforcement placement, level and stability and sub-grade preparation.
- Final inspection - the Owner or Contractor shall notify Council for a Final inspection once the concrete has been poured and finished, formwork removed and area restored. At least twenty-four (24) hours notice must be given.

To arrange for appropriate inspection times, bookings shall be made through Council's Customer Service Section.

If more inspections are required above the mandatory inspections due to any omission or unsatisfactory work, including the storage of materials, insufficient barricading and site safety, on the part of the owner or contractor, or remedial actions that Council deems necessary to achieve compliance, an additional fee shall be charged, as defined in Council's Fees and Charges Schedule.

Final Approval

V12 Notification in Writing - Council will notify the owner in writing of the Final Approval of the work. Any defects found during the Final Inspection must be remedied. This is the responsibility of the owner and therefore it is advised that final payment not be made to the Contractor until such approval has been received.

Once the driveway is completed and Council is satisfied with the works, a refund of the crossing bond can be arranged. The Applicant shall apply in writing to Council.

Adjustments to Utility Services

V13 Service Alterations - Any alteration, which may be necessary, for the construction of the vehicle crossing, to any water, sewer, gas, electricity, telecommunication, stormwater system, and other utility services is to be arranged by the contractor with the relevant utility authority.

V14 Protective Box Adjustments - The protective boxes over any hydrant, gas cocks, stop valves, sewer lines, and the like shall be adjusted by the contractor, in consultation with the relevant utility authority, so that they are flush with the finished surface.

V15 Physical Location - The contractor is responsible for the physical location of all utility services likely to affect the proposed works. The contractor is liable for any damage to service utilities. The contractor is required to contact “Dial before you dig” (ph 1100) before any work commencing.

V16 Associated Costs - Any cost incurred as part of the adjustment will be borne by the owner.

V17 Conflicts with Stormwater Conduits - Where an existing or proposed house stormwater pipe traverses the proposed driveway crossing, and there is insufficient cover over the pipe, the section of pipe shall be converted to a galvanised steel 200 x 100 x 6 rectangular hollow section (RHS) across the footpath, to achieve adequate cover. Alternatively, relocate the pipe, where possible, away from the driveway and in the direction which allows adequate drainage

Road Design Affecting Driveway Levels

V18 Proposed Design - Where a proposed design has been prepared by Council to alter the carriageway and/or footpath fronting the property concerned, the driveway works shall be carried out in conformity with the proposed design. Information for this purpose shall be supplied by Council or its representative.

V19 Proposal to Modify Street Levels - Where Council has a proposal to modify the area at the front of the property but a proposed design has not yet been prepared, the work shall be set out in accordance with the best available information and in accordance with this Document and any other relevant standards, on the understanding that if Council should carry out future construction works to a proposed design, which may involve the alteration to part or whole of any of the constructed work, then a contribution may be payable had no work been carried out, will be levied and must be paid by the property owner, in accordance with the Roads Act, at the time when the Council proposed works are to be carried out.

Public Safety and Provision for Traffic

V20 Pedestrian and Vehicle Safety - The contractor is responsible for the safe passage of pedestrian and vehicular traffic. During the progress of the works, all necessary warning notices, barricades and lights must be installed, in accordance with ***AS1742.3-2009, Traffic control devices for works on roads***.

Where the works require traffic control, the contractor will be responsible for appropriate traffic control devices being put in place, including necessary lamp signage, maintenance and the like in accordance with ***AS1742.3 - 1996.***

Where works are to be carried out on roads of a "Collector Road" status or higher, and obstruction to traffic is unavoidable, a Traffic Management Plan must be submitted with the application to Council, endorsed by the Police and relevant authorities e.g. RTA, for approval. This plan is to be prepared in compliance with ***AS1742.3 - 1996***. A minimum notification period not less than ten (10) working days shall be provided prior to the commencement of works.

These ancillaries should be included in the total cost towards the works.

V21 Liability - The contractor shall be liable for any accident, damage or injury to persons or property resulting from the work. In this regard, the Contractor must have appropriate and current public liability insurance to this effect.

Compliance with Other Regulations

V22 Compliance - Works shall be carried out in compliance with The Clean Waters Act, The Roads Act, The Motor Traffic Act and the Occupational Health and Safety Act, and any other Acts as deemed relevant.

Hours of Construction/ Demolition

V23 Hours of Construction/Demolition - The hours of construction/demolition shall be restricted to 7:00am to 5:00pm, Mondays to Fridays and 8:00am to 1:00pm Saturdays, with a total exclusion of work on Sundays and Public Holidays.

V24 Non-offensive Works - Non-offensive works, where power operated plant is not used such as setting out, surveying, plumbing, electrical installation, or site cleaning by hand shovel and site landscaping, is permitted between the hours of 1:00pm to 4:00pm Saturdays, at Council's approval.

Important Note: The Protection of the Environment Operations Act 1997 may preclude the operation of some equipment on site during these permitted working hours.

Preparation and Excavation

V25 Minimum Excavation - The Contractor shall excavate to the full depth required for the specified thickness of the proposed crossing slab.

In rock, clay or unstable foundation material, additional excavation shall be carried out and a sub-base of sand, or other approved material, to a minimum depth of 75mm consolidated thickness, shall be provided.

V26 Compaction - The sub-grade or sub-base shall be adequately compacted to the required minimum depth of 150mm to the following requirements:

- Sands - density index of 70% in accordance with ***AS 1289.E3.1*** where the compaction test is in accordance with ***AS 1289.E5.1***.
- Material other than sand - dry density rates in accordance with ***AS 1289.E4.1*** of more than 95% where the compaction test is in accordance with ***AS 1289.E1.1*** (standard).

V27 Adjacent Surface - The surface adjacent to the proposed driveway shall be trimmed to conform generally to the levels and cross-fall similar to the adjoining area, free of trip hazard, unless otherwise instructed by Council's Engineer. This shall include lifting and resetting footpath lawns where necessary.

Driveway Dimensions and Alignment

V28 Maximum Driveway Slab Widths - The width of any crossing to a property must be kept to a minimum. Excessively wide vehicle crossings will not be approved because it:

- compromises pedestrian safety by encouraging vehicles to cross the footway at greater speeds,
- minimises the area for pedestrian refuge,
- encourages illegal parking on the footway,
- detracts from passive streetscape by increasing the amount of visible hard paving, and
- reduces on-street parking spaces.

Refer to Part B3 of DCP for crossing and driveway widths.

V29 Driveway Slabs for Commercial Premises - Commercial premises, properties requiring two-level entries, or where traffic is heavy (for example, the property frontage to a main road with heavy vehicular traffic movement); the above widths may be increased at Council's discretion. For example, service stations may be granted wider driveway widths based on swept vehicle paths and submission of a Traffic Report.

V30 Wheel Strips - Wheel strips **are not acceptable** because they do not provide sufficient protection to the public footway. Constant wearing by vehicular traffic may cause rutting in the grass verge which compromises the safety of pedestrians using the footway.

V31 Vehicle Crossings to be Perpendicular to Kerb Line - Vehicle crossings are to be constructed perpendicular to the kerb line. In special circumstances, to reduce disturbance to traffic flow along a major road, an angled driveway may be permitted subject to the approval of Council's Asset Engineer.

Driveways off Narrow Roads

V32 Splays and Widened Driveways - Splays are not to be used. The maximum crossing slab width shall be 3.0 metres. Council does not encourage the construction of wide crossovers where it is unnecessary as it increases the risk to pedestrians and diminishes the opportunity for on-street parking.

Vehicle crossings are generally required to be constructed perpendicular to the kerb line. This encourages vehicles to slow down whilst entering properties.

In special circumstances, the driveway may be widened to prevent vehicles from driving onto the nature- strip or where safer access and egress can be provided.

Where the width of the road carriageway is less than 5.5 metres, the driveway may be permitted to be widened, subject to a check using a standard swept turning path of the 85th Percentile vehicle (B85).

Permitted Number of Driveways per Property

V33 A maximum of one (1) vehicle crossing for vehicle access is permitted per site. See Part B of DCP for further information.

Driveway Locations

V34 Prohibition - Access shall be located so that sight distances are not affected by existing structures such as street trees, earth mounds, bus shelters, and other physical features. Council may not approve the location of such an access if the location will adversely affect sight lines or detracts from the streetscape of the area.

Vehicle access will not be permitted at the following locations and circumstances:

- At Council's discretion
- Where the proposed vehicle access is likely to diminish on-street parking
- To a major road if reasonable access can be gained from another public road of lower classification
- Opposite or within 6.0 metres of a median opening in a major road
- Within 25.0 metres of a signalised intersection*
- Within 9.0 metres at non-signalised intersections*
- At localised depressions** ("sag" points)
- At the entrance into a basement or sub-floor level regardless of whether it is in a localised depression or not***

The above distances are measured perpendicular from the face of the kerb of the intersecting street (or prolongation of the kerb line or tangent point if curved).

***Important Note 1:** Access may be permitted provided that it can be demonstrated, to Council's satisfaction, that it is safe to do so and that extenuating circumstances exist, for example, where this is the only location where vehicular access can be gained.

****Important Note 2:** At sag locations in the road, if the proposed driveway could result in the driveway becoming a spillway for stormwater entry or stormwater ponding here, unless an appropriate hydraulic model (using either Manning's Equation or HEC-RAS, which-ever being appropriate and based on the 100-yr ARI design storm) is used to determine the water surface profile to demonstrate that the driveway profile has a design crest which prevents stormwater from entering into the premises and/or that the stormwater runoff can be safely conveyed along a suitably designed overland flow path, then the driveway will not be approved.

*****Important Note 3:** All driveways to basement or sub-floor areas, whether it be located in a sag or not, will not be approved unless a catchment analysis for the 100-yr ARI design storm is undertaken to determine the stormwater runoff and then an appropriate hydraulic model (using either Manning's Equation or HEC-RAS, which-ever being appropriate) is used to determine the water surface profile, to demonstrate that the proposed driveway will offer adequate protection from stormwater entering into the premises. Refer Section ***Overland Flow and Flood Studies*** for further details.

V35 Minimum Length of Parking Bay - A driveway will not be permitted if the proposed parking space within the property between the boundary and building line is less than 5.5m in length, causing a parked vehicle to encroach onto the footway reserve.

V36 Sight Lines - Vehicle crossings shall be located so that minimum sight distances to traffic and pedestrians can be provided. Sight distance to pedestrians shall be met by providing clear sight lines in accordance with ***AS/NZS 2890.1 - 2004, Parking Facilities, Part 1: Off-street car parking.***

Vehicle crossings should also not be located where existing trees or power poles may obstruct sight lines or where it is too close to the root zone of trees. Similarly, the driveways shall not be located too close to power poles where undermining may occur.

V37 Removal of Obstructions - In certain situations, Council may grant approval for the removal or relocation of these structures, where there is no alternative location.

In this circumstance, approval must be sought from Council's relevant officers who may include Asset Engineer, Traffic Engineer, Tree Preservation Officer and Planners. All costs associated with such work shall be borne by the Owner.

V38 Stormwater Pits - All driveways must be clear of existing stormwater inlet pits. The removal or reduction in the length of the pit lintel or grating is not acceptable, as this would reduce the rate of stormwater collection. However, excluding existing pits located in a depression (sag), if the hydraulic characteristics of the drainage system are not made less efficient, the relocation of the pit may be permitted. In this circumstance Council will undertake the works of pit relocation or nominate an approved Contractor. All costs associated with the relocation of the pit shall be borne by the Owner.

V39 Street Trees - Driveways must not be located over or near trees to be retained. The minimum clearance to trees will depend on factors such as the proximity to the trees root zone and sight lines.

Existing Crossings

V40 Retention of Existing Crossings - Existing crossing slabs and laybacks may be re-utilised if:

- They are in the correct location, set at the correct levels and in reasonable condition, **and**
- its retention is NOT contrary to this Document.

V41 Removal of Existing Crossings - Existing crossings and layback must be removed, where the crossing slab and layback is made redundant. It shall be completely removed and the footway area and kerb/gutter restored to Council's satisfaction.

V42 Owner's Cost for Removal of Redundant Crossings - Any existing un-used crossing(s) and/or layback(s) must be removed and the kerb/gutter and footpath reinstated/restored at the owners expense to Council's satisfaction.

Driveway Levels and Gradients

V43 Design – The Applicant shall submit a longitudinal driveway profile, which will show dimensions, levels and gradients, for Council approval.

V44 Absolute Maximum Longitudinal Gradient - The absolute maximum longitudinal gradient of driveways shall not exceed 25% within the property and 10% in the footway (unless justification can be provided to vary these grades). Where the gradient exceeds 18%, a check is required using standard vehicle template (B85) to ensure that it does not scrape.

If a pedestrian footpath exists or is required, the gradient across the footway must not exceed 2.5% (1 in 40) where the footpath meets the driveway.

The location of the footpath is to match existing or 450mm offset from the property boundary or as directed by Council's Asset Engineer if no footpath currently exists. It may be necessary to transition existing footpaths both sides of the driveway to align with the new driveway such that cross fall across the footpath is maintained at not more than 2.5% (3% absolute maximum). Driveways are to be graded to fall towards the kerb wherever possible.

V45 Changes in Gradients - Changes in gradients shall not exceed 12.5% algebraically (1 in 8) in a crest and 15% (1 in 6.7) in a depression (sag) to prevent vehicles scraping or bottoming.

Changes in grades in excess of 12.5% (crest) and 15% (sag) will require the introduction of transitions. A minimum transition of 2.0 metres in length will be required (a 1.5 metres transition may be permitted if a template is overlaid onto the driveway profile which demonstrates that it will not scrape).

V46 Compliance – Driveways shall be designed to match in with the topography of the site, and shall comply with ***AS/NZS 2890.1 - 2004, Parking Facilities, Part 1: Off-street car parking***.

Council, at its discretion, may not approve a Driveway Application on the basis that the information provided to Council, at the time of approval, was in error or there are deficiencies in the information provided for Council to make an informed determination at the time of the assessment.

Driveway Material

V47 Concrete - All vehicle crossing slabs and laybacks are to be constructed in plain concrete with a minimum compressive strength of 32MPa at 28 days.
Ready mixed concrete conforming to ***AS1379-1973*** shall be used. The Contractor is to arrange for certificates by the manufacturer to be given for all concrete delivered and shall be able to produce these to Council's Representative upon request.

V48 Cosmetic Pavement - Construction of driveways, within the road reserve, using brick pavers, coloured, stained, stamped or patterned concrete, pebblecrete, or any other cosmetic material other than plain concrete **will not be approved**. Only standard plain concrete finishes to vehicle crossings will be permitted.

V49 Base - Clean sand shall be used, free of any deleterious material, compacted and screeded to a smooth finish. Bedding thickness is to be a minimum of 50mm uniform thickness.

Compact sand bedding to a minimum density index of 70 as per ***AS1289 5.6.1***.

For road base (DGB20), the standard shall be ***AS1289.5.2.1***.

V50 Filling Material - Where filling under the proposed concrete is necessary, such filling shall consist of granular material of maximum size of 40mm and shall be spread in layers of a maximum thickness of 150mm and consolidated to provide a 95% compaction when tested under the modified proctor method.

Expansion and Construction Joints

V51 Expansion and Construction Joints - Shall be provided to the full depth of the slab, at each side of the slab and where required or as directed by Council.

The joint shall be filled with a 12mm thick bitumen impregnated material such as a compressible mastic board. Other types of jointing material can only be used with the approval of Council.

Expansion joints shall separate the concrete apron from the driveway area that it adjoins, in line with the leading edge of paths.

V52 Concrete Footpaths - Concrete footpaths shall have expansion and tooled (dummy) joints installed at the widths as indicated below:

Slab Width (metres)	Tooled Joint (metres)	Expansion Joint (metres)
1.2	1.2	3.6
2.0	2.0	6.0
3.0	3.0	9.0
3.5	3.5	10.5

Finish

V53 Concrete Finish - The concrete surface shall be finished true and even, free from air and stone pockets, depressions and projections. The concrete shall be tamped and screeded to the correct surface levels and shall be given an even non-skid finish.

The crossings are to be cove finished in the direction of the kerb and gutter unless it has a gradient steeper than 1 (vertical) to 5 (horizontal), where it shall be finished with a wooden float and then grooved (ensure grooves do not create tripping hazard to pedestrians). The path section behind the apron shall be soft broom finished across the path. All edges of the slab shall be rounded with a 50mm edging tool.

V54 Slip Resistance - In general, driveways should have a slip resistance appropriate for the pavement slope in accordance with ***AS3600***.

Minimum Driveway Slab Thickness

V55 Council Standards - All work is to be carried out in accordance with Council's standard details, Construction Specification for Concrete and Restoration Works, where applicable.

V56 Minimum Thickness of Gutter Crossings - Gutters and gutter crossings (laybacks) shall have a minimum uniform thickness of 150mm or 180mm for commercial and industrial sites.

V57 Minimum Thickness of Driveway Slabs - The minimum crossing slab thickness shall be in accordance with the following table:

Development Type	Minimum Slab Thickness (millimetres), Reinforcement
Residential	110, SL62
Commercial	180, SL72
Industrial	180, SL72
Residential Flat Buildings	150, SL72

V58 Minimum Thickness of Footpaths - Footpaths shall be a minimum of 75mm in thickness to match existing pathways unless under driveway in which the thickness shall be the same as for the driveway or as directed otherwise by Council

Non-Compliance

V59 Non-compliance - Failure to comply with the conditions of this Document will result in the approval to carry out construction of the crossing being revoked. If works are constructed in non-conformity, Council will issue an order to have the area restored or remedied.

V60 Recovery of Costs - The cost for reinstatement of non-complying works shall be recoverable by Council, for example, deducted from the Security Deposit held by Council.

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ES3 Stormwater Management

Objectives

SWM1 Uniform Guidelines - To provide uniform guidelines and applying control systems to achieve consistency, in the assessment and conditioning of Development Applications, in relation to stormwater runoff from all development types.

SWM2 Minimise Adverse Impact to Properties - To minimise any adverse impact on properties caused by stormwater runoff from all developments types.

SWM3 Minimise Impact on Water Quality - To ensure that the water quality of receiving waterways is not adversely affected by the discharge of pollutants such as nutrients and pathogens, from stormwater runoff as a result of development.

SWM4 Uniform Controls - To ensure that uniform stormwater controls are applied throughout the whole of the City of Canada Bay Council Local Government Area.

Controls

SWM5 Controls - To achieve the above objectives, the following controls are applied:

- For controls where the site is within a Flood Planning Area, refer to the Flood Planning Section of Council's Development Control Plan.
- The provision of safe overland flowpaths within developments and on public land.
- The definition of floodways for major storms within developments and on public land.
- The provision of controls such as on-site stormwater detention, community basins and the like and on-site retention systems to reduce and control stormwater runoff.
- The application of alternative methods of merit based stormwater control and conveyance devices.
- The removal of flood effected development from known floodways and the prohibition of future developments in such floodways.
- The provision of minimum free-boards for assigning floor levels to reduce the risk of flood damage to property/s.
- The installation of pipe/channel systems to minimise hazard to pedestrian and vehicular traffic caused by uncontrolled surface stormwater runoff.
- The installation of water quality control devices such as trash screens, gross pollutant traps, water quality ponds and the like and encouraging the use of water sensitive urban design to protect the quality of receiving waters.
- Depending on the development type and general site fall, the following stormwater control types would be applicable.

Development Type	Site slope/ Site drains to	Control Type
1	Front boundary	E, G
	Rear boundary	B, C, D, E, G
2	Front boundary	A*, F**
	Rear boundary	A+, B***, C, D, F**
3, 4, 4a	Front boundary	A, D++, F
	Rear boundary	A+, B***, C, D++, F
5, 6, 7, 8, 9	Front boundary	A, D++, F, H
	Rear boundary	A+, B***, C, D++, F, H
2, 3, 4, 4a, 5, 6, 7, 8, 9	Waterfront property or site drains to a public reserve or park	E, F, H

Key:

Development Type

1 - Demolition Only
2 - Alterations and additions
3 - New dwelling with existing footpath along frontage
4 - New dwelling with no existing footpath
4a - Dual occupancy, town homes etc.
5 - Residential Flat Building (RFB), commercial and mixed developments
6 - Development under SEPP Housing for Seniors or People with a Disability
7 - Substantial Development
8 - Subdivision of one into two allotments
9 - "Greenfields" site, subdivision of more than two allotments

Stormwater Control System

A - On-site Stormwater Detention System (OSD)
B - On-site Retention System or absorption system (OSA)
C - "Charged" system
D - Mechanical Pump-out System
E - Scour and erosion control system/devices
F - Rainwater Re-use System
G - Sediment Pond
H - Water Sensitive Urban Design (WSUD)

* Where additional impervious area increase of building or structure is 50sqm or more.
** Where additional impervious area increase of building or structure is 40sqm or more
*** Geotechnical Investigation is required to support OSA design if more than 50sqm is to drain into the OSA
+ OSD is not required if all stormwater collected from impervious areas can be disposed by OSA
++ To drain basement or sub-floor areas only

Nuisance Overland Flooding to Low-Lying Habitable Floors and Basement Areas

SWM6 Gutter Capacity - Where the proposed development will result in the exposure of low lying habitable floors or basements including sub-floor areas, garages and low level car parking areas to potential ingress of surface runoff, the determination of the street gutter capacity based on the peak runoff for the 100-year ARI storm event will be required. This is to ensure that the likelihood of surface runoff from the street entering the proposed low lying areas does not occur.

SWM7 Flood Protection – For all low lying habitable floors or basements including sub-floor areas, garages and low level car parking areas, following determination of the 100-year ARI design storm and gutter capacity, if it is found that there is potential for surface stormwater to enter into the property or minimum free boards cannot be achieved, it will be necessary to introduce a crest in the driveway ramp, or relocate the basement entry to a location where it is not vulnerable to water ingress , or install flood gates or raise floor levels to provide adequate free board protection.

Overland Flow and Flood Studies

SWM8 Gutter Capacity - Where the proposal has the potential to obstruct natural flow paths, encroach over stormwater drainage easements, is a proposed driveway into a basement or sub-floor area, or the area proposed for development is potentially flood affected, an overland stormwater flow assessment or flood study will be required.

SWM9 Design Storm - The design storm to be used to determine the flowrate for the overland flow assessment or flood study shall be the peak 100-year ARI storm event. Design guidelines are given in Section ***Stormwater Drainage Design***.

On-site Stormwater Detention Systems

General

OSD1 Runoff Control - On-site Stormwater Detention (OSD) systems are to be implemented to control the rate of runoff from development sites and subdivisions to limit or reduce the rate of runoff to existing conditions or better.

OSD2 Alternative Methods - Alternative methods of stormwater control may be used but are merit based and would only be permitted if OSD is found to be of no benefit in attenuating flows and reducing the peak discharge downstream.

Exemptions

OSD3 Exemptions - OSD will be applied to the developments types as listed in the table under the Section ***Controls***. Exemption from OSD would only apply in the following situations:

- The proposal is a residential development consisting of only alterations and additions to an existing dwelling where the additional increase in impervious area does not exceed 50sqm outside the footprint of the existing building and the land naturally falls towards the property street frontage with direct access to a formed public road/street.
- The development consists of improvements only to the existing building such as a second floor extension or internal refurbishments, which are wholly confined within the footprint of the existing building.
- The development is located within a known flood affected area or subject to tidal influence. This does not include areas where it is affected by nuisance flooding caused by inadequate capacity of the drainage system. Council should be consulted on this matter for further clarification.
- The runoff from the development is directly discharged into one of the bays or waterways and does not pass through any public drainage system (e.g. piped conduit, dish drain, open channels, kerb and gutter, public reserve, public roadway etc.) or that downstream properties could be adversely affected by the discharge from the development site.
- An alternative method of stormwater disposal is applied such as an on-site absorption system, which fully caters for the site's runoff.

Site Storage Requirement and Permissible Site Discharge

OSD4 Catchment Based Method - The Catchment Based Method for determining the Site Storage Requirement (SSR) and Permissible Site Discharge (PSD) is to be used to size OSD systems for all development types except demolition works. The hydrological Site Based Method (ILSAX or DRAINS) is only to be used if more than 30% of the site cannot be routed through the OSD system.

OSD5 Design Parameters - OSD design parameters are as follows:

- Site Storage Requirement (SSR) is 200cum per hectare.
- Permissible Site Discharge (PSD) is 180L/s per hectare.

OSD6 Area for Calculating Volume and Discharge – For the Catchment Based Method, the area to be used in calculating the OSD volume (SSR) and discharge (PSD) shall be based on the total site area.

For the hydrological Site Based Method, the PSD shall be calculated on a 0% pre-development site impervious area during the peak 5 year ARI storm event or 25L/s (which-ever is the smaller value in the case of discharge to the kerb) and the volume shall be sized on the basis of reducing the fully developed (post-development) site discharge for the peak 100 year ARI storm event back to the PSD.

OSD7 Alterations and Additions - In the case of development type 2, where the proposed alterations and additions are to be completely separated from the existing building/s and represent less than 10% of the total site area, then the SSR and PSD can be determined from the proposed footprint of the additions only.

OSD8 Maximum Site Discharge - The maximum discharge from the site must not be greater than the calculated PSD. This would include both piped and uncontrolled flows. That is, the total outflow from the site must not exceed the PSD.

OSD9 Concentrated Discharge - If the discharge from the development is to be concentrated at a single point (e.g. to the kerb and gutter) in the road reserve or public land, the maximum concentrated discharge is limited to 25L/s per 15 lineal metre of frontage, for all storm events.

Rainwater Re-use deductions

OSD10 Rainwater Re-use Deductions - Rainwater re-use volume can be deducted from the calculated SSR only if the rainwater re-use volume has been obtained from the BASIX Certificate. A maximum of 50% reduction is allowed. The PSD shall be retained for all controlled outflows.

Orifice controls

OSD11 Orifice Types - Orifice is to be a circular shaped hole drilled in a flat plate made from a stainless steel plate of 3mm thick and 200mm x 200mm minimum dimension. The orifice shall be formed to a circular square edged cut (circular hole is to be pre-drilled into the plate) and the plate permanently fixed to an oversized conduit or pipe stub if the hole is greater than 100mm.

OSD12 Permanent Fixture of Orifice - Dyna bolts or equivalent are to be used to permanently fix orifice plates. For orifice stubs/pipes, the fixture is to be such that tampering and removal is minimised.

OSD13 Minimum Orifice Diameter - For orifice plates, the size of the orifice must not be less than 50mm in diameter to avoid blockages.

OSD14 Orifice equation - The orifice equation to be used is:
$Q = C.A.\sqrt{(2.g.h)}$
Where
D = diameter of orifice = $\sqrt{(4.A/\pi)}$ in metres
A = area of orifice hole in square metres
π = pi = 3.1416 (dimensionless)
g = acceleration due to gravity = 9.81 m/s^2
C = orifice coefficient (dimensionless). Ref table
h = depth of water to centre of orifice in metres

OSD15 Orifice Coefficient - Orifice coefficients are given in table below.

Orifice Type	Discharge Coefficient
Stainless steel flat plate with circular hole	0.6
Pipe stub 100mm long	0.8

High Early Discharge (HED) Control

OSD16 HED Control Pit Type - The control pit in the OSD system must be a "High Early Discharge" (HED) arrangement for the Catchment Based Method.

OSD17 Non HED Control Pit Type - If a HED control configuration is not used, then an additional 20% volume must be added to the basic storage (SSR) for the Catchment Based Method.

Tail-water influence

OSD18 Orifice Control - The centre-line of the orifice must be higher than the water level at the point of connection into the existing receiving drainage system otherwise a "drowned orifice" or downstream control occurs.

OSD19 Drowned Orifice - Where a "drowned orifice" occurs, supporting hydraulic calculations will need to be submitted to ensure that there is no loss in storage volume as a result.

OSD20 Control Types - Adopted water control levels are given in table below.

Discharge point	Water level to be adopted
Kerb and Gutter	At the top of kerb
Pipe outlet or culvert	Top of conduit if super-critical flow or "free outlet"
	Depth as calculated if sub-critical flow
Pit	150mm above top of pit
Open channel	Depth as calculated
Waterway or Bay	Depth at High Tide

Site area to be routed through OSD

OSD21 Area to be routed through OSD System - The majority of the site runoff must be routed through the OSD facility.

A maximum of 30% of the site is permitted to bypass the OSD system if the Catchment Based Method is to be used. The 30% bypass must not be made up of more than 50% of the site's impervious areas.

For the Site Based Method, a maximum of 50% of the site is permitted to bypass the OSD system. This must be made up of at least 80% of the site's impervious areas.

OSD22 Adjustment of Volume and PSD due to Bypass for the Catchment Based Method.

For a bypass of 30% of total site area, an additional 20% increase in the calculated SSR volume shall be applied and the PSD shall be reduced by 20%. Proportional increase of the basic volume and reduction of the PSD shall apply between 0% and 30% bypass.

Trash screens

OSD23 Purpose - A rustproof screen or cage is to be used to protect the outlet from potential blockages.

OSD24 Removable - The screen or cage must be removable for ease of maintenance and inspections.

OSD25 Material - The screen or cage is to be made from Lysaght's maxi-mesh RH3030 or similar material.

OSD26 Minimum Surface Area - The minimum surface area of the screen is to be 50 times the area of the orifice outlet.

OSD27 Location - The screen or cage shall completely protect the outlet. It is to be located at a distance 1.5 times the orifice diameter or 200mm away, whichever is the greater.

OSD28 Orientation - Where possible, the main incoming line is to flow across the face of the mesh.

OSD29 Lifting Handle - The screen or cage shall include a lifting handle for ease of removal for inspection and maintenance.

Minimum requirements for underground OSD systems

OSD30 Purpose - Underground OSD systems shall be designed and located to attenuate and safely control stormwater runoff from the site to the public road gutter or receiving drainage system.

OSD31 Overland Flow path - Where likely overflow from the OSD facilities pass through private property and a controlled and safe overland flow path cannot be provided, the overflow is to be fully contained within an underground piped drainage system with a design capacity equivalent to the peak 100-year ARI storm event.

OSD32 Location - Underground OSD systems must be located external to all building footprints. This includes basements, ground floor parking areas, garages, or patios unless all access points and emergency overflow provisions are external to the structure.

Underground OSD systems must be located outside the root zones of trees that are to be retained.

Underground OSD systems must be located in areas which will not impede existing overland flow paths, or cause concentration or diversion of stormwater into public or private property/s resulting in the undermining of existing structures or services or jeopardising public safety or cause public nuisance.

Underground OSD systems must not be located within deep soil areas. Deep soil areas must be provided in accordance with any deep soil requirements prescribed within the Landscaped area sections of Parts E-H and J-K of this DCP.

Where underground OSD systems are located under soft landscaped areas, it must have a minimum topsoil cover of not less than 600mm over the tank.

Underground OSD systems are to be located where they can be easily accessible for inspections and routine cleaning.

In this regard, for development types 4a, 5, 6 and 7, the following requirements must be met:

- The underground OSD facility must be located in common areas and not in private courtyards
- The location of the underground OSD system is such as to ensure that the facility is located where easy unimpeded access is possible for routine inspections and maintenance requirements. It needs to be accessible for third party inspectors including Council

OSD33 Provision of Formal Surcharge Path - A formal surcharge path must be provided even when the 100-year ARI flows can be fully catered for by the system, to account for pipe blockages and higher intensity storms.

OSD34 Easements - Easements must be created over private property/s for pipe systems and surcharge paths through adjoining property/s.

OSD35 Structural Adequacy - Underground OSD systems are to be designed to be structurally sound and able to adequately withstand all service loads.

OSD36 Adequate Soundproofing - Underground OSD systems must be adequately soundproofed to minimise noise when stormwater is collected or discharged.

OSD37 Drainage of Base - The base of the OSD system must be graded to drain completely. Permanent water ponding in the tank encourages insect infestation and will not be acceptable. The base of the structure is to have a minimum longitudinal gradient of 0.7% to the outlet.

OSD38 Material - Underground OSD systems must be constructed from reinforced concrete, pre-fabricated material or proprietary system/s approved by Council. Atlantis units or similar type systems are not to be used for detention storage due to reduced storage and difficulties with maintenance and inspections.

OSD39 Inspection Access - Underground OSD systems must have at least one (1) inspection access opening over the outlet. This inspection point must be a minimum 600mm x 600mm in dimension.

For ease of maintenance at least one (1) additional access at the extreme corner of the tank must be provided.

Additional access or flushing points shall be provided for irregular shaped structures to allow for easier access for routine cleaning and maintenance.

Underground OSD systems must have additional access points at distances of not less than 5000mm.

Where the tank is less than 500mm in clearance height, gratings over the tank must be installed which cover at least 30% of the surface area of the structure.

OSD40 Confined Spaces - Underground OSD systems must comply with ***AS2865 Safe Working in a Confined Space*** and be appropriately designed to eliminate gas build-up.

OSD41 Steps - Underground OSD systems must have step irons when the depth exceeds 1200mm.

Minimum requirements for above-ground OSD systems in landscaped areas

OSD42 General - Above-ground OSD systems include areas where detention storage is provided in soft and hard landscaped area and above ground storage structures such as rainwater tanks.

OSD43 Purpose - As with Underground OSD systems, above-ground OSD systems are to be designed to collect, attenuate and safely control all stormwater runoff from the site to the public road gutter or drainage system.

OSD44 Overland Flow path - Where likely overflow from these OSD facilities is across private property and a suitable overflow path cannot be provided then the overflow shall be contained within an underground piped drainage system with a design capacity equivalent to the peak 100-year ARI storm event. This underground system (both pits and pipes) shall be designed to receive and fully contain controlled flows and overflows from the OSD facility.

OSD45 Location - Above-ground OSD systems must be located external to all building footprints, basements, ground floor parking areas, garages, or patios unless access points and emergency overflow provisions are either provided externally or are easy to get to for the purpose of inspections and maintenance to the system.

Above-ground OSD systems must not be located across the boundary/s of allotment/s.

Above-ground OSD systems must not be located such as to restrict pedestrian access from the public road to the building.

Where above-ground structures such as rainwater tanks are to be used, they must be located in an area least visually obtrusive and in compliance with Councils other planning requirements.

Above-ground OSD systems must be located where they can be easily accessible for inspections and routine cleaning. In this regard, for development types 4a, 5, 6 and 7, the following requirements must be met:

- The OSD facility must be located in common areas and not in private courtyards
- The location of the OSD system is such as to ensure that the facility is located where easy unimpeded access is possible for routine inspections and maintenance requirements

OSD46 Provision of Formal Surcharge Path - A formal surcharge path must be provided even when the 100-year ARI design flow is fully accommodated within the piped system to account for greater storm intensities and blockages.

OSD47 Easements - Formal easements must be created on private property for pipe systems and surcharge paths.

OSD48 Adequate Soundproofing - Above-ground OSD systems must be adequately soundproofed to minimise noise when stormwater is collected or discharged.

OSD49 Adequate Waterproofing - The barrier around the perimeter of the OSD storage area must be constructed of masonry type material or a fully waterproof (prefabricated) material or equivalent.

OSD50 Accessibility of Control Structures - Control structures must be located where they can be easily accessible for routine inspections and cleaning.

OSD51 Drainage of OSD Base - The base of above-ground OSD systems must be graded to drain completely. In soft landscaped areas, the gradient of the base must not be less than 1.0%.

OSD52 Subsoil Drainages - To avoid ground saturation in soft landscaped areas, subsoil drains shall be installed where gradients are less than 1.0%.

OSD53 Good Design - Above-ground OSD systems must be designed in a manner which minimises inconvenience, unsightliness and hazard and is compatible with the proposed development in terms of functionality and purpose.

OSD54 Maximum Ponding Depths - Above-ground OSD systems must not allow water to pond more than 200mm in tennis court areas and other hard paved surface areas.

Above-ground OSD systems may be allowed to pond more than 300mm in soft landscaped areas, provided that the following parameters are satisfied:

- Restricted access is enforced
- Embankment batter slopes are greater than 1 in 4
- OSD basin is fully fenced off with approved pool fencing and childproof, self-closing gates with batter slopes into the basin, around its perimeter, not to exceed 1 in 6
- The maximum depth of ponding in landscaped areas must not exceed 1200mm, regardless of other restrictive measures implemented

Minimum requirements for above-ground OSD systems in driveways and car parking areas

OSD55 Purpose - These OSD systems must be designed and located to collect, attenuate and safely control stormwater runoff from the site to the public road gutter or drainage system.

OSD56 Overland Flow path - Where likely overflow from these OSD facilities is across private property and a suitable overflow path cannot be provided, the overflow shall be contained within an underground piped drainage system with a design capacity equivalent to the peak 100-year ARI storm event. This underground system (both pits and pipes) shall be designed to receive and fully contain controlled flows and overflows from the OSD facility.

OSD57 Location - These above-ground OSD systems must be located external to all building footprints. This includes basements, ground floor parking areas, garages, or patios unless all access points and emergency overflow provisions are external to the structure.

These above-ground OSD systems must not be located such as to restrict pedestrian access from the public road to the building.

Control structures must be located where they can be easily accessible for routine inspections and cleaning.

OSD58 Provision of Formal Surcharge Path - A formal surcharge path must be provided even where the 100-year ARI design flow is fully accommodated within the piped system to cater for greater storm intensities and blockages.

OSD59 Drainage of Base - To avoid localised ponding within the detention area, the base of the OSD system must be graded to drain completely, with gradients not less than 0.5% in concrete paved areas or similar and 0.7% in bitumen surfaced areas.

OSD60 Good Design - These above-ground OSD systems must be designed in a manner which minimises inconvenience, unsightliness and hazard and is compatible with the proposed development in terms of functionality and purpose.

OSD61 Adequate Waterproofing - These above-ground OSD systems must be totally impermeable unless permeable pavement has been designed as a function provided any water penetration will not affect adjoining buildings, structures and the like.

OSD62 Maximum Ponding Depths - Water is not permitted to pond more than 200mm in depth for all storm intensities, in these above-ground OSD systems.

Overland Flows and Flow Paths

OSD63 Existing and Natural Overland Flow paths- Existing and natural overland flow paths for surface stormwater are to be maintained whenever possible.

Overland flows or surface runoff collected from the site or passing through the site from upstream property/s is not permitted to be concentrated and channelled onto adjoining property/s.

OSD64 Concentration of Overland Flow paths - Where surface runoff or overland flows become concentrated, they will need to be safely re-directed to the street or to the site's OSD facility.

OSD65 Diversion of Surface Runoff or Overland Flows to OSD System - Where concentrated surface runoff or overland flows are to be controlled through the OSD facility, the OSD system must be designed to cater for any additional inflow.

OSD66 Emergency Overland Flow path - To cater for unexpected blockages in the OSD system or additional runoff in excess of the design storm, provision must be made for an emergency flow path from the OSD system to the street such as installing overflow weirs or spillways. The width of overflow weirs shall not exceed more than 2000mm across any property frontage.

OSD67 Designated Flow paths - Any likely overflow from these facilities must be fully contained within designated flow paths and must be conveyed safely to the nearest public road reserve or waterway.

Designated flow paths shall be designed for the peak 100-year ARI storm event. Open channels, kerbs, pits and pipes may be used to contain runoff within the flow path.

Freeboard

OSD68 Definition - Freeboard refers to the clearance distance between the maximum water level and the surface level of habitable floors and garage floors.

OSD69 Adequate Freeboard - Adequate freeboard or clearance distance between the maximum depth of ponding in the detention system and the finished floor level of all habitable areas, garages, storage facilities, etc., are to be provided so that damage to goods and materials, nuisance flooding, or hazard is avoided.

OSD70 Minimum Freeboard - The minimum freeboard requirements for OSD pondage are tabled below.

Maximum water level in (A)	Finished floor level (B)	Minimum Freeboard between (A) and (B)
Detention facility	Warehouse	150mm
Detention facility	Factory	150mm
Detention facility	Garage	150mm
Detention facility	Carport	150mm
Detention facility	Office space	300mm
Detention facility	Habitable rooms	300mm
Detention facility	Living rooms	300mm
Detention facility	Retail space	300mm
Detention facility	Store rooms	300mm
Detention facility	Show rooms	300mm

***Important Note:** Refer to Clause **SW25** and the Flooding Control Section of Council's **Development Control Plan** for freeboard requirements in flood prone land.

All proposed developments are generally prohibited in known flood areas, flood ways and flood zones unless it can be demonstrated that a fail safe emergency evacuation route can be provided for occupants and that the proposed development will not cause an increase of the flood waters both upstream and downstream of the proposed development.

Council's Stormwater Policy is for the removal of such flood affected developments from known flood ways and the prohibition of future developments in such floodways, wherever possible, to protect life and amenity.

Discharge Points

OSD71 Maximum Concentrated Stormwater Runoff - The maximum concentrated stormwater runoff allowed to be discharged to the kerb and gutter at any single point is 25L/s even if the permissible site discharge exceeds this rate.

If more than 25L/s must be discharged, the following alternatives may be considered:

- Alternative 1 - Discharge made directly to the nearest Council piped drainage system, or to an approved piped drainage system or lay a new pipe and pit system to connect into the existing drainage infrastructure. This new line shall be designed and installed to Council's standards and will become a public system. Note: Approval under Section 138 of the Roads Act 1997 will be required
- Alternative 2 - The detention system is upsized (where on-site detention is required) to accept additional flows such as to limit the outflow to 25 L/s
- Alternative 3 - If there is sufficient property frontage width to enable split flows to the kerb at a minimum distance of 15 metres apart between kerb outlets
- Alternative 4 - Discharge directly into a watercourse or channel or to a stormwater channel or to the Bay, subject to joint approval from Council and other relevant governing authority. Adequate protection against scour and erosion at the point of discharge must be provided

OSD72 Maximum Discharge Velocity - The maximum discharge velocity into an unlined, that is, other than concrete channel shall be in accordance with the Department of Sustainable Natural Resources document ***Managing Urban Stormwater, Soils and Construction***, table 5.1 maximum discharge flow velocities in waterways.

OSD73 Approval for Connection into Existing Council Piped Drainage System - Connection into an existing Council piped drainage system may be permitted subject to Council approval.

OSD74 Construction of New Piped System - If direct connection outside of the property frontage cannot be obtained, for example, the nearest piped system is more than 10 metres or one property frontage away (whichever is the smaller distance), this will require the construction of new inlet pits and the laying of a new pipeline, to Council standards, to connect into the existing line. Minimum Council design standards are given in Section under ***Stormwater Drainage Systems***.

OSD75 Minimum Drainage Infrastructure - Council encourages minimising the number of pits, junctions and pipe lengths in the road reserve. However, pits are preferable over bend joins to eliminate blind junctions such that ease of maintenance can be achieved.

OSD76 Private Stormwater Drainage System - Any private stormwater pipe leaving the site, must be laid at an angle of not less than 45 degrees to the front boundary line. If the pipe needs to be laid at a more acute angle or must run parallel with the kerb line in order to achieve gravity discharge to the kerb or connection into an under-ground system, then it must be taken to the kerb at 45 degrees and then a minimum 375-dia RCP is to be laid parallel to the kerb line connecting into the nearest downstream underground public drainage system. Standard gully inlet pits with minimum 1.2 metre long kerb lintels (subject to required inlet capacities) will need to be constructed at all bends, junctions and minimum distances between pits as described in ***Australian Rainfall and Runoff, volume 1***.

OSD77 Equivalent Conduit Sizes - Conduits laid to the kerb face must be sized to cope with the design flow and with at least 50mm cover. Where cover is inadequate, the following pipe equivalencies shall be used:

- 100mm-dia equivalent to one (1) 100mm x 100mm x 6mm thick RHS
- 150mm-dia equivalent to one (1) 200mm x 100mm x 6mm thick RHS
- 225mm-dia equivalent to two (2) 200mm x 100mm x 6mm thick RHS

OSD78 Outlets through Sandstone Kerbing - Outlets laid through existing sandstone kerbing will require drilling through sandstone kerb subject to Council approval.

OSD79 Pipe Class - The pipe class must be adequate to withstand proposed traffic loads.

OSD80 Rectangular Hollow Sections - All Rectangular Hollow Sections (RHS) are to be hot-dipped galvanised or stainless steel material.

Discharge to Different Catchment

OSD81 Gravity Drainage - Stormwater is to be drained in the same direction as the natural fall of the land by gravity means.

OSD82 Diversion of Stormwater to Different Catchment - Diverting stormwater runoff from one catchment (or sub-catchment) to another catchment (or sub-catchment) is generally prohibited.

OSD83 Approval for Drainage to Different Catchment - Approval for drainage "against the natural fall of the land" is only permitted in the following circumstances:

- Adjacent downstream property owner/s have indicated that they are not prepared to grant easement/s to permit the drainage of the low lying property to follow the natural fall of the land. Proof of genuine attempt at easement acquisition in the form of correspondence will be required
- An assessment of the receiving drainage system confirms that it can adequately cope with the additional runoff proposed to be discharged

OSD84 Drainage "Against Fall of Land" - Where drainage "against the fall of the land" is permitted, On-site stormwater Detention will be required, regardless of the development type. The volume and discharge is to be calculated on the area being directed to the outlet.

OSD85 Low-Lying Property Drainage - For low lying properties, on-site absorption (OSA) may be used for the disposal of runoff from on-ground paved or roof areas that are unable to be collected and taken to the street frontage.

Legal Obligations

OSD86 Positive Covenant and Restriction on the Use of Land – All OSD facilities other than those located in single residential dwellings and type – 2 alteration & additions developments will require a Positive Covenant and Restriction on the use of land, in favour of the City of Canada Bay Council on the Title.

OSD87 Purpose of Positive Covenant - The purpose of the Covenant is to ensure that the registered proprietor of the land is made aware and takes responsibility for the control, care and maintenance of the OSD system.

OSD88 The Purpose of Restriction on the Use of Land - The purpose of the Restriction ensures that the system cannot be altered in any manner, shape or form.

OSD89 Newly Created Allotments - For newly created parcels of land, these terms shall be created under Section 88B of the Conveyancing Act 1919.

OSD90 Existing Land - For existing titles, the terms of Positive Covenant and Restriction on the use of land shall be created by an application to the Land Titles Office using Forms 13PC and 13RPA.

OSD91 Standard Wording - Standard wording for Positive Covenant and Restriction on the use of land are given in the Appendix.

On-site Stormwater Absorption Systems

General

OSA1 Application - On-site stormwater absorption (OSA) systems may be used for disposal of the site's stormwater runoff. Refer to the Section under ***Controls*** for when it can be applied.

OSA systems can be used to dispose of stormwater on the site subject to the suitability of soil conditions and site constraints. Typical OSA systems include rubble drains, rubble trenches, and on-ground infiltration systems.

OSA can be used as an alternative method of stormwater disposal for 'low lying' properties where an easement through adjoining downstream properties cannot be obtained.

Design Principles

OSA2 Standard Design Methodology - The OSA system shall be appropriately sized, based on the area to be captured, using the methodology as given in the following table:

Total Impervious Area to be captured (sqm)	OSA Design Methodology*
≤ 50	Standard trench detail - 'Jumbo 410' type or equivalent material (refer to Appendix). The trench length is to be 4 metres for every 25sqm of catchment (hard stand, roof) area draining to it.
>50	Geotechnical Report to be prepared by a Geotechnical Engineer. Trench area and volume calculated from soil infiltration rate and Report recommendations. Mass Curve Method can be used.

***Important Note:** Design Constraints apply

OSA3 Location - OSA systems are to be located in 'soft' landscape areas, such as in the garden and vegetated on-ground areas. In 'hard' landscape areas, the use of porous pavement (pervious paving) is preferred.

Absorption systems shall not be located under or over any sewer service without Sydney Water approval.

Absorption systems are not to be located in rock (most non-sedimentary rocks and some sedimentary rocks such as shale) which has zero or near-zero permeability. Where rock is encountered, the base of any proposed gravel filled trench shall be set at least 500mm above the rock.

OSA systems are not permitted in shallow soil over bedrock.

Absorption trenches must follow the line of contours.

OSA4 Access - For routine inspections and maintenance, an access chamber is to be provided at either end of the OSA system.

OSA5 Water Sensitive Urban Design (WSUD) - OSA systems may be used in combination with WSUD systems and integrated as part of its performance principals.

OSA6 Design Storm Event - Runoff generated from the development must be fully catered for by the absorption system, for all storm events up to and including the 100-yr ARI storm event.

OSA7 Soil Type - Soils to be used for OSA systems **must not** be predominantly loose aeolian sands or clay soils.

Suitable soils must have a uniform thickness of at least 3.0 metres.

A soil assessment and permeability test is required from a qualified Geotechnical Engineer where runoff is collected from an area greater than 50sqm.

Suitable soils must have hydraulic conductivity values greater than 1×10^{-6} m/s and the minimum absorption rate to be adopted shall be limited to 1.0 L/sqm per second irrespective of the absorption rate achieved by any geotechnical testing.

OSA8 Minimum Clearance from Structures and Buildings - Clearance distance between all buildings, footings, structures and downstream boundaries are to be at least 3.0 metres from the proposed OSA system.

Minimum clearances are not to be reduced without a supporting Geotechnical Report.

The minimum clearance distance between sewer mains and the proposed absorption system is to be at least 1.0 metre unless approved by Sydney Water. Where clearance between buildings or structures to the OSA system cannot be provided, the structure is to be supported on a pier and beam system to a minimum 300mm below the base of the OSA system, which must be certified by a Structural Engineer.

OSA9 Steep Sites - Absorption systems will not be permitted on 'steep' sites with slopes greater than 5%, unless there is a supporting Geotechnical Report.

OSA10 High Water Table - Absorption systems will not be permitted where there is the presence of a high water table or the location of the OSA system would likely cause the water table to rise.

Where a high water table is encountered, the base of any proposed gravel filled trench shall be set at least 500mm above the water table.

OSA11 Sediment Traps and Trash Screens - Runoff directed into the OSA system must pass through an approved silt trap and filter system to remove all debris, silts, sands, etc. prior to absorption.

OSA12 Dispersion System - To ensure any overflows from the OSA system are not concentrated onto adjoining downstream properties, a dispersion system shall be provided at the overflow outlet.

Charged Systems

General

CH1 Application - 'Charged Systems' refers to a network of sealed or watertight stormwater drainage pipes which convey stormwater under constant pressure, requiring sufficient hydraulic head to move water.

Where a site naturally falls to the rear and the property is not benefited by any stormwater drainage easement and following unsuccessful attempts at obtaining a drainage easement and other drainage disposal methods such as OSA, have been found to be inappropriate for the site, then charged systems may be considered, to convey stormwater to the street frontage. Refer to Section ***Controls***, for when it can be applied.

Charged systems are generally not to be used if a gravity feed system is available to dispose of stormwater off the site to the nearest downstream Council drainage system.

Important Note: Charged systems are only permitted when used in combination with rainwater re-use facilities.

CH2 Permissibility - Charged systems may only be used if:

- Genuine attempt at easement acquisition has been undertaken and the downstream property owner/s have indicated that they are not prepared to grant easement/s to permit the drainage of the property to follow the natural fall of the land - written evidence is to be submitted as proof
- The soil absorption characteristics and other physical constraints indicate that an OSA system is not feasible to cater for the development. A Geotechnical Report, indicating that the soil has very poor absorption rate, may be submitted as proof
- The existing street drainage system and gutter capacity must have sufficient capacity to cope with the additional runoff and not result in nuisance or flooding to 'low level' property/s. A check of the gutter capacity is required to ensure stormwater does not overtop the kerb into low lying property/s

Design Principles

CH3 Permissible Site Discharge - The rate of runoff discharged to the street must not exceed the Permissible Site Discharge (PSD) calculated from Section ***On-site Stormwater Detention Systems***.

The PSD is 180L/s per ha and calculated only on the area being discharged/directed to the outlet.

CH4 Combination of OSD, OSA and Charged Systems - The design of a charged system may be used in combination with an OSD and/or OSA system to minimise the runoff to the street.

CH5 Watertight System - Charged lines may be taken directly from the roof gutter to the street and must be fully watertight.

CH6 Rainwater Re-use Overflows - Overflows from the rainwater re-use system are to be drained to the external drainage system, OSD or OSA system if these have been designed to accommodate the runoff.

CH7 Directing runoff to the street - If the charged system is to be directly taken to the street, details and supporting calculations need to be provided showing that sufficient pressure head can be generated to direct flows to the street.

CH8 Outflows from OSD systems under pressure -Outflows from OSD systems are generally to be by gravity feed ('free outlet' control). However, 'drowned outlets' may be permitted if supporting calculations can be provided showing that sufficient pressure head can be generated to direct flows to the street via a charged system and that the permissible discharge for the site can be maintained. A suitable hydrological program such as DRAINS can be used to model such situations.

CH9 Design Storm Event - The charged drainage system including roof gutters pipes and pits is to be designed for the 1 in 100-year ARI storm event.

CH10 Minimum Height of Pressure Head - The minimum height difference between the roof gutter level and the discharge pit must be at least 2.0 metres unless supporting calculations showing a hydraulic grade line for the 1 in 100-year ARI storm event indicates that the system can drain to the street with a 300mm free board to the gutter line.

CH11 Gravity Feed to Street - The charged line must discharge to a sump within the property boundary and then gravity fed to the street or receiving drainage system.

Where gravity feed to the street is not achievable, a non-return valve must be installed over the inlet pipe to the sump.

CH12 Location of Surcharge Pits - Surcharge pits are to be located such that any likely overflow is safely directed to the street or away from structures and buildings.

CH13 Minimum Pipe Sizes for Pressure Application - Pipes must be minimum 150mm-dia in size for pressure applications and solvent welded unless hydraulic calculations support that a smaller pipe can be used. Pipes less than 80mm-dia will not be acceptable.

CH14 Cleaning Eyes - Cleaning eyes within a sump must be installed at the lowest point in the system.

CH15 Gutter Guards - Gutter guards are to be installed to minimise debris entering the charged system.

Mechanical Pump-out Systems

General

MP1 Application - Mechanical pumps are to be used generally to convey sub-surface, or seepage water in a basement (sub-floor) area or to drain minor surface runoff collected from weather exposed areas (e.g. vehicular ramp) of less than 50m^2 or 100m^2 for development Types 5, 6 and 7.

MP2 Pumping of Stormwater - The pumping out of stormwater runoff in general is only permitted if:

- Gravity drainage cannot be achieved
- Genuine attempt at easement acquisition has been undertaken and the downstream property owner/s have indicated that they are not prepared to grant easement/s to permit the drainage of the property to follow the natural fall of the land - written evidence is to be submitted as proof.
- A 'charged system' cannot be installed because it does not satisfy Charged System Design Principles
- An OSA system cannot be installed because it does not satisfy OSA Design Principles
- There is no possibility of nuisance or flooding or damage to adjoining buildings and structures in the event of pump failure.
- The capacity of the receiving drainage system or kerb/gutter is capable of carrying/containing the flows. Council may request for gutter or system capacity calculations to support the proposal.

MP3 Disposal of Sub-surface Water – Because it is a relatively constant source that promotes algal growth and constant wetness, draining of sub-surface water, whether by pumping or by gravity; either directly or indirectly, to the kerb is not permitted except by way of a controlled release specifically and separately approved under Section 138.1(d) of the Roads Act 1993. Generally it is preferable to connect such sources to the nearest public underground drainage system. If that is not feasible and a thorough investigation has exhausted all acceptable alternatives then Council will consider an application for controlled release to the kerb.

Alternative methods of seepage water disposal and controlled release parameters are given in Section ***Subsurface Water***.

MP4 Where Council determines that mechanical pump out system (subsurface inflow or surface runoff) can negatively impact on the Council's infrastructure assets or is likely to cause nuisance flooding to adjacent properties, the applicant/the owner will need to adopt one or more the requirements below;

- Extension of the existing drainage system to enable a direct connection to underground drainage system.
- Acquisition of drainage easement to drain the subject property towards the fall of the land.

Design Principles

MP5 Minimum requirements for Mechanical Pump-out Systems - The minimum requirements for mechanical pump-out systems for stormwater apply as follows:

- The pump-out system shall consist of two (2) mechanical pumps, connected in parallel, with each pump being capable of emptying the holding tank at a rate equal to the peak 100-year ARI, 5 minute duration storm event. Any subsurface inflow rate during wet weather determined by an approved test procedure or estimated value is to be included
- The mechanical pump must be capable of draining the surface runoff collected from weather exposed areas of not less than $50m^2$ or $100m^2$ for Types 5, 6 and 7
- The capacity of the holding tank shall be calculated as above the level at which all pumps are automatically brought into operation
- The minimum capacity (volume) of the holding tank well shall be adequately sized in accordance with **AS/NZS3500.3.2 - 1998, National Plumbing and Drainage, Part 3.2: Stormwater drainage - acceptable solutions**, but based on the 100-year ARI, 5 hours design storm.
- A silt trap shall be provided on the inlet side of the holding tank
- The rising main from the pump system shall be designed and installed in accordance with the pump manufacturer's specification
- The rising main from the pump system shall discharge to a stilling sump within the property boundary and then gravity fed to the underground receiving drainage system or to an OSD system if the OSD system is piped to an underground receiving drainage system
- A one-way valve is to be installed on the rising main outlet. The stilling sump is to be located such that any likely overflow is safely directed to the street and away from adjoining buildings and structures
- The switching of the pumps shall be arranged so that they operate alternately
- The pumps shall be provided with automatic level switches so that they operate simultaneously should the capacity of the tank be exceeded
- An automatic alarm system shall be provided to warn of failure of any part of the pump system
- The alarm shall have visual indicators and an audible alarm siren
- A rechargeable battery back-up system for the alarm is to be provided in the event of power failure

Legal Obligations

MP6 Positive Covenant and Restriction on the Use of Land - Mechanical pump-out systems regardless of whether or not used as OSD systems shall require the creation of a Positive Covenant and Restriction on the Use of Land affixed to the title requiring the owner of the property to maintain the system, not tamper with the system and indemnifying Council against liability in respect of any damage sustained as a result of the failure of the pump system and damage to neighbouring property or any other cause not in Council's control, and providing for regular inspection by the proprietor. Refer to Section **On-site Stormwater Detention Systems**, Section under **Legal Obligations**.

Scouring, Erosion and Water Quality Control

General

SC1 Application - Where discharge of stormwater is to a natural watercourse, into bushland/ reserve, property or water way, adequate controls are required to protect these adjoining properties, bushland, roadways and receiving waters from erosion and degradation due to pollution, silt laden stormwater runoff and/or high concentration of runoff.

SC2 Scour and Erosion Control Devices - Notwithstanding other stormwater controls that may be required such as OSD (flow attenuating devices) or OSA, appropriate scour and erosion control devices are to be installed at the outflow to the system.

Minimum Requirements

SC3 Application - The installation of scour and erosion control devices and other stormwater management measures are required as follows:

- Appropriate scour protection devices installed at all outlets to stormwater conduits
- Additional installation of pollution control devices at the source, on-line*, off-line or at the end of the line to control sediment laden overland stormwater flows
- Stormwater management measures shall not be located on-line in water courses or within riparian zones or areas of remnant native vegetation
- Where the volume of runoff is considered high, it may be appropriate to include an OSD (for sites larger than 1200 sqm) and/or OSA system/s to reduce runoff into the receiving waterway
- The type of available control or treatment required for each development type that drains directly into a natural watercourse, bushland/ reserve, or water way are tabled below:

Development Type	Control Type
1	E*
2, 3, 4, 4a, 6, 8	A, B, E*, F, H
5, 7	A, B, E*, F, G*, H

Key:

Development Type

1 - Demolition only
2 - Alterations and additions
3 - New dwelling with existing footpath along frontage
4 - New dwelling with no existing footpath
4a - Dual occupancy, town homes etc.
5 - Residential Flat Building (RFB), commercial and mixed developments
6 - Development under SEPP Housing for Senior Citizens or People with a Disability
7 - Substantial development
8 - Subdivision of one into two allotments

Water Quality Treatment System

A - On-site Stormwater Detention System (OSD)
B - On-site Retention System or Absorption System (OSA)
C - "Charged" System
D - Mechanical Pump-out System
E - Scour and Erosion Control System/Devices
F - Rainwater Re-use System
G - Sediment Pond/Water Quality Device
H - Water Sensitive Urban Design (WSUD)
* denotes mandatory requirement

SC4 Pollutant Load to be Retained - Water quality treatment systems or pollution control devices such as sediment ponds where required to be installed are to ensure the following pollutant loads are retained on the site:

Pollutant Type	Percentage Retention of Post-development Loads
Total suspended solids (TSS)	80%
Total phosphorus (TP)	45%
Total Nitrogen (TN)	45%
Gross Litter	All Litter - 70% Material (>50mm) - 70%

SC5 Monitoring Water Quality - Water quality treatment systems or pollution control devices are to be installed and monitored regularly to ensure that they achieve their treatment objectives and that their performance meets the above criteria. If they fail to meet these targets, or if so required by the Appropriate Regulatory Authority (ARA), it shall be modified to achieve them and the system upgraded.

SC6 Ease of Maintenance - Water quality treatment systems or pollution control devices are to be designed to ensure ease of maintenance.

SC7 Scour Protection - Scour protection devices shall include embankment stabilisation e.g. rock walls, concrete aprons, gabions, turfing, jute mesh, energy dissipating units, or other more appropriate erosion control devices approved by Council. Preference is for 'soft engineering' solutions.

SC8 Control Devices near Creeks - Stormwater pollution control devices may not be appropriate within or adjacent to creek locations. In this regard, The Department of Planning and NSW Fisheries shall be contacted for advice about suitable erosion control measures here.

SC9 First Flush - Stormwater pollution control devices to remove pollutants during the 'first flush', shall be installed within the site. These include proprietary items such as Humeceptors or CDS units, silt and grease arrestors. Installation of these devices shall be in accordance with the manufacturer's specification.

SC10 Large Scale Control Devices - Other sediment control devices such as stilling basins and constructed wetlands shall be required for large-scale or substantial developments. These include land and community title subdivisions. Design of these devices shall be in accordance with the ***Managing Urban Stormwater, Soils and Construction Manual*** issued by the NSW Department of Housing.

SC11 Silt Traps - Silt traps are to be installed in all stormwater pits to contain silt and debris. Silt traps shall be installed at the bottom of pits at a depth of 200mm to capture silts and fines. Weep holes shall be drilled into the base of the pit to ensure that it does not permanently hold water and create a breeding ground for insects. Where the pit is located over impervious material, a 100mm layer of gravel bedding with subsoil drains will also need to be laid.

Soil and Water Management

SC12 Soil and Water Management Plan - A soil and water management plan is required for all development types, except for minor developments, for example extension to an existing dwelling of less than 50sqm.

Minimum guidelines shall be in accordance with the ***Managing Urban Stormwater, Soils and Construction Manua***l by the NSW Department of Housing, August 1998.

SC13 Installation and Maintenance - All sediment control devices are to be installed prior to any commencement of clearing and earthworks on the site. Ongoing maintenance of these devices during construction will be required.

SC14 Maintenance Schedule - For large scale developments, residential flat buildings and mixed used developments, a maintenance schedule is to be kept on site to ensure that the devices are cleaned on a regular basis.

Rainwater Re-use

General

RR1 Application - Notwithstanding BASIX water conservation targets, the collection of rainwater for non-potable use is encouraged. Non-potable water usage shall include watering of the garden, irrigation, washing machine and toilet flushing.

Minimum Requirements

RR2 BASIX Certificate Requirements - Rainwater re-use shall be provided in accordance with BASIX Certificate requirements.

BASIX is a web-based planning tool designed and developed by Department of Planning in association with other government agencies and utilities to assess the water and energy efficiency of new residential developments.

The NSW Government introduced BASIX into the development approval system on 1 July 2004.

RR3 Rainwater Re-use - Part of BASIX requires the installation of rainwater re-use facilities. The volume of storage required depends on the size of the dwelling, the number of amenities and other site factors. Further details can be obtained at www.basix.nsw.gov.au.

RR4 Council's Rainwater Re-use Volume - Council requires a minimum volume of 3,000L for residential developments (Development Types 2 and 3 only) and 5,000L for the other developments (Development Types 4a, 5, 6, and 7).

RR5 Minimum Rainwater Re-use Volume to be provided - The minimum re-use volume to be provided shall be the greater of the volume determined from the BASIX Certificate and Council's minimum Rainwater Re-use volume.

Additional storage is also encouraged but is subject to Council's planning requirements.

RR6 Submission of a Development Application - Where it is proposed to install a rainwater tank only, a Development Application (DA) would need to be lodged if the volume of the proposed rainwater tank exceeds 10,000 L. No DA would be required if the proposed rainwater re-use volume is less than 10,000 L or if the rainwater harvesting proposal forms part of a DA for Development Types 2, 3, 4, 4a, 5, 6 and 7.

On-site Stormwater Detention Offset

RR7 Exemption from OSD - The provision of a rainwater re-use system does not negate the requirements for OSD, if required, as stipulated in Section ***On-site Detention System, Controls***.

RR8 Reduction of OSD from Rainwater Re-use - The calculated basic OSD storage volume (ref. Section ***On-site Detention System***) can be reduced by a portion of the rainwater re-use volume as calculated from the BASIX Certificate or Council's Rainwater Re-use volume.

A maximum of fifty percent (50%) of the required volume (BASIX Certificate minimum volume or Council's Rainwater Re-use volume) can be deducted from the basic OSD calculated site storage volume. Additional storage deduction or volume beyond what has been determined from the BASIX Certificate or Council's Rainwater volume **will not be permitted**.

The re-use volume shall be deducted from the calculated OSD volume by straight subtraction of the volumes.

The permissible site discharge (PSD) is not required to be adjusted.

RR9 Dual Usage - Dual usage for both OSD and re-use in the same tank is permitted. However it must be noted that stormwater collected for re-use must not include runoff collected from on-ground areas, balconies and sub-floor areas (sub-surface water). Only stormwater collected from roof areas can be stored for re-use.

RR10 Permitted Use - Rainwater collected for re-use is classified as non-potable and is only permitted for use in the flushing of toilets, laundry clothes washing, irrigation systems including watering the garden and must not be used for human consumption in accordance with Sydney Water guidelines.

RR11 When designing dual-purpose tanks, consideration must be made for the collection of rainwater from the site, noting that OSD control generally applies to the total site area but stormwater collected for the re-use component can only be collected from the roof of dwellings. A dual-purpose OSD/re-use system that collects only rainwater from the roof may result in much of the stormwater from the site area to bypass the OSD system. Therefore the design must take into consideration of the majority of the site's runoff, especially the roofed and impervious areas, to ensure that it can be controlled through the OSD system.

Stormwater Drainage Design

General

SW1 Application - This Section provides the minimum design guidelines for both private and public stormwater drainage systems.

Stormwater drainage systems referred to herewith are the systems which are designed to convey stormwater runoff. This includes property drainage, street drainage (both piped and surface flow paths), and trunk drainage (larger conduits, open channels) and receiving waters (rivers, creeks, groundwater storage, sea and ocean).

SW2 Purpose - Stormwater drainage systems are to be designed to collect and convey stormwater runoff from a site to a receiving waterway with minimal nuisance, danger to life or damage to properties.

Minimum Requirements

SW3 Australian Rainfall and Runoff Handbook - Stormwater drainage systems shall be designed in accordance with the Australian Rainfall and Runoff Handbook utilising the "major" and "minor" system design criteria.

SW4 Gravity Drainage - Stormwater runoff shall be conveyed to follow the natural fall of the land, by gravity means, wherever possible. The design of "Charged Systems" is not covered in this Section. Charged systems are not acceptable for public drainage systems.

SW5 Re-directing Stormwater - Re-directing stormwater runoff from one catchment (or sub-catchment) to another catchment (or sub-catchment) is generally prohibited.

SW6 Public Drainage systems - Public stormwater drainage systems must be designed as gravity systems. For private stormwater drainage systems, an alternative to gravity drainage will only be considered where easement acquisition is unsuccessful and on-site disposal such as OSA is not possible.

SW7 Minimising the Quantity and Improving the Quality of Stormwater Runoff - Stormwater quantity and quality (pollutants) shall be minimised by designing the system with the following criteria:

- Have adequate sub-surface drainage to provide protection to structures, and prevent long term water ponding
- Have adequate inlets to collect and convey surface stormwater runoff to prevent water from entering buildings or damage structures, minimise nuisance and danger to persons and vehicular traffic, prevent long term surface water ponding, prevent erosion, and protect adjoining and downstream properties from any adverse impacts as a result of stormwater runoff from proposed developments
- Include a system of overland flowpaths, where possible, to provide fail-safe protection to buildings, structures, adjoining and downstream properties in the event of pipe blockage or storm events that generate greater runoff than the capacity of the piped drainage system
- Include sediment and silt traps and trash screens strategically located in catch drains and inlet pits to capture pollutants
- This can be achieved by:
  - The construction of surface flow routes to convey floodwaters away from private and public properties and, in flood prone land, the velocity and depth of flows are controlled to an acceptable level.
  - The provision of surface flow routes and piped drainage systems to direct/control frequent runoff, so that convenience and safety for pedestrians and vehicle traffic can be provided.
  - The provision of both piped drainage and surface flowpaths for new developments, re-developments and new subdivisions.
  - The installation of water quality control devices such as gross pollutant traps, stilling basins, baskets and the like to collect pollutants present in the stormwater runoff.

Minor and Major System Design

SW8 "Dual Drainage" System - The method of stormwater drainage design used to size pipe networks and trunk drainage systems to convey stormwater runoff to the receiving water is known as the "dual drainage" system approach or minor/ major design concept, as described in the Australia Rainfall and Runoff Handbook. This method has been adopted by Council and a summary of the design criteria are set out below.

Minor System Design

SW9 Definition - The gutter and pipe network capable of conveying stormwater runoff during minor storm events is known as the "minor system".

SW10 Widths of Flows - When designing the minor system, adequate inlet pits are to be installed such that the maximum gutter flow widths shall not exceed the lesser of 2.5 metres or one-quarter of the road carriageway width.

Wider flow widths may be accepted on roads whose cross-sectional gradients are less than 1.0%. This is subject to Council approval.

For private stormwater drainage systems, the minor system must be capable of capturing or containing the runoff produced from the average rainfall recurrence interval as stipulated in ***SW21 Average Recurrence Interval for Public Drainage Systems***.

SW11 Minimum Conduit Size - The minimum conduit sizes for the minor system design shall be as follows:

- Public system - pipes, 375mm-dia
- Public system - box culverts, 600mm wide x 450mm high
- Private system - pipes, 90mm-dia for roof runoff only
- Private system - pipes, 100mm-dia for surface runoff within the property only
- Roads - pipes, 375mm-dia
- Roads - conduits, equivalency to 375mm-dia

SW12 Minimum Pipe Gradient - The minimum pipe gradient shall be as follows:

- For pipes less than or equal to 225mm-dia: 3%
- For pipes greater than 225mm-dia: 1.0%
- For concrete lined box culverts poured in-situ: 0.5%

SW13 Anchor Blocks - Pipes which are to be laid at a slope greater than 20% will require anchor blocks at the top and bottom of the section and at intervals of not more than 3.0 metres in between. Bulkheads shall be provided on steep gradients where soil instability is likely. To retain backfill material, bulkheads shall be installed at intervals of not more than 5.0 metres.

SW14 Pipe Material and Jointing Type - Type of pipe material and jointing to be used for the minor system design shall be as follows:

- Public system - reinforced or fibre reinforced concrete*, rubber ring jointed
- Private system - up to 300mm-dia uPVC, solvent welded joints; 300mm-dia and larger reinforced or fibre reinforced concrete*, rubber ring jointed

SW15 Alternative Material - Subject to Council approval, other types of material such as plastic pipes may be used for larger conduits, if it can be demonstrated that the substitute material has the same, if not better, structural and durability qualities when compared to reinforced concrete.

SW16 Depth of Cover - Depth of cover to the conduit obvert shall be as follows:

- Public system not subject to vehicle loads - 450mm
- Pubic system subject to vehicle loads - 600mm
- Private system not subject to vehicle loads - 300mm
- Private system subject to vehicle loads - 600mm

SW17 Less than Minimum Cover - If it is not practical to provide for the minimum cover requirements specified above, then at least 50mm thick granular overlay shall be provided over the obvert of the conduit with a 150mm thick reinforced concrete slab constructed over it or conduit is to be mass concrete surrounded.

SW18 Pipe Class - The appropriate class of pipe to be used shall depend on the minimum cover provided and the loading onto the pipe in accordance with ***AS3725 - 1989, loads on buried concrete pipes***.

SW19 Design Velocity of Flows - Design velocity of flows shall be as follows:

- Conduits - 0.6 m/s minimum, 6.0m/s maximum
- Surface flow - 2.0m/s maximum

Where these values are exceeded, appropriate erosion control and scour protection measures are to be provided at the outlet.

SW20 Maximum Depth of Flows - Maximum permitted depth of surface flow shall be:

- Road carriageway, driveways, footpaths and carparks - 150mm
- Landscaped areas - 300mm

SW21 Average Recurrence Interval for Public Systems - The average recurrence interval to be adopted for the design of the public drainage system is tabulated below:

Location	ARI (years)
Local Roads	10
Collector roads	10
Sub-arterial roads	10
Arterial roads	20
State roads	50
Access to emergency facilities	100
At a depression (low point) in road	100
Public system passing through private property	100

SW22 Average Recurrence Interval for Private Systems - The average recurrence interval to be adopted for private drainage systems (minor system design) is tabulated below:

Location	ARI* (years)
Residential - low density	10
Residential - medium to high density	20
Commercial	50
Industrial	50
Hospitals and Emergency Facilities	100

*** Important Note:** The underground drainage system (includes pipes, conduits and pits) is to be designed for the 1 in 100-year ARI where major system flows (e.g. along a drainage easement) are likely to surcharge across private property or cause localised flooding. A surcharge path must also be provided to safely convey surface stormwater across private property within easements. The minimum design ARI for surcharge paths shall be the 1 in 100-years.

Major System Design

SW23 Definition - The "major system" comprises the drainage route, which conveys the runoff for the major storm events. This may be a series of trunk drainage systems and overland surface routes including open channels, creeks, and river systems.

SW24 Provision of Overland Flow Routes - Overland flow routes are to be provided at the following locations:

- Within the road carriageway excluding footpaths and the footway reserve. Flows across footpaths will only be permitted where this will not cause flooding to property or create danger to pedestrians and is subject to Council approval
- Within drainage easements. Where it is not practical to provide an overland flow route over the easement, the piped drainage system shall be sized to accept the runoff for the major storm event i.e. the 100-year ARI
- Within a known and designated floodway
- Within creeks and river systems.

SW25 Minimum Freeboard Requirement for Flood Prone Land - Freeboard can vary according to parameters such as the size of the upstream catchment, the local terrain, the difference between the 1% AEP (Annual Exceedance Probability) level and the PMF (Probable Maximum Flood) level and the proposed use.

In some cases the determination of an appropriate freeboard will be best done on the merits of the individual case through the Development Application process. However the minimum freeboard requirement unless overridden by a Flood Study, Draft Flood Study, Floodplain Risk Management Study, Floodplain Risk Management Plan or the DCP (Development Control Plan) shall be as follows:

Freeboard requirements above 1% AEP water surface level				
Finished Floor Level (B)	Adopted Flood planning area	Overland flow path identified by Council as "Minor"	Overland flow paths other than ones identified by Council as "Minor	Mainstream flooding
Residential – Habitable rooms	As per the adopted Plan	300mm	500mm	500mm
Residential – Non-habitable rooms	As per the adopted Plan	300mm	300mm	500mm
Commercial or Industrial – All internal areas	As per the adopted Plan	300mm	500mm	500mm
Carport open on 3 or 4 sides (At Ground Level)	As per the adopted Plan	150mm*	150mm	300mm
Entrance to Basement	As per the adopted Plan	300mm*	Difference between the 100-yr ARI Level and the PMF Level	Difference between the 100-yr ARI Level and the PMF Level
Critical Infrastructure	As per the adopted Plan	300mm	Difference between the 100-yr ARI Level and the PMF Level	Difference between the 100-yr ARI Level and the PMF Level

* **Note**: At Council's discretion, may be reduced

SW26 Design Velocities and Depths of Flow - Design velocities and depths of surface flows shall be in accordance with Figures G1 and G2 of the ***New South Wales Government Floodplain Management Manual: The management of flood liable land***, with hazard category classed as "low hazard".

SW27 Average Recurrence Interval - The average recurrence interval to be adopted for the major system design is tabulated below:

Location	ARI (years)
Private	100
Public	100

Catchment Area

SW28 Definition - The catchment area is defined by the limits from where surface runoff will make its way, either by man-made or natural paths, to the point of exit.

Catchment Runoff

SW29 Catchment Runoff - Catchment runoff shall be determined using a suitable hydrological method depending on the level of accuracy required and the extent and shape of the catchment. Limitations of each method are given in the Australian Rainfall & Runoff Handbook.

SW30 Determination of Catchment Runoff - Catchment runoff is to be calculated using the following methods:

Method	Application
Rational Method	For catchments areas < 1200 sqm
Hydrological Method	For catchment areas > 1200 sqm

SW31 Rational Method Approach - The Rational Method for the estimation of peak flows will be acceptable for small catchments. This method is best suited to catchments with uniform slope and roughness characteristics and where the level of accuracy is not critical. This would include site discharge calculations and roof runoff.

SW32 Hydrological Computer Model Approach - The use of hydrological computer models is best suited to medium to large catchments and where a reasonable level of accuracy is required.

Acceptable computer models include ILSAX, DRAINS, RAFTS and RORB.

SW33 Impervious Areas - The impervious area percentages to be adopted for determining runoff are tabulated as follows:

Public System (trunk drainage)	
Residential Areas	80
Commercial	100
Road Reserves	80

Private System (inter-allotment drainage)	
Road Reserves	80
Residential Single	80
Residential Medium Density	90
Residential High Density	100
Industrial	100
Commercial	100

SW34 Roughness coefficients - Roughness Coefficients are to be used to calculate free surface flow.

For the purpose of determining stormwater runoff into open channels and free surface hydraulics, Manning's roughness coefficients shall be used. Typical values are given in appendix and the Australian Rainfall and Runoff Handbook.

For sections with composite roughness values, Horton's Equation may be used to convert to an equivalent roughness value for simplicity in calculations.

Horton's Equation is given as:
$n = \{\Sigma (Pi.ni^{3/2}) / \Sigma Pi \}^{2/3}$

Where ni = is the Manning's Roughness Coefficient for section i and
Pi = is the wetted perimeter or length of the section with a roughness value ni

Hydraulic Grade Line

SW35 Analysis - Hydraulic grade line calculations are to be performed in accordance with the ***Australian Rainfall and Runoff***, and shall be undertaken by a qualified person with experience in hydrology and hydraulic design.

SW36 Full Hydraulic Calculations - Full hydraulic calculations must be submitted for all public and major piped systems (375mm-dia and larger), drainage lines through easements and flood assessment to ascertain flood levels or where Council deems it necessary to determine the feasibility of the proposal.

SW37 Reduction of Losses - Drainage lines shall be designed with minimal bends to avoid bend losses. Where this is unavoidable, junction pits shall be provided at the location of bends or changes in direction.

SW38 Avoidance of Chokes - Pipes will not be permitted to be laid such that a larger pipe joins into a smaller pipe downstream, to avoid potential chokes in the system. However, this may be unavoidable when the new line is connected into an existing system. In this circumstance, the starting hydraulic control shall be adopted at the ground level at the point of connection.

SW39 Water Surface Profiles – For determination of flood profiles and surface drainage systems (e.g. channels, open drains and the like), hydraulic calculations are to include determination of water surface profiles and backwater effect using suitable computer models such as DRAINS and HEC-RAS.

SW40 Frictional Losses - Frictional losses in closed conduits of circular shaped cross-section (e.g. pipes), shall be determined using the Darcy-Weisbach Formula. This Formula may be applied to rectangular sections (e.g. box culverts), by converting the product of the area and hydraulic radius to the power of two-thirds (A.R2/3) to an equivalent circular section.

SW41 Colebrook-White Roughness Values - Colebrook-White roughness parameters used for pipes are as tabulated:

Conduit Material	K value (mm)
uPVC pipe	0.03
Reinforced concrete pipe	0.06
Fibre reinforced concrete pipe	0.06

SW42 Pit Energy Losses - Pit energy losses and pressure changes at junctions, bends, transition structures, slope junctions, inlet pits, junction pits, drops and outlets must be considered in the hydraulic assessment.

Pressure head coefficients for determining these "head losses" are to be obtained from the following sources:

- Missouri Charts
- Hare Equations
- U S Corp of Engineers mitre bend charts
- AR&R 1987 Handbook or later editions

SW43 Downstream Hydraulic Controls - The following downstream water surface level or controls are to be adopted:

- Where the hydraulic grade line level downstream of the proposed works, including the upstream pit losses at the starting pit is known (corresponding to the design storm recurrence interval as adopted), this level is to be used
- Where the downstream starting point is at a pit and its hydraulic grade line is unknown, a level of 150mm below the surface level of this pit is to be adopted
- Where the outlet is to an open channel, the water surface level is to be determined using Manning's Equation or an appropriate hydraulic model. The water level shall be adopted as the normal depth calculated using an appropriate method, or the top of the outlet pipe, whichever is the greater
- Where the outlet is to an open channel, and downstream flood levels are known, the water surface level to be adopted shall be the 1% AEP flood level

- Where the outlet is affected by tidal or wave action, the resulting tide water level shall be adopted
- Where the outlet is to an existing pipe or conduit, the hydraulic grade line of the conduit shall be determined downstream to a pit where its water level is known (e.g. at a grate in the gutter where the maximum free surface ponding is at the top of kerb)
- Where the outlet is at the invert of the k erb, the water surface level shall be adopted at the top of the kerb

Stormwater Drainage Pits

SW44 Pit Types - Standard Council kerb inlet pits with kerb lintel openings, junction pits and letter box type pits are to be installed for all public drainage systems. Pits for private drainage systems are to be inlet and junction pit types with grates or solid covers.

SW45 Material - Public drainage pits are to be precast concrete, fibre reinforced concrete or insitu poured concrete.

Private drainage pits may be constructed from pre-fabricated high density poly-plastic of appropriate load class as specified by the Manufacturer.

The bases of pits shall be concrete benched to minimise hydraulic losses.

Pits constructed of brick or blockwork will not be acceptable unless they are designed and constructed to withstand structural loading and fully waterproofed to prevent leakage.

SW46 Minimum Dimensions - Minimum internal dimensions of pits are tabulated below:

Pit Type	Dimension (mm)
Kerb Inlet with Lintel and Grate	600 x 900
Inlet Pits in Landscaped Areas	600 x 600
Junction Pits	600 x 600
Private Grated Inlet Pit < 1.2m deep	300 x 300
Private Grated Inlet Pit > 1.2m deep	450 x 450
Private Junction Pit < 1.2m deep	300 x 300
Private Junction Pit > 1.2m deep	450 x 450

SW47 Private Stormwater Drainage Pit Location - Private pits are to be located wholly within property boundaries. If any private pit is required to be located external to the property, then it shall be constructed to a public standard and becomes the property of Council.

SW48 Grates - Grates over public pits are to be galvanised and hinged to frame. Private pits may have grates made from pre-fabricated high density poly-plastic of appropriate load class as specified by Manufacturer.

SW49 Load Class of Grates and Covers - Stormwater drainage pit grates and covers shall be provided to support the required load classification at the following locations:

Location	Load Class Required*
Driveways including access handles	Heavy Duty
Car parks	Heavy Duty
Road Carriageways	Heavy Duty
Footways	Heavy Duty
Reserve, landscaped areas with pedestrian traffic only	Medium Duty
Reserve, landscaped areas with no traffic	Light Duty

*** Important Note**: Light duty is equivalent to 1 tonne wheel load, medium duty is equivalent to 3.5 tonne wheel load and heavy duty is equivalent to 9 tonne wheel load.

All public grates shall be hinged to frame and lockable.

Private grates are to be hinged to frame and lockable where it is designed to surcharge or where upwelling is likely.

SW50 Liftable Lids - All lids over pits must be liftable for routine inspections and maintenance.

SW51 Junction Pits - Junction pits are not to be designed as pressurised systems.

SW52 Step Irons - Where pits are 1.2 metres or greater in depth, step irons in accordance with ***AS1657*** are to be provided to one side of the pit wall to allow access for inspections and cleaning.

SW53 Letterbox Type Pits - Letterbox type pits may be used for collection of surface water. However, they are not permitted at or near kerb locations where there is likely pedestrian and/or vehicular traffic. In these locations, pits with butterfly type grates flush with the surrounding ground level are preferred.

SW54 Lintels - Lintels over kerb openings shall be provided at the kerb side with the opening length dependent on its design capture rate, but not less than 1.2 metres and not greater than 4.0 metres.

SW55 Pit Locations - Stormwater drainage inlet pits shall be positioned at the following locations:

- Spaced such that the gutter flow width is limited to 2.5 metres maximum width for the minor system design.
- Located at the upstream side of allotments to minimise runoff flowing across the road.
- Located at sag points and at road depressions.
- Located where access for inspections and maintenance is readily available.
- Provided at changes in direction, grade, conduit level, size, or class of conduit.
- Provided at junctions.
- Spaced at a distance of no greater than 50 metres apart.

SW56 Inlet Capacities - The inlet capacity of pits shall be determined in accordance with the Australian Rainfall and Runoff Handbook.

Inlet capacities are to be restricted with the following blockage factors:

Location	Inlet Type	Capacity Allowed (%)
sag	side entry only	80
sag	grate only	80
sag	combination	100 side 0 grate
sag	letterbox	50
on-grade	side entry only	80
on-grade	grate only	50
on-grade	combination	80

Open Channels

SW57 Preferences - Piped drainage systems are preferred over open channel systems.

Open channels will only be permitted if they form part of the major drainage system and where permitted, shall be designed to have smooth transitions, with adequate access provisions available for inspections, general maintenance and adequate safety measures installed to protect persons and vehicles.

These include perimeter fences, bollards, and grills over outlet pipes. Step irons shall be installed and flow velocities and depths are to be reduced at nominated access points.

SW58 Design - Open channels shall be designed in accordance with the Australian Rainfall and Runoff Handbook and the NSW Government Floodplain Management Manual and must be able to contain the major system runoff. Open channels shall be designed to avoid hydraulic jumps or generate supercritical flow conditions. Side slopes must not exceed 1 in 3, unless fully fenced off.

Wherever possible, low flows shall be contained within a piped system or contained within a concrete lined channel at the invert of the channel.

SW59 Manning's Roughness Coefficient – Manning's roughness coefficients for open channel sections applicable to specific channel types can be obtained from the Australian Rainfall and Runoff Handbook.

Typical values are given below:

Surface Finish	n value
Concrete pipes or box sections	0.012
Concrete trowel finish	0.015
Concrete formed without finishing	0.016
Sprayed concrete, granite	0.018
Bitumen, smooth finish	0.016
Bricks or pavers	0.016
Pitchers or dressed stone in mortar	0.016
Rubble masonry or random stone in mortar	0.028
Rock lining or rip-rap	0.028
Earth, clean	0.027
Corrugated metal	0.027
Earth, weed and gravel	0.022
Rock cut	0.028
Short grass	0.033
Long grass	0.035
Medium to dense brush	0.150

Building Adjacent to Stormwater Drainage Systems

SW60 Location of Structural Supports - Where structural supports such as foundations, piers, and footings are to be located adjacent to the drainage system, they are to be located outside of the drainage easement and must not load bear onto the underlying drainage structure. In general, where a drainage structure is parallel or adjacent to foundations, piers or footings, the base of the footing shall be located outside the influence zone created by an angle of 45 degrees to the horizontal extended from the invert of the drainage structure.

Stormwater Connections

SW61 Under Buildings - shall be carried out in accordance with ***AS/NZS3500.3, Section 3***.

SW62 Above ground pipe work - Shall be carried out in accordance with ***AS/NZS3500.3, Section 6*** and this Document.

Non-return valves are not permitted to be installed in Council maintained (public) systems.

SW63 Connection Detail - If the ratio of the private pipe size to the Council (public) pipe size is more than one third, a standard stormwater gully pit at the connection point, will be required.

Avoid Conflict with Utility Services

SW64 General - Care shall be taken to ensure that the proposed stormwater drainage system will not conflict with utility services. In this regard, all utility services shall be located prior to final drainage system design. Stormwater drainage conduits crossing over or under sewer lines must be laid in accordance with Sydney Water requirements. This may require support trenching and concrete encasement of sections that traverse the utility.

SW65 Location of Drainage Lines in Road Reserve - Public drainage lines laid in the road reserve, shall be located under the kerb line or within the road carriageway, to avoid conflict with the utility services in the footway.

For private drainage lines which must cross the footway reserve, they shall be laid across the footway perpendicular to or at a maximum angle of 45 degrees to the kerb face to minimise conflict with services.

Easements

SW66 Requirement - Where the site grades to the rear, the creation of formal drainage easements will be necessary. Evidence in the form of a Legal Agreement between affected parties or copies of titles showing the creation or intention to create easements must be provided to Council in support of the Development Application. This is essential for DA approval. Where easements cannot be negotiated, signed documents by all affected parties or acceptable documentation provided as evidence shall be submitted to support the case for alternative solutions.

Easements shall be required over constructed public drainage systems within private properties, to **ensure** that Council has full rights of access to such drainage systems for the purpose of inspection, maintenance or upgrade.

Stormwater drainage easements shall be required over all private inter-allotment drainage lines.

Stormwater drainage easements will not be required within or over natural drainage systems such as creeks and watercourses.

Council does not favour or encourage the piping, construction within or over, or interference with natural drainage systems. Any proposal to carry out such works will be subject to an assessment pursuant to other relevant Council policies and joint approval from other relevant authorities.

SW67 Easement Acquisition - Council will take the opportunity to acquire drainage easements over existing constructed public drainage systems within private property whenever a development occurs by Condition of Consent.

When a developer, property owner or Council proposes to relocate or reconstruct a public drainage system within the site, a drainage easement in Council's favour must be created to suit the relocated or reconstructed drainage system at the cost to the developer.

A subdivision **will not** be approved where a formal drainage easement cannot be provided to drain a newly created allotment in the same direction as the natural fall of the land.

SW68 Prohibition of Building over Easements - Any construction of buildings or other permanent structures over a public drainage easement is not permitted.

Easements allow Council reasonable access for the purpose of construction, maintenance and upgrade of the stormwater drainage system.

Encroachments impede or re-direct overland flows away from the easement, and may load bear onto the underlying drainage structure.

Council may require the relocation of an existing pipe to avoid encroachment. Where encroachment is necessary to achieve reasonable development, then the conduit and easement may be relocated subject to Council approval.

SW69 Load bearing Structures adjacent to Drainage Easements - Any structural support such as footings and piers will only be permitted to be located adjacent to an easement if they do not load bear onto the underlying drainage structure, and that the built structure will not be undermined by any future maintenance work necessary within the easement.

SW70 Planting of Significant Trees - The planting of trees or large shrubs, particularly those with extensive root systems will not be permitted in or within proximity of drainage easements.

SW71 Construction over Public Drainage Easements - Construction over a public drainage easement is generally prohibited. Public drainage easements must be free of all encroachments with a minimum vertical clearance from the surface/ground level over the drainage structure to a height of 5.0 metres above.

Paved surfaces over the public drainage easement are permitted provided that construction joints along each longitudinal edge of the easement are installed to facilitate access to the drainage structure.

SW72 Public Easement Widths - Public easement width shall be a minimum width equal to the external width of the conduit plus 1.0 metre, rounded to the nearest 0.1 metre.

Inter-allotment Drainage

SW73 Application - Inter-allotment drainage shall be provided for property/s that does not drain directly to its street frontage by gravity means, or directly by gravity means to an existing stormwater drainage system (public or legally private) or by gravity means to a natural watercourse.

Easements shall be created over all inter-allotment drainage systems on private property/s in favour of all upstream properties to be benefited by it.

SW74 Inter-allotment Easement Widths – Inter-allotment easement widths (private) shall be a minimum width equal to the external width of the conduit plus 300mm. However these widths may be varied where there are site constraints.

SW75 Sizing of Inter-allotment Drainage Systems - Inter-allotment conduits shall be sized on the total site area of the benefitted allotments with a minimum impervious area as given in Section ***Impervious Areas***.

SW76 Material - Inter-allotment drainage pits and pipes shall be of reinforced concrete, fibre reinforced concrete or uPVC material. All pipes/conduits are to be rubber ring jointed or solvent welded as specified by the manufacturer and in accordance with ***AS4058***, ***AS4139*** and ***AS1254*** respectively.

Subsurface Water

SW77 Definition - Subsurface or groundwater is water held in the soil or in pores and crevices in rock and is generally present behind basement walls or subfloor areas which are below the natural ground level.

SW78 Minimum Information to be Provided – Where a proposal is for the installation of a basement or below ground area or the development will require cutting into the existing ground level, a Geotechnical Report must be submitted to Council for assessment. This Report shall detail an investigation of subsurface conditions including groundwater levels, the likelihood or indication of a high water table or seepage water, the soil type encountered and the soil infiltration rate.

SW79 Disposal – Generally subsurface water is collected by sub-soil drainage pipes and collected in a holding tank which is either pumped or gravity fed into an approved disposal point. Subsurface water is not permitted to be discharged to the kerb either directly or indirectly except in a controlled manner specifically approved by Council under **S138.1(d) of the Roads Act 1993** (refer ***SW80*** below). It must be drained directly into an underground public drainage system or other disposal point approved by Council.

SW80 Direct Connection into an Underground Public Drainage System – This is the preferred method of subsurface water disposal. The subsurface water is conveyed across the public footway by gravity means and drained into the nearest public underground piped drainage system.

A junction pit is to be installed within the property boundary with a non-return valve on the upstream pipe to prevent water back flowing into the site.

If there is no existing underground drainage system in the vicinity of the source, a new underground (piped) drainage system shall be installed and connected into the nearest downstream underground drainage system. The new drainage system other than the line that crosses the footway shall be designed to a public drainage system standard and shall become part of the public drainage system.

SW81 On-site Disposal of Subsurface Water – Subsurface water may be disposed of via on-site absorption in combination with a level spreader. However, this is subject to the same constraints as for the disposal of stormwater runoff from an On-site Stormwater Absorption (OSA) system design.

OSA may not be suitable where a high water table exists or for low lying properties or sites which have limited space for disposal.

SW82 Waterproofing Subfloor Areas – Basement walls and subfloor areas may be waterproofed to minimise the collection of seepage water, in particular where Type 2 acid sulphate soils or high water tables are encountered.

Water proofing has its limitations and subsoil water ingress may still exist as there would be high pore pressures exerted on the walls and floors of the “tanked” structure. Pore pressures and floatation forces mean these types of structures require specialized design and certification by a Qualified Structural Engineer.

SW83 High Water Table – In the case of a high water table, the draw down effect of the water table when subsurface water is collected and disposed would necessitate a statement from a Geotechnical Engineer that nearby structures will not be affected by the development. It may be necessary to obtain licence for the drawing down of groundwater from the Department of Primary Industries.

SW84 Controlled Disposal – If all alternative acceptable solutions have been exhausted, Council will consider separate specific approval of controlled release to the kerb under **Section 138.1(d) of the Roads Act**. In this circumstance subsurface water may be disposed to the kerb and gutter in a controlled rate, period and duration. This will necessitate the following:

- Provision of a sump or holding tank which can store collected seepage water for a minimum duration of 24 hours.
- The soil infiltration rate shall be determined by geotechnical investigation but shall not be less than 0.001 L/s per m^2.
- The holding tank shall be sized for the collected seepage water based on the area of exposed wall to the soil. For example, for typical double garage and an infiltration rate of 0.001 L/s per sqm and a wall height of 2.4m with subsoil drainage install around its perimeter say 25m long, the volume of the holding tank required will be 2.4 x 25 x (0.001/1000) x 24 x 60 x 60 = 5.2 cum or 5200 L required. Note this is in addition to the volume required for collected stormwater from weather exposed areas.
- Dual pumps to be installed and shall be designed to operate to discharge a maximum of 5L/s and restricted to pumping between 11pm and 3am only.

Stormwater Pollution and Erosion Control

Soil and Water Management

SPE1 Soil and Water Management Plan - A soil and water management plan shall be submitted and must be approved by Council prior to the commencement of any construction or demolition activity.

SPE2 Guidelines - Guidelines shall be in accordance with the ***Managing Urban Stormwater, Soils and Construction Manual, NSW Department of Housing*** or later editions.

SPE3 Sediment Control Devices - All sediment control devices are to be installed prior to any commencement of clearing and earthworks on the site. Ongoing maintenance of these devices during construction will be required.

A maintenance schedule is to be provided with the Soil and Water Management Plan for large scale developments and works within public land.

SPE4 Soil Erosion Control - Soil erosion control is required to protect adjoining properties, bushland, roadways and receiving waters from degradation due to silt laden stormwater runoff as a result of development and/or concentration of runoff. Soil erosion control shall be provided as follows:

- Appropriate scour protection installed at the outlet to stormwater conduits, and
- Installation of pollution control devices at the source, on-line, off-line or at the end of the line to control sediment laden overland stormwater flows.

SPE5 Scour Protection Devices - Scour protection devices shall include embankment stabilisation e.g. rock walls, concrete aprons, gabions, turf, jute mesh, energy dissipating units, or other more appropriate erosion control devices approved by Council.

Please note that some types of scour protection devices may be inappropriate along certain creek locations.

SPE6 Silt and Sediment Control - Silt and Sediment Control devices are required as part of a development to remove pollutants during the "first flush".

These units shall be installed on line or within the site and may include proprietary items such as “Humeceptor” devices or CDS units, silt and grease arrestors approved by Council. Installation of these devices shall be in accordance with the manufacturer's specification.

Other sediment control devices such as stilling basins and constructed wetlands shall be required for large-scale developments and include land and community title subdivisions.

Design of these devices shall be in accordance with the ***Managing Urban Stormwater, Soils and Construction Manual, NSW Department of Housing, August 1998*** or later editions.

Integrated Developments

SPE7 Part 3A Permit for Development near Water Bodies - Any development within 40m of a water body such as a stream, creek, lagoon, or river may require a Part 3a Permit under the Department of Lands Guidelines and The Rivers and Foreshores Improvement Act 1948.

Water Sensitive Urban Design

Objectives

WSUD1 Principles of Water Sensitive Urban Design - All developments are encouraged to implement the principles of Water Sensitive Urban Design (WSUD) in order to minimise the impact of the development on the water cycle and achieve more sustainable forms of urban development.

WSUD2 Aim of WSUD - The aim of WSUD is to integrate stormwater management systems into the landscape component of the site in a manner that provides benefits that incorporate stormwater detention, retention, re-use and water efficiency whilst addressing issues such as nuisance flooding, protection from pollution of the receiving waterways and groundwater and improving visual amenity.

Design Principles

WSUD3 How Design Principles are achieved - In addition to those control systems already identified in ***Stormwater Management*** such as On-site Stormwater Detention, infiltration or absorption systems and rainwater harvesting, the aim of WSUD is to combine these options together with the proposed landscaping to achieve integration rather than relying on 'end of pipe' devices prior to discharge. These are achieved by:

- Operating practices and technologies which would prevent contamination of stormwater
- Locate the development such as to minimise disturbance of the natural drainage system
- Minimise impervious surfaces and encouraging soft landscaping to promote infiltration and reduce stormwater runoff
- WSUD elements are to be located and configured such that impervious areas to be treated can be maximised

WSUD4 Water Sensitive Urban Design Measures - Where WSUD principles are to be applied, the following table lists measures, which can be used to achieve water quality and water quantity targets. Note their uses may be complementary to other 'hard' engineering solutions.

WSUD Measure	Comments
Constructed Wetlands	To be considered for medium to large scale subdivisions
Sedimentation Basins	To be considered for medium to large scale subdivisions
Vegetated Filter Strips	Can be incorporated into new developments
Sand Filters	Used in combination with absorption system design
Bio-retention Systems	Used in combination with absorption system design or for water quality improvement targets in lieu of straight discharge into the waterways. Alternative Gross Pollutant Traps may be considered (mechanical system) for screening silts, sands and debris, may be considered
Permeable Pavers	As a complementary system to absorption trench to minimise on-ground impervious areas
Infiltration Trenches	Absorption trench design as described above
Rainwater Harvesting	Re-use is encouraged. Offset provision allowable from OSD

WSUD5 Water Sensitive Urban Design Modelling – Modelling of WSUD using a suitable program such as MUSIC (Model for Urban Stormwater Improvement Conceptualisation) will be acceptable to Council.

Document Submission

General

DS1 Minimum Requirements - At the lodgement of a Development Application, minimum submission of documentation is required to support the proposed development. Usually conceptual plans would suffice unless the proposed development would impact on public land or Council considers that there may be site constraints which may result in non-compliance to standards.

DS2 Stormwater Drainage Conceptual Plan - a stormwater drainage concept plan (SDCP) must be submitted with the Development Application.

DS3 Detailed Design Drawings - Detailed design drawings and supporting calculations are generally required at Construction Certificate submission and not required at DA stage except in the following circumstances:

- The proposed works include activities on Council property. A separate approval under Section 138 of the Roads Act may be necessary. It is important the Applicant contact Council in this case to ensure that approval can be granted.

  Important Note: Works in the road reserve can only be approved under Section 138 of the Roads Act. Approval under Part 4 of the Environmental Planning and Assessment Act does not grant automatic approval for works on public land.
- The proposed development is a new dwelling, residential flat building, mixed development, commercial or industrial development and the land falls to the rear and does not benefit from a formal drainage easement.
- A Stormwater Assessment Report is required due to likely flood affectation to ascertain design floor levels or if there is a proposed subfloor level which may be likely to be affected by stormwater inundation or disposal of seepage water is difficult.

  Where detailed design drawings are required, they must be submitted and approved by Council prior to the issue of the Construction Certificate.

Development Application

DS4 Submission of Conceptual Drawings - Engineering conceptual drawings shall be submitted at the lodgement of the Development Application containing the following information:

- A3 or A1 size drawing sheets at an appropriate scale of 1:100, 1:200 or 1:500.
- Showing the layout of the proposed drainage system and structures including the location of all downpipes, kerbs, channels, open drains, pits, pipes, retaining walls etc.
- Showing the nominal size of all stormwater conduits, grades, and pit dimensions.
- Showing conduit gradients.
- Showing the finished surface levels of any open channels, drains, or swales.
- Showing the location of all buildings, driveways, retaining walls, and other impervious and pervious surfaces.
- Showing the finished surface levels of paved areas, unpaved areas, building floors and garages
- Showing typical cross sectional details of any open channels, drains, or swales
- Where drainage easements are required, the location of the proposed easement for stormwater drainage and legal agreements attached
- Showing details of the proposed On-site Stormwater Detention (OSD) or On-site Absorption (OSA) System, or dispersion trenches, if required
- Include basic supporting computation or information
- Showing the location of any utility services, structures, trees, etc., which might affect the proposed development

  Important Note: It is the responsibility of the applicant to submit sufficient details of all relevant services, which may conflict with the proposed design. The exact locations of any crossings or connections are to be shown.

Construction Certificate

DS5 Submission of Construction Certificate Drawings - Detailed construction drawings are to be submitted as required, either to Council or to a nominated Principal Certifying Authority (PCA) and must include the following information:

- Drawings to be issued on standard A3 or A1 size drawing sheets at an appropriate scale of 1:100, 1:200 or 1:500.
- Drawings must clearly show the layout of the proposed engineering works, including the location of all retaining walls, downpipes, pits and pipes and labelled with their pipe sizes, gradients, existing and finished surface and invert levels, dimensions of all OSD, OSA and pump-out systems, including the proposed storage volumes, surcharge/overflow paths, permissible site discharge, and other relevant information sufficient for construction.
- All supporting calculations are to be supplied on computer disc (where applicable) with relevant hydrologic and hydraulic information.

DS6 Minimum Information - the minimum information to be provided on the drawings are as follows:

- Total site area in m^2.
- Total impervious area (roof and paved) in m^2.
- Area draining into the proposed stormwater (OSD or OSA) facility.
- Dimensions (mm), volume (cum), and discharge rate from the OSD or OSA system.
- Maximum water depth (mm) from centreline of outlet to top water level.
- Maximum depth of ponding for above ground OSD systems.
- Type and size of orifice (mm-dia), outlet pipe (mm-dia) and PSD (L/s).
- Details of the OSD control device(s) used including size and shape, outlet pipe diameter and invert level.
- For underground systems, at least one (1) detailed section through the OSD or OSA facility sufficient for construction.
- For above ground systems, at least two (2) detailed sections through the OSD facility, which shall include the maximum water level, gradients and overflow weir, sufficient for construction.
- Existing and proposed levels and details of adjoining structures and buildings shall be shown on the sections through the OSD or OSA facility.
- Overland flow path and PSD from the site.
- Plan showing the location of OSA or OSD facilities including dimensions, pervious (landscape) and paved (existing and proposed roof and paved) areas, and all existing and proposed surface levels.
- For pump-out systems, the pump type and rate, and holding tank volume.
- Location of any utility services, structures, trees, etc., which may affect the proposed drainage system.
- Full details of all relevant services, which may conflict with the proposed design, including invert levels and size of the service are to be shown.
- Structural details of retaining walls including sub-soil drainage, reinforcement details, dimensions and concrete strength.
- Where an inter-allotment drainage line is to be laid, a longitudinal section of the proposed pipe from the point of connection to the discharge point is to be provided. This must include pipe sizes, gradients, flowrates and a hydraulic grade line.

DS7 Certification - For residential flat buildings, dual occupancies, commercial, industrial, mixed developments, multi-residential developments, and similar type developments, the construction drawings must be certified by a qualified practising Civil Engineer, with membership with the Institution of Engineers, Australia, practising in the relevant competency category (civil, geotechnical, structural) and on the National Professional Engineers Register (NER).

For single residential developments, residential extensions, and small scale developments such as car ports, garages, sheds, etc, certification can be provided by a draftsperson, surveyor, or plumber with appropriate and relevant experience.

DS8 Drainage Easements - Where drainage easements are required, evidence in the form of a legal agreement between the affected parties or copies of titles showing the created easements shall be submitted with the drawings.

Occupation (Final) Certificate

DS9 Minimum Information - the minimum information to be provided to Council or a nominated Principal Certifying Authority (PCA) are as follows:

- **Works-as-executed drawings:** an engineering survey of the final works is to be submitted on one (1) set of the approved plans. This plan is to include finished levels, dimensions and volume of the built OSA, OSD facility, the location of all drainage pipes, sizes and levels, etc., and signed by a Registered Surveyor
- **Copies of titles** showing the creation of Positive Covenants and Restriction on the use of land
- **Certification** of the constructed drainage system by a suitably qualified and experienced Chartered Professional Engineer, on the National Engineers Register (NER) with the Australian Institute of Engineers for residential flat buildings, dual occupancies, commercial, industrial, mixed developments, multi-residential developments, and the like. For single residential developments, residential extensions, and small scale developments, a Compliance Certificate from a Surveyor or plumber with experience in stormwater design would be acceptable. The Compliance Certificate must certify that the works have been installed in accordance with the relevant Australian standards ***(AS3500)*** and Council's relevant specifications and DCP.
- **Identification Plate:** an identification plate of not less than 110mm wide x 80mm high, is to be fixed near or onto the control structure of the OSD system, this is to advise the registered proprietor of their responsibility to maintain the OSD facility and not to tamper with it in any manner without written consent. This plaque shall read 'This is an On-site Stormwater Detention System. It is an offence to reduce the volume of the system (tank or basin) or to remove the orifice that controls the outflow. The base of the outlet control pit and the debris screen must be cleared of debris and silt on a regular basis. This plate must not be removed.'

  Identification plates can be purchased from Council's Customer Services Centre

DS10 Where Onsite Detention system or a mechanical pump out system is proposed on site, the following documents must be submitted to Council or Principal Certifying Authority prior to occupation:

a) A Certificate from a Chartered Professional Engineer with Institution of Engineers, Australia Corporate Membership and registered on the National Engineers Register (NER) under the appropriate professional Category certifying the intended function of constructed stormwater drainage system including Onsite Detention (OSD) system, Onsite absorption system, Mechanical Pump out system, Stormwater retention system (OSR) etc, and

b) "Work - As - Executed" drawings of constructed stormwater drainage system prepared by a Registered Surveyor or equivalent.

- Where Council is not the Principal Certifying Authority, two (2) copies of the above documents are to be provided to Council prior to the issue of any Occupation Certificate. These documents are to be retained on Council's Construction Certificate files.

Section 138 Consent under the Roads Act

DS11 General - Development Approval does not give automatic approval for external works to the site, that is, in public domain areas.

Important Note - Private Certifiers cannot issue Consent under the Roads Act. The Road Authority which can issue Consent under the Roads Act will generally be either Council or the RMS. In some cases where Council or RMS is the Road Authority, the consent of both Council and the RMS will be required due to traffic or maintenance impacts.

Council is the Consent Authority for all works within the footway area, regardless of RMS approval for road pavement works or activities. This may be in the form of a **Road Opening Permit** (for minor works such as the laying of a private stormwater pipe across the footpath), **Driveway Application** (for driveway and footpath construction) or a **Section 138 Application for Major Works** (such as laying a stormwater drainage line under the kerb or road pavement construction). All these activities require approval from Council under Section 138 of the Roads Act 1993.

DS12 External works - Pursuant to Section 138 of the Roads Act 1993, written approval from the Appropriate Road Authority (Council or RMS), must be sought for proposed works external to the site. External works include the following:

- Closure of a carriageway on a State Road
- Closure of a carriageway on a Regional Road
- Works which may impact the traffic flow on a State Road or Regional Road
- Works within 100m of a Traffic Facility (e.g. Signalized Traffic Lights)
- Closure of a lane for the purpose of standing a crane, concrete pump or waste bin

DS13 Types of External Works cover by a Section 138 Approval - The types of works requiring Section 138 approval include but not limited to:

- Road works in general
- Stormwater drainage works
- Traffic devices or local area traffic management (LATM) schemes
- Footpath construction
- Water quality control devices on public land
- Driveway construction
- Any related works within an adjacent road reserve (path, verge or carriageway)

DS14 Road Occupancy License - Any works within the road reserve, for a State or Regional classified road, will require a Road Occupancy License to be obtained from the Planned Incidents Unit of the Traffic Management Centre of the RMS.

The Application must include details of a Traffic Management Plan.

DS15 Other Consents under Section 138 of the Roads Act - ***An Application for Driveway Construction and Ancillary Works, Road Opening Permit*** or a ***Consent Letter*** from Council is required for all other types of works within the road reserve.

ES4 Appendices

Terms of Positive Covenant

Existing Allotments

A1 The Terms of Positive Covenant - Where there is no land subdivision (no Section 88B instrument required) then the following standard wording for the "The Terms of Positive Covenant" is to be used and attached with the standard NSW Department of Lands form 13RPA.

Terms of Positive Covenant
(Show full details of Positive Covenant)

The registered proprietors covenant with the City of Canada Bay Council (Council) that they will maintain and repair the structure and works on the land in accordance with the following terms and conditions:

I. The registered proprietor will:

i. keep the structure and works clean and free from silt, rubbish and debris

ii. maintain and repair at the sole expense of the registered proprietors the whole of the structure and works so that it functions in a safe and efficient manner.

II. For the purpose of ensuring observance of the covenant the Council may by its servants or agents at any reasonable time of the day and upon giving to the person against whom the covenant is enforceable not less than two days notice (but at any time without notice in the case of an emergency) enter the land and view the condition of the land and the state of construction maintenance or repair of the structure and works on the land.

III. The registered proprietors shall indemnify the Council and any adjoining land owners against any claims for damages arising from the failure of any component of the on-site stormwater detention (OSD), on-site stormwater retention/absorption (OSA), stormwater quality improvement device (SQID) and/or mechanical pump-out system, or failure to clean, maintain and repair the stormwater management system.

IV. By written notice the Council may require the registered proprietors to attend to any matter and to carry out such work within such time as the Council may require to ensure the proper and efficient performance of the structure and works and to that extent Section 88F(2) (a) of the Act is hereby agreed to be amended accordingly.

V. Pursuant to Section 88F(3) of the Act the authority shall have the following additional powers pursuant to this covenant:

i. In the event that the registered proprietor fails to comply with the terms of any written notice issued by the Council as set out above the Council or its authorised agents may enter the land with all necessary equipment and carry out any work which the Council in its discretion considers reasonable to comply with the said notice referred to in I hereof.

ii. The Council may recover from the registered proprietor in a Court of competent jurisdiction:

(a) Any expense reasonably incurred by it in exercising its powers under sub-paragraph i hereof. Such expense shall include reasonable wages for the Council's own employees engaged in effecting the said work, supervising the said work and administering the said work together with costs, reasonably estimated by the Council, for the use of machinery, tools and equipment in conjunction with the said work.

(b) Legal costs on an indemnity basis for issue of the said notices and recovery of the said costs and expenses together with the costs and expenses of registration of a covenant charge pursuant to Section 88F of the Act or providing any certificate required pursuant to Section 88G of the Act or obtaining any injunction pursuant to Section 88H of the Act.

VI. This covenant shall bind all persons who claim under the registered proprietors as stipulated in Section 88E(5) of the Act.

For the purposes of this covenant:

Structure and Works shall mean the on-site stormwater detention (OSD), on-site stormwater retention/absorption (OSA), stormwater quality improvement device (SQID) and/or mechanical pump-out system constructed on the land as set out in the plan annexed hereto and marked with the letter "A" or alternatively as detailed on the plans approved by the Principal Certifying Authority (INSERT ORGANISATION/COMPANY NAME): {INSERT CONSTRUCTION CERTIFICATE NUMBER AND DATE ISSUE BY PRINCIPAL CERTIFYING AUTHORITY, DRAWING NUMBER, DATE, REVISION NUMBER AND DESIGNER DETAILS} including all gutters, pipes, drains, walls, kerbs, pits, grates, tanks, chambers, basins and surfaces designed to temporarily detain stormwater on the land.

The Act means the Conveyancing Act 1919.

A copy of the construction certificate or complying development certificate is held on Council file “DA number” or “CDC number”.

Name of authority having the power to release, vary or modify the ‘Positive Covenant’ is City of Canada Bay Council.

Land Subdivision

A2 The Terms of Positive Covenant - Where a subdivision has been lodged and a Section 88B instrument created, then the following standard wording for the "The Terms of Positive Covenant" shall be used.

Terms of Positive Covenant referred to in the above-mentioned Plan

The registered proprietors covenant with the City of Canada Bay Council (Council) that they will maintain and repair the structure and works on the land in accordance with the following terms and conditions:

I. The registered proprietor will:

i. keep the structure and works clean and free from silt, rubbish and debris

ii. maintain and repair at the sole expense of the registered proprietors the whole of the structure and works so that it functions in a safe and efficient manner.

II. For the purpose of ensuring observance of the covenant the Council may by its servants or agents at any reasonable time of the day and upon giving to the person against whom the covenant is enforceable not less than two days notice (but at any time without notice in the case of an emergency) enter the land and view the condition of the land and the state of construction maintenance or repair of the structure and works on the land.

III. The registered proprietors shall indemnify the Council and any adjoining land owners against any claims for damages arising from the failure of any component of the on-site stormwater detention (OSD), on-site stormwater retention/absorption (OSA), stormwater quality improvement device (SQID) and/ or mechanical pump-out system, or failure to clean, maintain and repair the stormwater management system.

IV. By written notice the Council may require the registered proprietors to attend to any matter and to carry out such work within such time as the Council may require to ensure the proper and efficient performance of the structure and works and to that extent Section 88F(2) (a) of the Act is hereby agreed to be amended accordingly.

V. Pursuant to section 88F(3) of the Act the authority shall have the following additional powers pursuant to this covenant:

i. In the event that the registered proprietor fails to comply with the terms of any written notice issued by the Council as set out above the Council or its authorised agents may enter the land with all necessary equipment and carry out any work which the Council in its discretion considers reasonable to comply with the said notice referred to in I hereof.

ii. The Council may recover from the registered proprietor in a Court of competent jurisdiction:

(a) Any expense reasonably incurred by it in exercising its powers under sub-paragraph i hereof. Such expense shall include reasonable wages for the Council's own employees engaged in effecting the said work, supervising the said work and administering the said work together with costs, reasonably estimated by the Council, for the use of machinery, tools and equipment in conjunction with the said work.

(b) Legal costs on an indemnity basis for issue of the said notices and recovery of the said costs and expenses together with the costs and expenses of registration of a covenant charge pursuant to Section 88F of the Act or providing any certificate required pursuant to Section 88G of the Act or obtaining any injunction pursuant to Section 88H of the Act.

VI. This covenant shall bind all persons who claim under the registered proprietors as stipulated in Section 88E(5) of the Act.

For the purposes of this covenant:

Structure and Works shall mean the on-site stormwater detention (OSD), on-site stormwater retention/absorption (OSA), stormwater quality improvement device (SQID) and/or mechanical pump-out system constructed on the land as set out in the plan annexed hereto and marked with the letter "A" or alternatively as detailed on the plans

approved by the Principal Certifying Authority (INSERT ORGANISATION/COMPANY NAME): {INSERT CONSTRUCTION CERTIFICATE NUMBER AND DATE ISSUE BY PRINCIPAL CERTIFYING AUTHORITY, DRAWING NUMBER, DATE, REVISION NUMBER AND DESIGNER DETAILS} including all gutters, pipes, drains, walls, kerbs, pits, grates, tanks, chambers, basins and surfaces designed to temporarily detain stormwater on the land.

The Act means the Conveyancing Act 1919.

A copy of the construction certificate or complying development certificate is held on Council file “DA number” or “CDC number”.

Name of authority having the power to release, vary or modify the ‘Positive Covenant’ is City of Canada Bay Council.

Restriction on the Use of Land

Existing Allotments

A3 The Terms of Restriction on the Use of Land - Where there is no land subdivision (no Section 88B instrument required) then the following standard wording is to be used for the "The Terms of Restriction on the Use of Land" and attached with the standard NSW Department of Lands form 13RPA.

Terms of Restriction on the Use of Land
(Show full details of the Restriction)

The registered proprietors covenant with the City of Canada Bay Council (Council) that they will not:

I. Do any act, matter or thing which would prevent the structure and works from operating in an efficient manner.

II. Make any alterations or additions to the structure and works or allow any development within the meaning of the Environmental Planning and Assessment Act 1979 to encroach upon the structure and works without the express written consent of the authority.

III. This covenant shall bind all persons who claim under the registered proprietors as stipulated in Section 88E(5) of the Act.

For the purposes of this covenant:

Structure and Works shall mean the on-site stormwater detention (OSD), on-site stormwater retention/ absorption (OSA), stormwater quality improvement device (SQID) and/or mechanical pump-out system constructed on the land as set out in the plan annexed hereto and marked with the letter "A" or alternatively as detailed on the plans approved by the Principal Certifying Authority (INSERT ORGANISATION/ COMPANY NAME): {INSERT CONSTRUCTION CERTIFICATE NUMBER AND DATE ISSUE BY PRINCIPAL CERTIFYING AUTHORITY: {INSERT DA NUMBER, DRAWING NUMBER, DATE, REVISION NUMBER AND DESIGNER DETAILS} including all gutters, pipes, drains, walls, kerbs, pits, grates, tanks, chambers, basins and surfaces designed to temporarily detain stormwater on the land.

The Act means the Conveyancing Act 1919.

Name of Authority having the power to release, vary or modify the ‘Restriction’ is City of Canada Bay Council.

Land Subdivision

A4 The Terms of Restriction on the Use of Land - Where a subdivision has been lodged and a Section 88B instrument created, then the following standard wording for the "The Terms of Restriction on the Use of Land" shall be used.

Terms of Restriction on the Use of Land referred to in the above-mentioned Plan

The registered proprietor covenant with the City of Canada Bay Council (Council) in respect to the structure erected on the land described as "on-site stormwater detention system" (which expression includes all ancillary gutters, pipes, drains, walls, kerbs, pits, grates, tanks, chambers, basins and surfaces designed to temporarily detain stormwater) shown on plans approved by the Principal Certifying Authority: {INSERT DA NUMBER, DRAWING NUMBER, DATE, REVISION NUMBER AND DESIGNER DETAILS} (hereinafter called "the system").

The registered proprietors covenant with the City of Canada Bay Council (Council) that they will not:

I. Do any act, matter or thing which would prevent the structure and works from operating in an efficient manner.

II. Make any alterations or additions to the structure and works or allow any development within the meaning of the Environmental Planning and Assessment Act 1979 to encroach upon the structure and works without the express written consent of the authority.

III. This covenant shall bind all persons who claim under the registered proprietors as stipulated in Section 88E(5) of the Act.

For the purposes of this covenant:

Structure and Works shall mean the on-site stormwater detention (OSD), on-site stormwater retention/ absorption (OSA), stormwater quality improvement device (SQID) and/or mechanical pump-out system constructed on the land as set out in the plan annexed hereto and marked with the letter "A" or alternatively as detailed on the plans approved by the Principal Certifying Authority (INSERT ORGANISATION/ COMPANY NAME): {INSERT CONSTRUCTION CERTIFICATE NUMBER AND DATE ISSUE BY PRINCIPAL CERTIFYING AUTHORITY}, including all gutters, pipes, drains, walls, kerbs, pits, grates, tanks, chambers, basins and surfaces designed to temporarily detain stormwater on the land.

The Act shall mean the Conveyancing Act 1919.

Name of Authority having the power to release, vary or modify the ‘Restriction’ is City of Canada Bay Council.

Generic Letter for Seeking Easement on Adjoining Land

B1 The following generic letter can be used to seek easement/s from adjoining downstream properties.

Dear . . . . . .

I/we are proposing to redevelop our property at

. . . . . .

Before we can proceed with this proposal, Council has advised us that we need to seek a formal drainage easement (Council's preferred option) to convey the stormwater runoff from our property to the nearest downstream public stormwater drainage infrastructure or to a Council approved discharge point, being (street)

. . . . . .

This will require you to grant me/us a drainage easement through your property with all legal and survey costs for the creation of the easement being borne by us, together with any consideration for the use of your property as determined by an independent valuation or agreement.

(Attach independent valuation/agreement to this form)

The other alternative is to have the development of our site limited to a discharge rate nominated by Council to allow sufficient area between the house and our rear/side boundary next to your property to install an underground absorption system (if appropriate for this site) to spread and disperse the stormwater flows into the ground. Discharging our stormwater to the street frontage is not a preferred option for Council as this could severely impact on the capacity of the existing drainage system in the street.

As the runoff and seepage from this system may flow towards your property because of the slope of the land, the best solution would be to have a drainage system that will convey our stormwater to (street)

. . . . . .

You are advised that if Council determines that the only way for the drainage of stormwater is via an easement through your property, I/we may have to use Section 88K of the Conveyancing Act 1919 to request the Supreme Court to grant me/us the drainage easement.

This will probably result in legal expenses and time spent for both you and I/us.

Could you please indicate your position regarding this matter so that we can advise Council to enable our application to progress?

YES I/we are/are not willing to grant you a drainage easement.

NO I/we are not willing to grant you a drainage easement.

Signed . . . . . Dated . . . . . .

Intensity-Frequency-Duration Charts

Rhodes

Parameters Used		
2 year I 1 hr: 35.87 I 12 hr: 7.57 I 72 hr: 2.39		
50 year I 1 hr: 70.00 I 12 hr: 16.00 I 72 hr: 5.22		
Co-efficient G: 0.00	F2: 4.29	F50: 15.84

Average Recurrence Interval (ARI) in mm/hour									
	Years								
Time	1	2	5	10	20	50	100	200	500
5 min	89.7	115	145	162	186	216	238	261	292
6 min	84.0	108	136	153	174	203	224	246	274
7 min	79.4	102	129	144	165	192	212	233	260
8 mins	75.4	96.5	122	137	157	182	202	221	247
9 mins	71.9	92.1	117	131	150	174	193	212	237
10 mins	68.8	88.2	112	126	144	167	185	203	227
12 mins	63.7	81.6	104	116	133	155	172	188	211
14 mins	59.4	76.2	96.9	109	125	145	161	176	197
15 mins	57.6	73.8	94.0	106	121	141	156	171	192
16 mins	55.9	71.7	91.2	102	117	137	151	166	186
18 mins	52.8	67.8	86.4	97.0	111	130	144	158	177
20 mins	50.2	64.4	82.1	92.3	106	123	137	150	168
25 mins	44.9	57.6	73.6	82.8	95.0	111	123	135	151
30 mins	40.8	52.5	67.1	75.5	86.6	101	112	123	138
40 mins	35.0	45.0	57.6	64.9	74.6	87.1	96.7	106	119
50 mins	30.9	39.8	51.0	57.5	66.1	77.3	85.9	94.5	106
1 hour	27.9	35.9	46.1	52.0	59.8	70.0	77.7	85.6	96.1
1.5 hours	21.7	28.0	36.2	40.9	47.2	55.4	61.6	67.9	76.4
2 hours	18.1	23.4	30.4	34.4	39.7	46.7	52.0	57.4	64.7
3 hours	14.0	18.1	23.7	26.9	31.1	36.7	40.9	45.2	51.1
4.5 hours	10.8	14.0	18.4	21.0	24.3	28.8	32.1	35.6	40.3
6 hours	9.0	11.7	15.4	17.6	20.4	24.2	27.1	30.0	34.0
9 hours	7.0	9.1	12.0	13.7	16.0	19.0	21.3	23.6	26.8
12 hours	5.8	7.6	10.0	11.5	13.5	16.0	18.0	20.0	22.7
15 hours	5.1	6.6	8.8	10.1	11.8	14.0	15.8	17.5	19.9
18 hours	4.5	5.9	7.9	9.1	10.6	12.6	14.2	15.8	17.9
24 hours	3.8	5.0	6.6	7.6	8.9	10.6	11.9	13.3	15.1
30 hours	3.3	4.3	5.8	6.7	7.8	9.3	10.4	11.6	13.2
36 hours	2.9	3.8	5.1	5.9	6.9	8.3	9.3	10.4	11.8
48 hours	2.4	3.2	4.3	4.9	5.8	6.9	7.8	8.7	9.9
72 hours	1.8	2.4	3.2	3.7	4.4	5.2	5.9	6.6	7.5

Concord West

Parameters Used		
2 year I 1 hr: 35.91 I 12 hr: 7.48 I 72 hr: 2.37		
50 year I 1 hr: 72.50 I 12 hr: 15.83 I 72 hr: 5.00		
Co-efficient G: 0.00	F2: 4.29	F50: 15.84

Average Recurrence Interval (ARI) in mm/hour									
	Years								
Time	1	2	5	10	20	50	100	200	500
5 min	89.5	115	146	165	189	220	244	268	300
6 min	83.9	108	138	155	177	207	229	252	283
7 min	79.2	102	130	146	168	198	217	239	268
8 mins	75.2	96.6	124	139	160	187	207	228	255
9 mins	71.7	92.2	118	133	153	178	198	218	244
10 mins	68.7	88.3	113	127	146	171	190	209	235
12 mins	63.5	81.7	105	118	136	159	176	194	218
14 mins	59.3	76.3	98.0	111	127	149	165	182	205
15 mins	57.4	73.9	95.0	107	123	144	161	177	199
16 mins	55.7	71.7	92.3	104	120	140	156	172	193
18 mins	52.7	67.9	87.4	98.7	114	133	148	163	183
20 mins	50.1	64.5	83.1	93.9	108	127	141	155	175
25 mins	44.8	57.7	74.5	84.3	97.2	114	127	140	157
30 mins	40.7	52.5	68.0	77.0	88.8	104	116	128	144
40 mins	34.9	45.0	58.4	66.3	76.5	90.0	100	111	125
50 mins	30.8	39.8	51.8	58.8	67.9	80.0	89.2	98.5	111
1 hour	27.8	35.9	46.8	53.2	61.5	72.5	80.9	89.4	101
1.5 hours	21.6	28.0	36.6	41.6	48.2	56.9	63.6	70.3	79.5
2 hours	18.0	23.4	30.6	34.9	40.4	47.8	53.4	59.1	66.9
3 hours	13.9	18.1	23.7	27.1	31.5	37.2	41.6	46.2	52.3
4.5 hours	10.7	13.9	18.4	21.0	24.4	29.0	32.4	36.0	40.8
6 hours	8.9	11.6	15.3	17.6	20.4	24.3	27.2	30.2	34.2
9 hours	6.9	9.0	11.9	13.6	15.9	18.9	21.2	23.5	26.7
12 hours	5.7	7.5	9.9	11.4	13.3	15.8	17.8	19.8	22.5
15 hours	5.0	6.5	8.7	10.0	11.6	13.8	15.5	17.3	19.6
18 hours	4.5	5.9	7.8	8.9	10.4	12.4	13.9	15.5	17.6
24 hours	3.8	4.9	6.5	7.5	8.7	10.4	11.7	13.0	14.7
30 hours	3.3	4.3	5.7	6.5	7.6	9.0	10.1	11.3	12.8
36 hours	2.9	3.8	5.1	5.8	6.8	8.0	9.0	10.0	11.4
48 hours	2.4	3.2	4.2	4.8	5.6	6.7	7.5	8.3	9.4
72 hours	1.8	2.4	3.1	3.6	4.2	5.0	5.6	6.2	7.1

North Strathfield

Parameters Used		
2 year I 1 hr: 37.60 I 12 hr: 7.71 I 72 hr: 2.45		
50 year I 1 hr: 77.00 I 12 hr: 16.20 I 72 hr: 5.03		
Co-efficient G: 0.00	F2: 4.29	F50: 15.85

Average Recurrence Interval (ARI) in mm/hour

	Years								
Time	1	2	5	10	20	50	100	200	500
5 min	93.3	120	152	171	196	228	252	277	310
6 min	87.5	112	143	161	184	215	238	261	293
7 min	82.6	106	135	152	175	204	226	248	278
8 mins	78.4	101	129	145	166	194	215	236	265
9 mins	74.8	96.1	123	138	159	186	206	227	254
10 mins	71.6	92.1	118	133	153	178	198	218	244
12 mins	66.3	85.2	109	123	142	166	184	203	228
14 mins	61.8	79.6	102	116	133	156	173	190	214
15 mins	59.9	77.2	99.3	112	129	151	168	185	208
16 mins	58.2	74.9	96.4	109	125	147	163	180	202
18 mins	55.0	70.9	91.4	103	119	140	155	171	192
20 mins	52.3	67.4	87.0	98.4	113	133	148	163	184
25 mins	46.7	60.3	78.1	88.5	102	120	134	147	166
30 mins	42.5	54.9	71.3	80.8	93.4	110	122	135	152
40 mins	36.4	47.1	61.4	69.8	80.7	95.1	106	117	132
50 mins	32.2	41.7	54.5	62.0	71.8	84.8	94.7	105	118
1 hour	29.0	37.6	49.3	56.2	65.2	77.0	86.1	95.3	108
1.5 hours	22.5	29.2	38.4	43.8	50.8	60.1	67.2	74.5	84.3
2 hours	18.8	24.4	32.0	36.5	42.4	50.2	56.2	62.3	70.5
3 hours	14.5	18.8	24.7	28.3	32.8	38.9	43.5	48.3	54.7
4.5 hours	11.1	14.5	19.1	21.8	25.4	30.1	33.7	37.4	42.4
6 hours	9.2	12.0	15.9	18.2	21.1	25.1	28.1	31.2	35.4
9 hours	7.1	9.3	12.3	14.0	16.4	19.4	21.8	24.2	27.4
12 hours	5.9	7.7	10.2	11.7	13.6	16.2	18.2	20.2	22.9
15 hours	5.2	6.7	8.9	10.2	11.9	14.1	15.8	17.6	20.0
18 hours	4.6	6.0	8.0	9.1	10.6	12.6	14.2	15.7	17.8
24 hours	3.9	5.1	6.7	7.7	8.9	10.6	11.8	13.1	14.9
30 hours	3.4	4.4	5.8	6.7	7.7	9.2	10.3	11.4	12.9
36 hours	3.0	3.9	5.2	5.9	6.9	8.2	9.1	10.1	11.5
48 hours	2.5	3.3	4.3	4.9	5.7	6.7	7.5	8.3	9.5
72 hours	1.9	2.4	3.2	3.7	4.3	5.0	5.6	6.2	7.1

Mortlake - Breakfast Point - Cabarita

Parameters Used		
2 year I 1 hr: 37.17 I 12 hr: 7.61 I 72 hr: 2.43		
50 year I 1 hr: 72.50 I 12 hr: 16.00 I 72 hr: 5.15		
Co-efficient G: 0.00	F2: 4.29	F50: 15.85

Average Recurrence Interval (ARI) in mm/hour

	Years								
Time	1	2	5	10	20	50	100	200	500
5 min	92.7	118	149	167	190	220	243	266	297
6 min	86.9	111	140	157	179	207	229	250	279
7 min	82.1	105	132	148	169	196	217	237	265
8 mins	78.0	99.7	126	141	161	187	206	226	252
9 mins	74.4	95.1	120	135	154	179	197	216	241
10 mins	71.2	91.1	115	129	147	171	189	207	232
12 mins	65.9	84.3	107	120	137	159	176	193	215
14 mins	61.5	78.8	99.9	112	128	149	165	181	202
15 mins	59.6	76.3	96.9	109	124	145	160	175	196
16 mins	57.8	74.1	94.1	105	121	140	155	171	191
18 mins	54.7	70.1	89.1	99.9	114	133	147	162	181
20 mins	52.0	66.6	84.8	95.1	109	127	140	154	173
25 mins	46.5	59.6	76.0	85.4	97.9	114	126	139	155
30 mins	42.3	54.3	69.3	77.9	89.4	104	116	127	142
40 mins	36.2	46.6	59.6	67.1	77.1	90.0	99.8	110	123
50 mins	32.0	41.2	52.8	59.5	68.4	80.0	88.8	97.7	110
1 hour	28.9	37.2	47.7	53.9	61.9	72.5	80.5	88.6	99.6
1.5 hours	22.4	28.9	37.3	42.2	48.6	57.0	63.4	69.9	78.7
2 hours	18.6	24.1	31.2	35.3	40.8	47.9	53.4	58.9	66.4
3 hours	14.3	18.6	24.2	27.4	31.7	37.4	41.7	46.1	52.0
4.5 hours	11.0	14.3	18.7	21.3	24.7	29.2	32.6	36.1	40.8
6 hours	9.1	11.9	15.6	17.8	20.7	24.4	27.3	30.3	34.3
9 hours	7.0	9.2	12.1	13.8	16.1	19.1	21.4	23.7	26.9
12 hours	5.8	7.6	10.1	11.6	13.5	16.0	17.9	19.9	22.6
15 hours	5.1	6.7	8.8	10.1	11.8	14.0	15.7	17.5	19.8
18 hours	4.6	6.0	7.9	9.1	10.6	12.6	14.1	15.7	17.8
24 hours	3.9	5.0	6.7	7.6	8.9	10.6	11.9	13.2	15.0
30 hours	3.4	4.4	5.8	6.7	7.8	9.2	10.3	11.5	13.1
36 hours	3.0	3.9	5.2	5.9	6.9	8.2	9.2	10.3	11.7
48 hours	2.5	3.2	4.3	4.9	5.7	6.8	7.7	8.5	9.7
72 hours	1.9	2.4	3.2	3.7	4.3	5.1	5.8	6.4	7.3

Concord East - Canada Bay

Parameters Used		
2 year I 1 hr: 37.27 I 12 hr: 7.70 I 72 hr: 2.40		
50 year I 1 hr: 75.00 I 12 hr: 16.00 I 72 hr: 5.00		
Co-efficient G: 0.00	F2: 4.29	F50: 15.85

Average Recurrence Interval (ARI) in mm/hour

	Years								
Time	1	2	5	10	20	50	100	200	500
5 min	92.7	119	151	169	193	225	248	272	305
6 min	86.9	111	141	159	182	211	234	257	287
7 min	82.1	105	134	150	172	200	222	243	272
8 mins	77.9	99.9	127	143	164	191	211	232	260
9 mins	74.3	95.4	122	137	157	183	202	222	249
10 mins	71.2	91.3	117	131	150	175	194	213	239
12 mins	65.8	84.5	108	122	139	163	181	198	223
14 mins	61.4	79.0	101	114	131	153	169	186	209
15 mins	59.5	76.5	98.0	110	127	148	164	181	203
16 mins	57.8	74.3	95.2	107	123	144	160	176	197
18 mins	54.6	70.3	90.2	102	117	137	152	167	188
20 mins	51.9	66.8	85.8	96.8	111	130	145	159	179
25 mins	46.4	59.8	77.0	87.0	100	117	130	144	162
30 mins	42.2	54.4	70.3	79.4	91.5	107	119	132	148
40 mins	36.2	46.7	60.5	68.5	79.0	92.9	103	114	129
50 mins	32.0	41.3	53.6	60.8	70.3	82.7	92.1	102	115
1 hour	28.8	37.3	48.5	55.1	63.7	75.0	83.6	92.4	104
1.5 hours	22.4	29.0	37.8	43.0	49.8	58.7	65.5	72.4	81.8
2 hours	18.7	24.2	31.6	35.9	41.6	49.1	54.8	60.7	68.5
3 hours	14.4	18.7	24.4	27.8	32.3	38.1	42.6	47.1	53.3
4.5 hours	11.1	14.4	18.9	21.5	25.0	29.5	33.0	36.6	41.4
6 hours	9.2	12.0	15.7	18.0	20.9	24.7	27.6	30.6	34.6
9 hours	7.1	9.2	12.2	13.9	16.2	19.1	21.4	23.8	26.9
12 hours	5.9	7.7	10.2	11.6	13.5	16.0	17.9	19.9	22.5
15 hours	5.2	6.7	8.9	10.1	11.8	14.0	15.6	17.4	19.7
18 hours	4.6	6.0	7.9	9.1	10.5	12.5	14.0	15.5	17.6
24 hours	3.9	5.0	6.6	7.6	8.8	10.5	11.7	13.0	14.7
30 hours	3.4	4.4	5.8	6.6	7.7	9.1	10.2	11.3	12.8
36 hours	3.0	3.9	5.1	5.9	6.8	8.1	9.1	10.0	11.4
48 hours	2.5	3.2	4.2	4.8	5.6	6.7	7.5	8.3	9.4
72 hours	1.8	2.4	3.2	3.6	4.2	5.0	5.6	6.2	7.0

Five Dock - Rodd Point

Parameters Used		
2 year I 1 hr: 38.64 I 12 hr: 7.78 I 72 hr: 2.43		
50 year I 1 hr: 77.50 I 12 hr: 16.20 I 72 hr: 5.00		
Co-efficient G: 0.00	F2: 4.29	F50: 15.85

Average Recurrence Interval (ARI) in mm/hour

	Years								
Time	1	2	5	10	20	50	100	200	500
5 min	95.9	123	155	173	197	229	253	277	309
6 min	89.9	115	145	163	186	216	238	261	291
7 min	84.9	109	138	154	176	204	226	248	277
8 mins	80.7	103	131	147	168	195	215	236	264
9 mins	77.0	98.6	125	140	160	187	206	226	253
10 mins	73.7	94.4	120	134	154	179	198	217	243
12 mins	68.2	87.4	111	125	143	167	185	203	227
14 mins	63.6	81.7	104	117	134	156	173	190	213
15 mins	61.7	79.2	101	114	130	152	168	185	207
16 mins	59.8	76.8	98.1	110	127	148	164	180	202
18 mins	56.6	72.7	93.0	105	120	140	155	171	192
20 mins	53.8	69.1	88.5	99.7	114	134	148	163	183
25 mins	48.1	61.9	79.5	89.6	103	121	134	147	165
30 mins	43.8	56.4	72.6	81.9	94.3	110	123	135	152
40 mins	37.5	48.4	62.5	70.7	81.5	95.7	106	117	132
50 mins	33.2	42.8	55.5	62.9	72.6	85.3	95.0	105	118
1 hour	29.9	38.6	50.2	57.0	65.8	77.5	86.4	95.4	108
1.5 hours	23.2	30.0	39.0	44.3	51.3	60.4	67.4	74.5	84.1
2 hours	19.2	24.9	32.5	37.0	42.8	50.5	56.3	62.3	70.4
3 hours	14.8	19.1	25.0	28.5	33.1	39.0	43.6	48.3	54.6
4.5 hours	11.3	14.7	19.3	22.0	25.5	30.2	33.7	37.4	42.3
6 hours	9.4	12.2	16.0	18.3	21.2	25.1	28.1	31.1	35.3
9 hours	7.2	9.4	12.3	14.1	16.4	19.4	21.8	24.1	27.3
12 hours	6.0	7.8	10.3	11.7	13.7	16.2	18.1	20.1	22.8
15 hours	5.2	6.8	9.0	10.2	11.9	14.1	15.8	17.5	19.9
18 hours	4.7	6.1	8.0	9.2	10.6	12.6	14.1	15.7	17.8
24 hours	3.9	5.1	6.7	7.7	8.9	10.5	11.8	13.1	14.8
30 hours	3.4	4.4	5.8	6.6	7.7	9.1	10.2	11.4	12.9
36 hours	3.0	3.9	5.2	5.9	6.9	8.1	9.1	10.1	11.4
48 hours	2.5	3.2	4.3	4.9	5.7	6.7	7.5	8.3	9.4
72 hours	1.9	2.4	3.2	3.6	4.2	5.0	5.6	6.2	7.0

Drummoyne - Chiswick - Abbotsford - Wareemba - Russell Lea

Parameters Used		
2 year I 1 hr: 39.13 I 12 hr: 8.00 I 72 hr: 2.50		
50 year I 1 hr: 80.00 I 12 hr: 16.83 I 72 hr: 5.35		
Co-efficient G: 0.00	F2: 4.29	F50: 15.86

Average Recurrence Interval (ARI) in mm/hour									
	Years								
Time	1	2	5	10	20	50	100	200	500
5 min	96.9	124	157	176	201	233	258	283	316
6 min	90.8	116	148	165	189	220	243	267	298
7 min	85.8	110	140	157	179	209	231	253	283
8 mins	81.5	104	133	149	171	199	220	242	271
9 mins	77.7	99.7	127	143	163	191	211	232	260
10 mins	74.4	95.5	122	137	157	183	203	223	250
12 mins	68.8	88.4	113	127	146	170	189	208	233
14 mins	64.3	82.6	106	119	137	160	178	195	219
15 mins	62.3	80.1	103	116	133	155	173	190	213
16 mins	60.4	77.8	99.8	112	129	151	168	185	208
18 mins	57.2	73.6	94.6	107	123	144	160	176	197
20 mins	54.3	70.0	90.1	102	117	137	152	168	189
25 mins	48.6	62.7	80.9	91.5	106	124	138	152	171
30 mins	44.2	57.1	73.9	83.7	96.6	114	126	140	157
40 mins	37.9	49.0	63.7	72.4	83.7	98.5	110	121	137
50 mins	33.5	43.3	56.6	64.4	74.6	88.0	98.2	109	123
1 hour	`30.2	39.1	51.2	58.4	67.7	80.0	89.4	99.0	112
1.5 hours	23.4	30.4	39.9	45.5	52.8	62.4	69.8	77.4	87.5
2 hours	19.5	25.3	33.3	38.0	44.1	52.2	58.4	64.7	73.3
3 hours	15.0	19.5	25.7	29.4	34.1	40.4	45.2	50.2	56.8
4.5 hours	11.6	15.0	19.8	22.7	26.4	31.3	35.0	38.8	44.0
6 hours	9.6	12.5	16.5	18.9	22.0	26.1	29.2	32.4	36.8
9 hours	7.4	9.6	12.7	14.6	17.0	20.2	22.6	25.1	28.5
12 hours	6.1	8.0	10.6	12.2	14.2	16.8	18.9	21.0	23.8
15 hours	5.4	7.0	9.3	10.6	12.4	14.7	16.5	18.4	20.9
18 hours	4.8	6.2	8.3	9.5	11.1	13.2	14.8	16.5	18.7
24 hours	4.0	5.2	6.9	8.0	9.3	11.1	12.4	13.8	15.7
30 hours	3.5	4.5	6.0	6.9	8.1	9.6	10.8	12.0	13.7
36 hours	3.1	4.0	5.4	6.2	7.2	8.6	9.6	10.7	12.2
48 hours	2.6	3.3	4.4	5.1	6.0	7.1	8.0	8.9	10.1
72 hours	1.9	2.5	3.3	3.8	4.5	5.3	6.0	6.7	7.6

Rhodes Peninsula Site Specific Requirements

Minimum Standards

MS1 General - The minimum engineering standards given in this Appendix applies to all proposed developments in the Rhodes Peninsular area.

The general standards given in the main body of this Engineering Development Control Plan will still apply where no reference or detail is given in this Appendix.

Shared Paths

SP1 Shared cycle ways and footpaths - shared cycle ways and footpaths shall be provided in all public domain areas. They shall be constructed to the following standards:

- Wearing surface material shall be of concrete 100mm thick, 32MPa compressive strength and reinforced with F72 mesh placed centrally.
- Concrete pavement shall be of uniform colour to match existing area. Coloured black oxide may be used.
- Concrete pavement to have keyed or dowelled joints at 12 metre centres. Control joints shall be saw cut at 3 metre intervals as soon as the concrete has set sufficiently as to not pull stones when cutting.
- Concrete pavement shall be laid on a 20mm sand blinding layer on a compacted sub-grade in accordance with the ***AUSPEC*** specification.
- Concrete pavement shall be finished with a coving trowel.

Seawalls

SE1 Serviceability Level - Seawalls shall be constructed to a serviceable level in accordance with the Australian Standards for Marine Structures.

SE2 Sea Level Rise - Seawalls shall be designed and constructed to withstand a 1 in 100 year ARI storm event with no overtopping inclusive of additional height of 900mm to account for sea level rise.

Jetty

JE1 Prohibited - Jetties or similar structures are prohibited.

Council is unable to maintain and renew jetties due to financial constraints.

Street Lighting

ST1 Design Requirements - All street lights shall be designed and installed to the requirements, specification and approval of Energy Australia.

All street lights are to be connected to the Energy Australia street lighting network.

ST2 Maintenance - All lighting and associated electrical components shall be designed to a public standard.

Energy Australia shall be responsible for the maintenance and continual future maintenance of all street lights.

ST3 Meters and Switch Boards - meters, switch boards and the like shall be separate from any private system and located wholly within land proposed to be dedicated as public domain in the future.

Park Lighting

PL1 Lighting Type - 'Bega Pole 8682 Lights' or equivalent are acceptable.

PL2 Prohibited - Bollard lighting, solar lighting or similar will not be acceptable.

Council has found that the high vandalism and unreliability of these lights makes them unsustainable.

Tree Planting

TP1 General - Refers to tree planting in road carriageways and footways in general.

TP2 Street Trees - Street trees generally shall be planted within a square reinforced concrete cut-off wall as a structural root barrier. Approved synthetic root barrier systems or equivalent may be used in footway areas (pedestrian access areas only).

Where street trees are to be planted in road carriageways (pavement area subject to vehicular loads), it shall be planted within a square reinforced concrete cut-off wall only.

The root barriers shall be extended 300mm below the road pavement. The purpose of the root barriers is to protect the road pavement from moisture and root ingress.

Design Life of all Structures

DL1 General - All public infrastructure shall be designed and selected to provide the least lifecycle costs with respect to maintenance and renewal of the infrastructure throughout its entire serviceable life.

DL2 Seawalls - Seawalls shall be designed and constructed for a minimum design life of 100 years in accordance with the Australian Standards for Marine Structures.

DL3 Road Pavements - All new road pavements shall be designed for a service life of not less than 40 years. Refer Section ***Road Carriageway***

Civic Signage

SG1 General - All signage shall be designed and installed in accordance with Canada Bay Council's Signage Manual.

Garbage Bins

GR1 General - All garbage bins shall be minimum 240 Litres wheelie bin type and housed in stainless steel and timber surround (model no. EM235 Bennelong Bin Enclosures by Emerdyn Pty Ltd).

Stormwater Drainage

SD1 General - Stormwater drainage systems shall be designed generally in accordance with Section ***Stormwater Management***.

SD2 On-site Stormwater Detention - On-site stormwater detention (OSD) shall be required for all proposed development allotments unless drainage from the developed site is discharged directly into the Bay, or that the street trunk drainage system has been designed to cater for the 1 in 100 year ARI storm event.

Where OSD is required, the permissible site discharge shall be based on a "greenfields" site with an impervious area of 0%.

SD3 Sub-surface Water - Sub-surface water collected from basements and all lowered floor areas shall not be discharged directly to the kerb. Refer to Section 3 ***Stormwater Management***, ***Sub-surface Water*** for further guidelines.

SD4 Scour and Erosion Control - Refer to Section 3 ***Stormwater Management*** for further guidelines.

Road Pavement

RP1 General - All new road pavements shall be designed for a minimum 2.5 x 10^6 ESA.

RP2 California Bearing Ratio - Testing shall be undertaken to obtain CBR values for pavement design.

The CBR value shall be obtained using the four (4) day soak test with the standard procedure adopted by the RMS.

RP3 Wearing Surface - Road pavement wearing surface shall be constructed as flexible or rigid to match existing pavements or as approved by Council.

Works as Executed Drawings and Asset Data

WAE1 Works-As-Executed Drawings - Prior to handing over land or assets to Council, the developer is to provide Works-As-Executed drawings prepared and certified by a registered surveyor.

The plans are to be provided in the form of:

- A1 size pdf drawings suitable for archiving (vector based, not raster) and
- A vector format suitable for importing into Council's Land Information Systems (MapInfo) or Cad systems (AutoCAD).

WAE2 Detailed Asset Data - Prior to handing over land or assets to Council, the developer is to provide detailed asset data at a component level for importation into Council's Asset Management System.

Information required will depend on the components and the developer should submit a component list to Council for further advice.

The following list is representative of what would be required:

- A vector representation of the component and its location on MGA94 coordinates linked to:
  - Description.
  - Material details.
  - Design life.
  - Installation date.
  - Acquisition date.
  - Dimensional and quantity information where it is not defined by the graphic object (e.g. The length of a pipe can be represented by the length of a line object on the plan. A data value representing the diameter needs to be attached to that line object. The area of a segment of road can be defined by a polygon. A data value representing the pavement depth needs to be attached to the polygon.)
  - Valuation at installation date.

It is recommended that these requirements be considered at the design documentation stage.

For more complex and proprietary items, for example pumps or lighting systems, the developer shall provide to Council's satisfaction details of Brand, Model, Supplier, Warranty, Installation Guide, User Guide, Safety Instructions, Servicing Record, Maintenance Manual, Keys etc as appropriate.

Community Land

CL1 Plan of Management - This Section provides a guideline for the preparation of a Plan of Management for open space land which will be transferred to Council as community land.

CL2 The Local Government Act - The ***Local Government Act 1993*** emphasises that Plans of Management should be prepared for all community land for which Council will be responsible to ensure land it owns or controls is actively and effectively managed.

CL3 Description of Use - The Plan of Management should describe how public land will be managed, maintained and utilised, who is responsible for its management, its facilities and the uses and activities that occur there.

CL4 Status - The plan should show the status of each park or reserve and the planning of each, meet the other requirements of the Act pertaining to community land management, have informed the community based on a consultative process and establish a framework for meeting community needs regarding open space.

CL5 Strategic Document - The plan would be a strategic document with prioritised actions which give Council flexibility to develop strategies consistent with the objectives identified in its Management Plan.

CL6 Development of Opportunities - The plan should also enable Council to take advantage of any opportunities that arise during the life of the plan that enable implementation of the strategies in ways that may be more cost-effective, more time efficient, or in some other way provide benefits that were unavailable or not recognised during preparation of the plan.

Strathfield Triangle Site Specific Requirements

Minimum Standards

MS1 General - The minimum engineering standards given in this Appendix applies to all proposed developments in the North Strathfield area otherwise known as the Strathfield Triangle.

The general standards given in the main body of this Engineering Specification will still apply where no reference or detail is given in this Appendix.

STRATHFIELD TRIANGLE

GENERAL NOTES

1. Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer
2. Strip all topsoil from the construction area. All stripped topsoil shall be disposed of off-site unless directed otherwise.
3. Make smooth connection with all existing works.
4. Compact subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint.
5. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority is to be carried out in accordance with the requirements of the relevant Authority. The Contractor shall obtain these requirements from the Authority. Where the requirements of the Authority are different to the drawings and specifications, the requirements of the Authority shall be applicable.
6. For all temporary batters refer to geotechnical recommendations.

REFERENCE DRAWINGS

1. These drawings have been based from, and to be read in conjunction with the following Consultants drawings. Any conflict to the drawings must be notified immediately to the Engineer.

Consultant	Dwg Title	Dwg No	Rev	Date
BYRNE	SURVEY	1021705	E	27.11.15
SILK	LANDSCAPE	L-001	C	17.06.16
STONE	STRATHFIELD_20160621	–	–	21.06.16
TTPA	w_strathfield	DS0000	A	16.02.16

STORMWATER DRAINAGE NOTES

1 Stormwater Design Criteria :
- (A) Average recurrence interval –
  1:100 years for roof drainage to first external pit
  1:20 years for paved and landscaped areas
- (B) Rainfall Intensities –
  Time of concentration: 6 minutes
  1:100 years = 233 mm/hr
  1:20 years = 181 mm/hr
- (C) Runoff coefficients –
  Roof areas: Cxa = 1.00
  Roads and paved areas: Cxa = 0.95
  Landscaped areas: Cxa = 0.68

2. Pipes 300 dia and larger to be reinforced concrete Class "2" approved spigot and socket with rubber ring joints U.N.O.
3. Pipes up to 300 dia shall be sewer grade uPVC with solvent welded joints.
4. Equivalent strength VCP or FRP pipes may be used subject to approval.
5. Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
6. Where subsoil drains pass under floor slabs and vehicular pavements, unslotted uPVC sewer grade pipe is to be used.
7. Grates and covers shall conform with AS 3996–2006, and AS 1428.1 for access requirements.
8. Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
9. Care is to be taken with levels of stormwater lines. Grades shown are not to be reduced without approval.
10. All stormwater pipes to be 150 dia at 1.0% min fall U.N.O.
11. Subsoil drains to be slotted flexible uPVC U.N.O. class 1000
12. Adopt invert levels for pipe installation (grades shown are only nominal).

SITEWORKS NOTES

1. All basecourse material to comply with RMS specification No 3051 and compacted to minimum 98% modified dry density in accordance with AS 1289 5.2.1.
2. All trench backfill material shall be compacted to the same density as the adjacent material.
3. All service trenches under vehicular pavements shall be backfilled with an approved select material and compacted to a minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1

BOUNDARY AND EASEMENT NOTE

The property boundary and easement locations shown on Taylor Thomson Whitting drawing's have been based from information received from : BYRNE & ASSOCIATES
Al–1021705

Taylor Thomson Whitting makes no guarantees that the boundary or easement information shown is correct.
Taylor Thomson Whitting will accept no liabilities for boundary inaccuracies. The contractor/builder is advised to check/confirm all boundaries in relation to all proposed work prior to the commencement of construction. Boundary inaccuracies found are to be reported to the superintendent prior to construction starting.

SURVEY AND SERVICES INFORMATION

SURVEY

Origin of levels : SSM 91103 RL 16.66
Datum of levels : A.H.D. AUSTRALIAN HEIGHT DATUM
Coordinate system : MGA
Survey prepared by : BYRNE & ASSOCIATES
Setout Points : CONTACT THE SURVEYOR

Taylor Thomson Whitting does not guarantee that the survey information shown on these drawings is accurate and will accept no liability for any inaccuracies in the survey information provided to us from any cause whatsoever.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on Taylor Thomson Whittings drawings have been plotted from diagrams provided by service authorities. This information has been prepared solely for the authorities own use and may not necessarily be updated or accurate.

The position of services as recorded by the authority at the time of installation may not reflect changes in the physical environment subsequent to installation.

Taylor Thomson Whitting does not guarantee that the services information shown on these drawings shows more than the presence or absence of services, and will accept no liability for inaccuracies in the services information shown from any cause whatsoever.

The Contractor must confirm the exact location and extent of services prior to construction and notify any conflict with the drawings immediately to the Engineer/Superintendent.

The contractor is to get approval from the relevant state survey department, to remove/adjust any survey mark. This includes but is not limited to; State Survey Marks (SSM), Permanent Marks (PM), cadastral reference marks or any other survey mark which is to be removed or adjusted in any way.
Taylor Thomson Whitting plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.

PAVEMENT LEGEND

NOTES
1. Asphaltic concrete shall conform to AS2150 and the specification
2. Pavement based on geotechnical report by J&K GEOTECHNICS 28855rpt 17.12.15

P1 — 50mm Thickness asphaltic concrete (AC10) with AMC1 binder on 150mm Compacted thickness fine crushed rock (DGB20) on 350mm Compacted thickness fine crushed rock (DGS40)

P2 — 50mm mill existing pavement and replace with 50mm Thickness asphaltic concrete (AC10) with AMC1 binder TO RMS SPECIFICATION

P3 — 100mm Thickness concrete (f'c=32MPa) with SL62 fabric and expansion joints at max 6.0m centres and weakened plane joints at max 1.5m centres on 100mm Compacted thickness fine crushed rock (DGB20)

P4 — 150mm Thickness concrete (f'c=32MPa) with SL82 fabric (40 top cover) on 100mm Compacted thickness fine crushed rock (DGB 20)

P5 — 80mm ECOTHREK Pavers with 3mm stone in voids on 30mm Sandbedding on 200mm Filter material (crushed hard rock or natural gravel) with grading in accordance with the specification section 5.3.5 – subsoil drains on 100mm Lean mix concrete on 100mm Compacted thickness fine crushed rock (DGB20) on Subgrade compacted to 98% SMDD

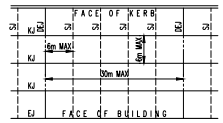
P6 — 100mm Thickness concrete (f'c=32MPa) with SL62 fabric finished to SILK drawings with expansion joints at max 6.0m centres and weakened plane joints at max 1.5m centres on 100mm Compacted thickness fine crushed rock (DGB20)

P7 — Pavers as per SILK drawings on 30mm Thickness mortar on 100mm Thickness concrete (f'c=32MPa) with SL62 fabric and expansion joints at max 6.0m centres and weakened plane joints at max 1.5m centres on 100mm Compacted thickness fine crushed rock (DGB20)

JOINTING NOTES

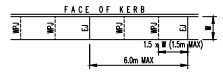
Vehicular Pavement Jointing

1. Keyed construction joints should generally be located at a maximum of 6m centres.
2. Saw joints should generally be located at a maximum of 6m centres or 1.5 x the spacing of keyed joints, where key joint spacing is less than 4m, with dowelled expansion joints at maximum of 30m centres.
3. Provide 10mm wide full cork depth expansion joints between buildings and all concrete or unit pavers.
4. The timing of the saw cut is to be confirmed by the contractor on site. Site conditions will determine how many hours after the concrete pour before the saw cuts are commenced. Refer to the specification for weather conditions and temperatures required.
5. Vehicular pavement jointing as follows.



Pedestrian Footpath Jointing

1. Expansion joints are to be located where possible at tangent points of curves and elsewhere at max 6.0m centres.
2. Weakened plane joints are to be located at a max 1.5 x width of the pavement.
3. Where possible joints should be located to match kerbing and / or adjacent pavement joints.
4. All pedestrian footpath jointings as follows (uno).



CONCRETE NOTES

EXPOSURE CLASSIFICATION : External : B1

CONCRETE

Place concrete of the following characteristic compressive strength f'c as defined in AS 1379.

Location	AS 1379 f'c MPa at 28 days	Specified Slump	Nominal Agg. Size
FOOTPATHS	N25	80	20
KERBS	N20	80	20
VEHICLE PAVEMENTS	SF25 (4.0MPa at 10 days)	80	20

1. Use Type "GP" cement, unless otherwise specified.
2. All concrete shall be subject to project assessment and testing to AS 1379.
3. Consolidate by mechanical vibration. Cure all concrete surfaces as directed in the Specification.
4. For all fails in slab, drip grooves, regiets, chamfers etc. refer to Architects drawings and specifications.
5. Unless shown on the drawings, the location of all construction joints shall be submitted to Engineer for review.
6. No holes or chases shall be made in the slab without the approval of the Engineer.
7. Conduits and pipes are to be fixed to the underside of the top reinforcement layer.
8. Slurry used to lubricate concrete pump lines is not to be used in any structural members.

FORMWORK

1. The design, certification, construction and performance of the formwork, falsework and backpropping shall be the responsibility of the contractor. Proposed method of installation and removal of formwork is to be submitted to the superintendent for comment prior to work being carried out.

KERBING NOTES

Includes all kerbs, gutters, dish drains, crossings and edges.

1. All kerbs, gutters, dish drains and crossings to be constructed on minimum 75mm granular basecourse compacted to minimum 98% modified maximum dry density in accordance with AS 1289 5.2.1.
2. Expansion joints (E/J) to be formed from 10mm compressible cork filler board for the full depth of the section and cut to profile. Expansion joints to be located at drainage pits, on tangent points of curves and elsewhere at 12m centres except for integral kerbs where the expansion joints are to match the joint locations in slabs.
3. Weakened plane joints to be min 3mm wide and located at 3m centres except for integral kerbs where weakened plane joints are to match the joint locations in slabs.
4. Broomed finished to all ramped and vehicular crossings, all other kerbing or dish drains to be steel float finished.
5. In the replacement of kerbs –
   Existing road pavement is to be sawcut 500mm from lip of gutter. Upon completion of new kerbs, new basecourse and surface is to be laid 500mm wide to match existing materials and thicknesses.
   Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole.
   Existing kerbs are to be completely removed where new kerbs are shown.

SAFETY IN DESIGN

Contractor to refer to Appendix B of the Civil Specification for the Civil Risk and Solutions Register.

EXISTING SERVICES

Contractor to be aware existing services are located within the site. Location of all services to be verified by the Contractor prior to commencing works. Contractor to confirm with relevant authority regarding measures to be taken to ensure services are protected or procedures are in place to demolish and/or relocate.

EXISTING STRUCTURES

Contractor to be aware existing structures may exist within the site. To prevent damage to existing structure(s) and/or personnel, site works to be carried out as far as practically possible from existing structure(s).

EXISTING TREES

Contractor to be aware existing trees exist within the site which need to be protected. To prevent damage to trees and/or personnel, site works to be carried out as far as practically possible from existing trees. Advice needs to be sought from Arborist and/or Landscape Architect on measures required to protect trees.

GROUNDWATER

Contractor to be aware ground water levels are close to existing surface level. Temporary de-watering may be required during construction works.

EXCAVATIONS

Deep excavations due to stormwater drainage works is required. Contractor to ensure safe working procedures are in place for works. All excavations to be fenced off and batters adequately supported to approval of Geotechnical Engineer.

GROUND CONDITIONS

Contractor to be aware of the site geotechnical conditions.
Refer to geotechnical report by J&K GEOTECHNICS 17.12.15 for details.

HAZARDOUS MATERIALS

Existing asbestos products & contaminated material may be present on site. Contractor to ensure all hazardous materials are identified prior to commencing works. Safe working practises as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report by J&k GEOTECHNICS 17.12.15 for details.

CONFINED SPACES

Contractor to be aware of potential hazards due to working in confined spaces such as stormwater pits, trenches and/or tanks. Contractor to provide safe working methods, use appropriate PPE when entering confined spaces and be licenced.

MANUAL HANDLING

Contractor to be aware manual handling may be required during construction. Contractor to take appropriate measures to ensure manual handling procedures and assessments are in place prior to commencing works.

WATER POLLUTION

Contractor to ensure appropriate measures are taken to prevent pollutants from construction works contaminating the surrounding environment.

SITE ACCESS/EGRESS

Contractor to be aware site works occur in close proximity to footpaths and roadways. Contractor to erect appropriate barriers and signage to protect site personnel and public.

VEHICLE MOVEMENT

Contractor to supply and comply with traffic management plan and provide adequate site traffic control including a certified traffic marshall to supervise vehicle movements where necessary.

SIGNS AND LINE MARKING NOTES

1. Pavement marking and sign posting to be in accordance with RMS. 'Interim Guide to Signs and Markings'.
2. Contractor is to provide guide posts, spaced in accordance with AS1742.2. They are to be located near all head walls and pipe outlets.
3. Raised pavement markers to be in accordance with AS1742.2
4. Where existing pavement marking conflicts with proposed, it is to be removed.
5. Line marking plan does not define boundaries.
6. Erect temporary sign 'changed traffic conditions ahead' 120m ahead of new work in both directions.
7. Establish the location of existing utility services and locate new signs clear of these installations.
8. The sloped face of the SF median kerbs which adjoin through lanes, are to be painted white in lieu of an E3 edge line. The reflective pavement markers normally associated with an E3 edge line are to be located on the pavement adjacent to the SF kerb.
9. Bicycle pavement markings and sign posting to be in accordance with Austroads Standards.
10. The design of major directional sign posting to be prepared and assessed by the RMS.

CONCRETE FINISHING NOTES

1. All exposed concrete pavements are to be broomed finished.
2. All edges of the concrete pavement including keyed and dowelled joints are to be finished with an edging tool.
3. Concrete pavements with grades greater than 10 % shall be heavily broomed finished.
4. Carborundum to be added to all stair treads and ramped crossings U.N.O.

BULK EARTHWORKS NOTES

1. All bulk earthworks setout from grid lines U.N.O.
2. All batters at a slope of 3 (H) : 1 (V) U.N.O.
3. Excavated material may be used as structural fill provided,
   (i) It complies with the specification requirements for fill material,
   (ii) the placement moisture content complies with the Geotechnical Consultants requirements, and allows filling to be placed and proofrolled in accordance with the specification. Where necessary the Contractor must moisture condition the excavated material to meet these requirements.
4. Compact fill areas and subgrade to not less than:

Location	Standard dry density (AS 1289 5.1.1.)	Moisture (OMC)
Under building slabs on ground:	98%	±2%
Under roads and carparks:	98%	±2%
Landscaped areas:	95%	±2%

5. Before placing fill, proof roll exposed subgrade with a 10 tonne minimum roller to test subgrade and then remove soft spots (areas with more than 3mm movement under roller). Soft spots to be replaced with select fill U.N.O.
6. Contractor shall place safety barriers around excavations in accordance with relevant safety regulations.
7. For interpretation of bulk earthworks foot print line shown on the bulk earthworks drawings refer to the bulk earthworks construction legend.
8. Bulk earthwork drawings are not to be used for detailed excavation.
9. Refer to Geotechnical Report prepared by – J&k GEOTECHNICS 28855rpt 17.12.15

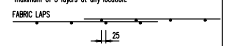
REINFORCEMENT NOTES

1. Fix reinforcement as shown on drawings. The type and grade is indicated by a symbol as shown below. On the drawings this is followed by a numeral which indicates the size in millimetres of the reinforcement.

N Hot rolled ribbed bar	grade D500N
R Plain round bar	grade R250N
SL Square mesh	grade 500L
RL Rectangular mesh	grade 500L

2. Provide bar supports or spacers to give the following concrete cover to all reinforcement unless otherwise noted on drawings.

Footings – 75 top, 75 bottom, 75 sides.
Slabs – 40 top, 40 bottom,
Cover to reinforcement ends to be 50 mm u.n.o.
3. Provide N12–450 support bars to top reinforcement as required, Lap 500 U.N.O.
4. Maintain cover to all pipes, conduits, regiets, drip grooves etc
5. All cogs to be standard cogs unless noted otherwise.
6. Fabric end and side laps are to be placed strictly in accordance with the manufacturers requirements to achieve a full tensile lap. Fabric shall be laid so that there is a maximum of 3 layers at any location.



PIT SCHEDULE

Note: Grate size does not necessarily reflect pit size, refer pit type details, shown on detail sheet – C1.1.
Final internal pit dimensions are to comply with AS3500

Type	Description	Cover (Clear Opening)	Number
A	Kerb inlet pit 1800 lintel	600 x 900 Class D galvanised mild steel grate hinged to frame	1,2,16,17,18, 19,21,22,23, 24,25,26,27, 28,29,30,31 32,33,36
B	Surface inlet pit	900 x 900 Class D galvanised mild steel grate hinged to frame	3,4,5,6,7,9 10,11,13,14 34
C	Surface inlet pit	900 x 900 Class D galvanised mild steel grate hinged to frame	12
		900 x 900 Class D galvanised mild steel grate with concrete infill	35
D	Surface inlet pit	900 x 900 Class D galvanised mild steel 'V' grate hinged to frame	8,20
E		Adjust existing pit to suit proposed works	37,38,39,40
F		Existing pit to remain	15

SITEWORKS LEGEND

- F22.20 — Finished surface level
- *F22.20 — Level to be confirmed on site
- F22.00 — Finished contour
- K&G — Kerb and gutter
- KO — Kerb only
- DD — Dish drain
- RK&T — Roll kerb and toe
- SA — RMS Kerb (SA)
- CE — Concrete edge
- Stormwater pit, flow direction and fine with
- IR — Intermediate riser with subsoil drainage line (100 dia)
- FP — Flushing point with subsoil drainage line (100 dia)
- Proposed boundary
- Proposed conduits
- W — TAP — Top with proposed water line connection

EXISTING SEVICES LEGEND

- S — Existing sewer
- W — Existing water
- EU — Existing underground electrical
- OH — Existing aerial electrical
- T — Existing communications
- G — Existing gas
- SW — Existing stormwater

SURVEY LEGEND

- +18.48 — Surface level
- 19 — Contour
- Kerb line
- Batter
- Retaining wall
- EASEMENT FOR _____(_m WIDE) — Easement
- Fence
- Tree to be removed/be retained
- Boundary

DRAWING LIST

Drawing Number	Drawing Title
C00	NOTES AND LEGENDS SHEET
C01	SOIL AND EROSION CONTROL PLAN
C02	SITEWORKS PLAN SHEET 1
C03	SITEWORKS PLAN SHEET 2
C04	SITEWORKS PLAN SHEET 3
C05	SITEWORKS PLAN SHEET 4
C06	COOPER STREET LONGITUDINAL SECTION
C07	HILTS ROAD AND LEICSTER LANE LONGITUDINAL SECTION
C08	CLARENCE STREET LONGITUDINAL SECTION
C09	NOT USED
C10	DETAILS SHEET 1
C11	DETAILS SHEET 2
C12	SECTIONS SHEET 1
C13	SECTIONS SHEET 2
C14	SECTIONS SHEET 3
C15	KERB RETURNS SHEET
C16	COOPER STREET CROSS SECTIONS SHEET 1
C17	COOPER STREET CROSS SECTIONS SHEET 2
C18	HILTS ROAD AND LEICSTER LANE CROSS SECTIONS SHEET 1
C19	HILTS ROAD AND LEICSTER LANE CROSS SECTIONS SHEET 2
C20	CLARENCE STREET CROSS SECTIONS
C21	STORMWATER LONGITUDINAL SECTIONS SHEET 1
C22	STORMWATER LONGITUDINAL SECTIONS SHEET 2
C23	STORMWATER LONGITUDINAL SECTIONS SHEET 3
C24	STORMWATER LONGITUDINAL SECTIONS SHEET 4
C25	STORMWATER LONGITUDINAL SECTIONS SHEET 5

STEP IRONS REQUIRED FOR PITS DEEPER THAN 900mm

FOR WATER SUPPLY/MODIFICATION/AUGMENTATION WORKS CONTRACTOR IS TO ENGAGE SYDNEY WATER SERVICES COORDINATION AND ACHIEVE WORK APPROVAL

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P5	ISSUE FOR TENDER	KH	PW	12.09.16
P4	PRELIMINARY	KH	PW	01.07.16
P3	ISSUE FOR APPROVAL	KH	PW	12.05.16
P2	ISSUE FOR REVIEW	KH	PW	18.02.15
P1	ISSUE FOR REVIEW	KH	PK	23.12.15

Client: City of Canada Bay Council

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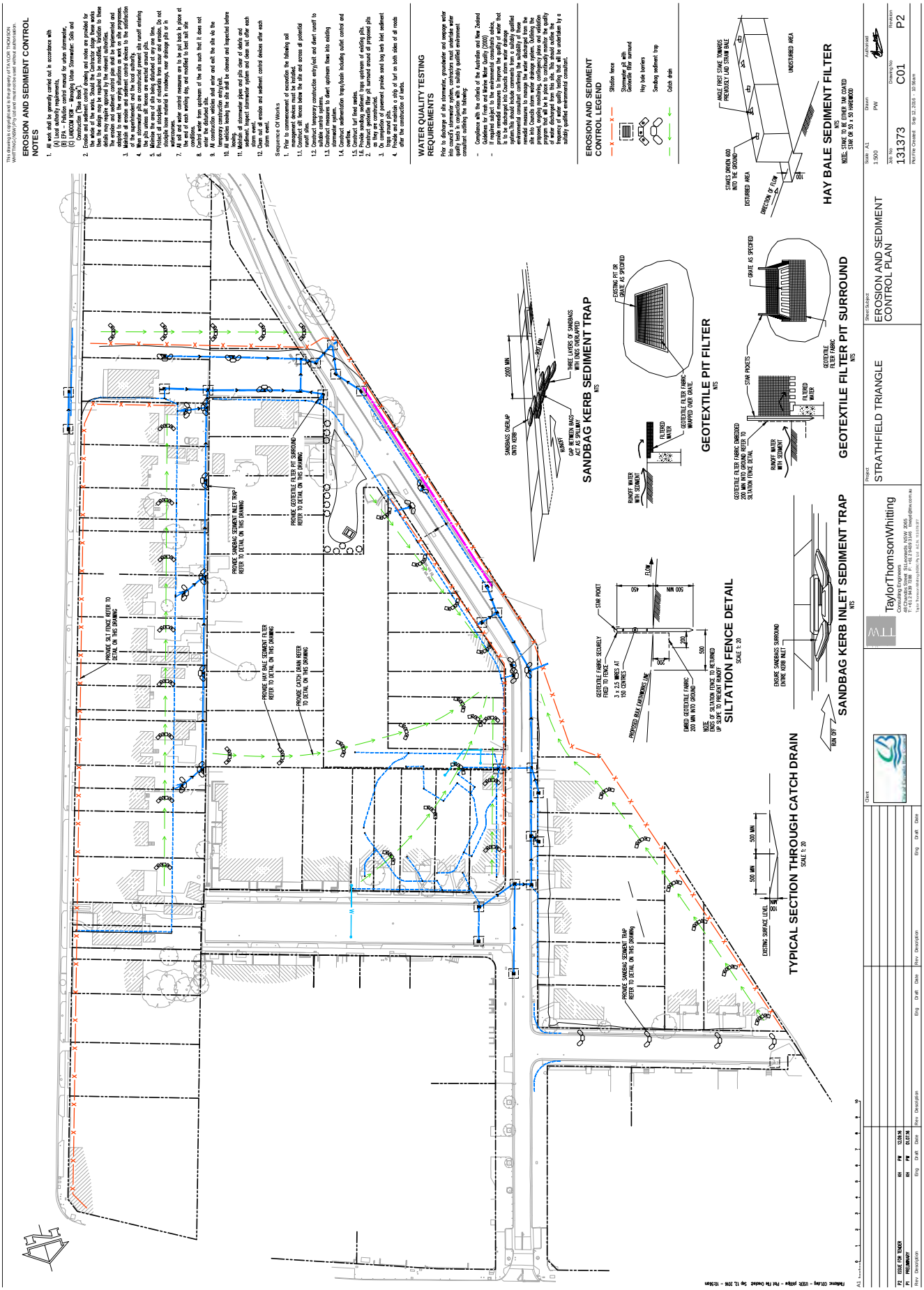
Project: STRATHFIELD TRIANGLE

Sheet Subject: NOTES AND LEGENDS SHEET

Scale: A1 -
Drawn: PK
Authorised:
Job No: 131373
Drawing No: C00
Revision: P5
Plot File Created: Sep 12, 2016 - 10:57am


EROSION AND SEDIMENT CONTROL NOTES
1. All work shall be generally carried out in accordance with
(A) Local authority requirements.
(B) EPA - Pollution control manual for urban stormwater.
(C) Soil and Water Management for Urban Stormwater - Soils and Construction ("Blue Book").
2. Erosion and sediment control drawing and notes are provided for guidance only and it is the responsibility of the contractor to ensure that they are adequate for the purpose. Where they are not adequate, then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. Where required, divert all water from disturbed areas and prevent the site unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all disturbed areas from erosion by rainfall and wind. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. Install sediment and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. Waterways adjoining the site shall be cleaned and inspected before leaving the site.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.
Sequence of Civil Works
1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential overland flow paths.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Protect existing turf lined swales.
1.6. Provide standing sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits and existing pits as required.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Protect and stabilise a strip of turf on both sides of all roads after the construction of kerbs.
WATER QUALITY TESTING REQUIREMENTS
Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:
- Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
- Where water quality fails to meet the criteria listed in the tables, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system. The measures are to be prepared by a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site. Contractors must undertake water quality tests in accordance with the approved monitoring, sampling and testing program that will be in place to continually monitor the quality of water discharged from this site. The program shall outline the frequency of testing and the person undertaking the testing by a suitably qualified environmental consultant.
EROSION AND SEDIMENT CONTROL LEGEND
Silt fence
Stormwater pit with Geotextile filter surround
Hay bale barriers
Sandbag sediment trap
Catch drain
SANDBAG KERB SEDIMENT TRAP
NTS
THREE LAYERS OF SANDBAGS WITH ENDS OVERLAPPED
SANDBAGS OVERLAP ONTO KERB
RUNOFF
SANDBAGS ACT AS SPILLWAY
2000 MIN
GEOTEXTILE PIT FILTER
NTS
EXISTING PIT OR GRATE AS SPECIFIED
GEOTEXTILE FILTER FABRIC WRAPPED OVER GRATE
FILTERED WATER
RUNOFF WATER WITH SEDIMENT
SILTATION FENCE DETAIL
SCALE 1: 20
STAR POCKET
450
500 MIN
GEOTEXTILE FABRIC SECURELY FIXED TO FENCE
3 x 2.5 MMGS AT 150 CENTRES
PROPOSED BULK EARTHWORKS LINE
EMBED GEOTEXTILE FABRIC 200 MIN INTO GROUND
NOTE ENDS OF SILTATION FENCE TO RETURNED UP SLOPE TO PREVENT RUNOFF
TYPICAL SECTION THROUGH CATCH DRAIN
SCALE 1: 20
500 MIN
EXISTING SURFACE LEVEL
SANDBAG SEDIMENT TRAP
REFER TO DETAIL ON THIS DRAWING
SANDBAG KERB INLET SEDIMENT TRAP
NTS
ENSURE SANDBAGS SURROUND ENTIRE KERB INLET
RUN OFF
GEOTEXTILE FILTER PIT SURROUND
NTS
GRATE AS SPECIFIED
STAR POCKETS
GEOTEXTILE FILTER FABRIC EMBEDDED 200 MM INTO GROUND REFER TO SILTATION FENCE DETAIL
RUNOFF WATER WITH SEDIMENT
FILTERED WATER
GEOTEXTILE FILTER FABRIC
HAY BALE SEDIMENT FILTER
NTS
NOTE: STAKE TO BE DRIVEN TAR COATED STAR OR 50 x 50 HARDWOOD
ANGLE FIRST STAKE TOWARDS PREVIOUS LAID STRAW BALE
STAKES DRIVEN 600 INTO THE GROUND
DISTURBED AREA
DIRECTION OF FLOW
UNDISTURBED AREA
PROVIDE GEOTEXTILE FILTER PIT SURROUND REFER TO DETAIL ON THIS DRAWING
PROVIDE SANDBAG SEDIMENT INLET TRAP REFER TO DETAIL ON THIS DRAWING
PROVIDE SILT FENCE REFER TO DETAIL ON THIS DRAWING
PROVIDE HAY BALE SEDIMENT FILTER REFER TO DETAIL ON THIS DRAWING
PROVIDE CATCH DRAIN REFER TO DETAIL ON THIS DRAWING
Project
STRATHFIELD TRIANGLE
Sheet/Subject
EROSION AND SEDIMENT CONTROL PLAN
TaylorThomsonWhitting
Consulting Engineers
Scale
1:500
Drawn
PW
Authorised
Job No
131373
Drawing No
C01
Revision
P2
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Sept 12, 2014 - 10:36am
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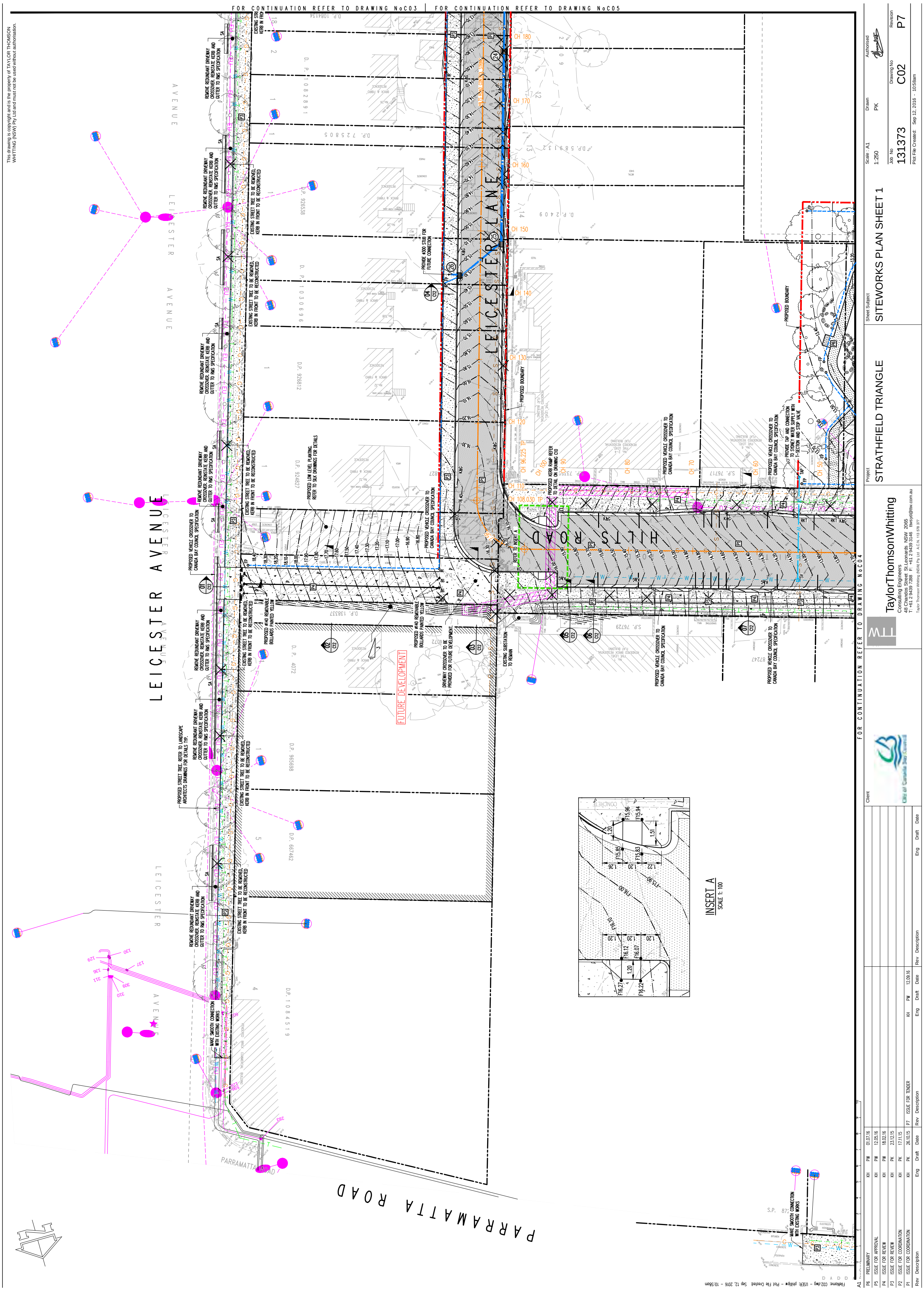
P1 PRELIMINARY KH PW 01.07.14
Rev Description Eng Draft Date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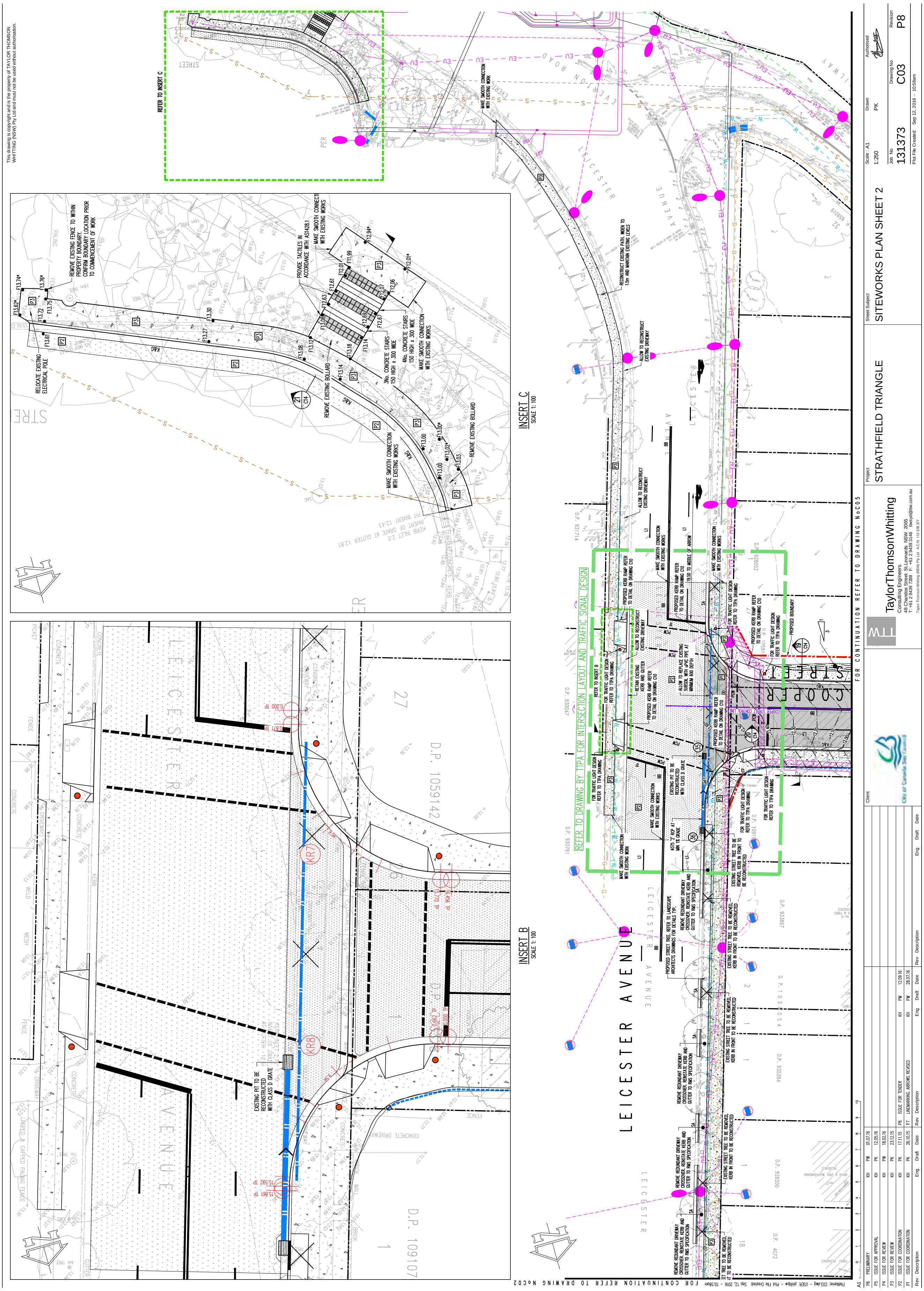
LEICESTER LANE
HILTS ROAD
PARRAMATTA ROAD
FUTURE DEVELOPMENT
INSERT A
SCALE 1: 100
STRATHFIELD TRIANGLE
SITEWORKS PLAN SHEET 1
TaylorThomsonWhitting
131373
C02
P7


INSERT B
SCALE 1:100
INSERT C
SCALE 1:100
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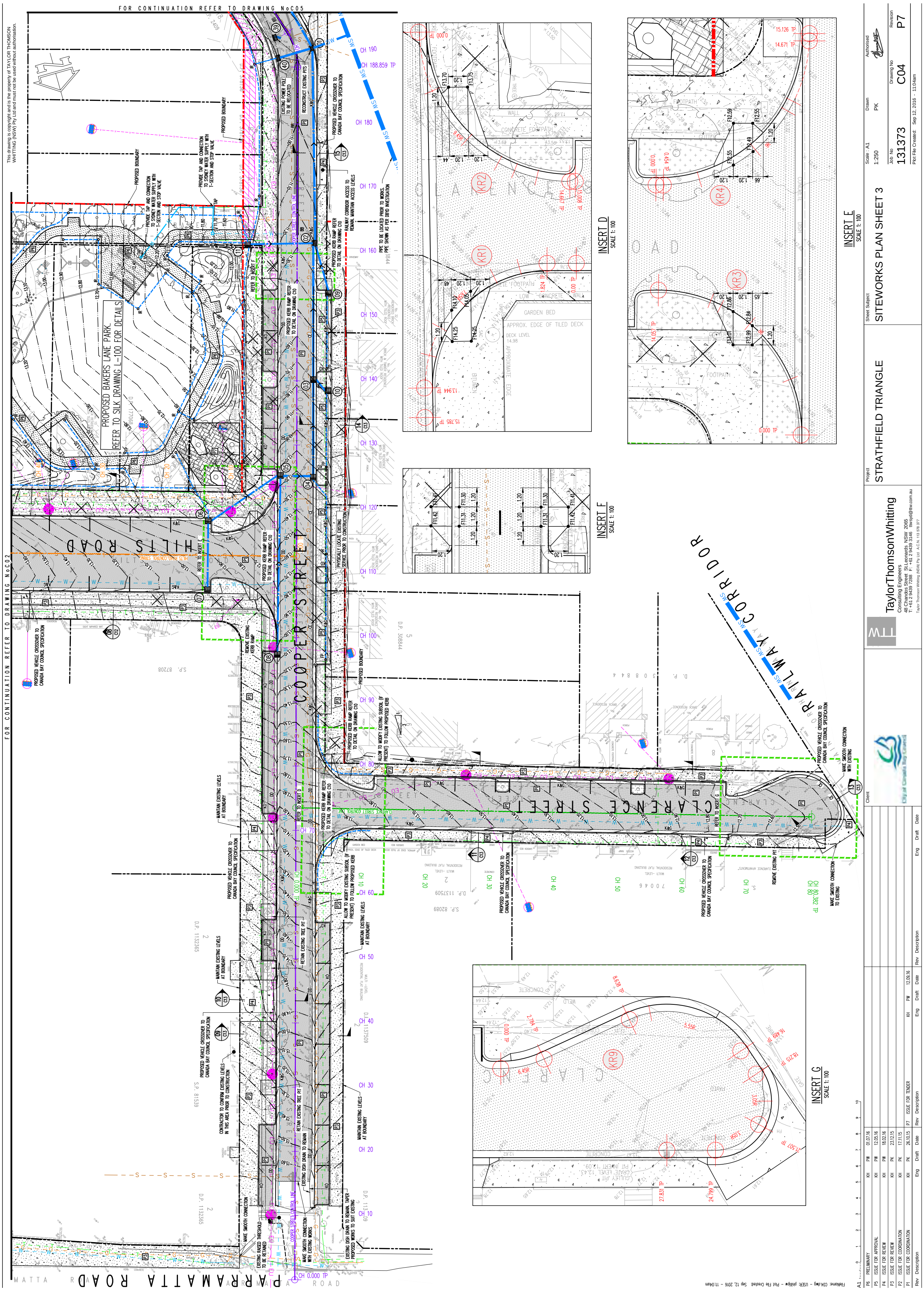
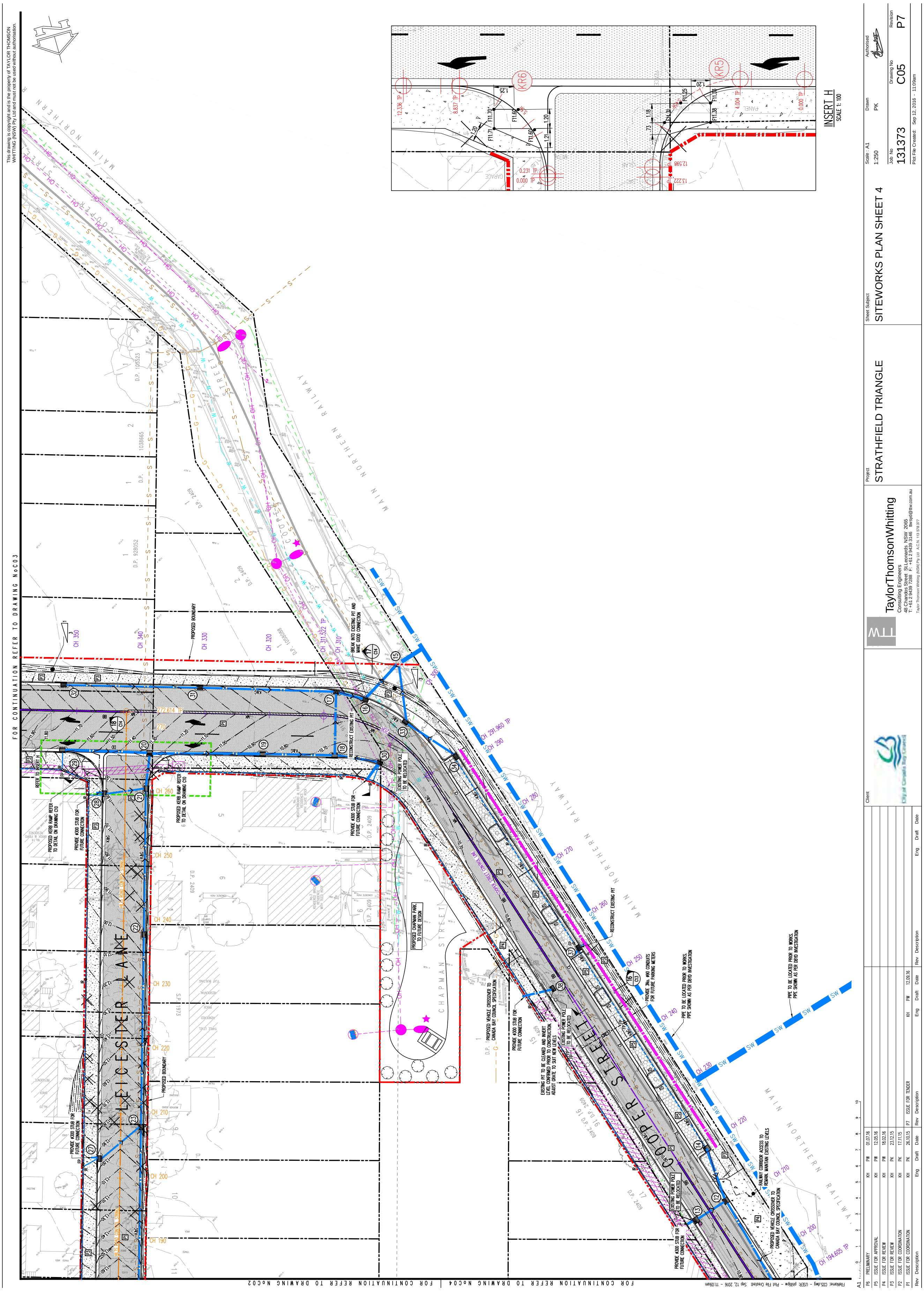
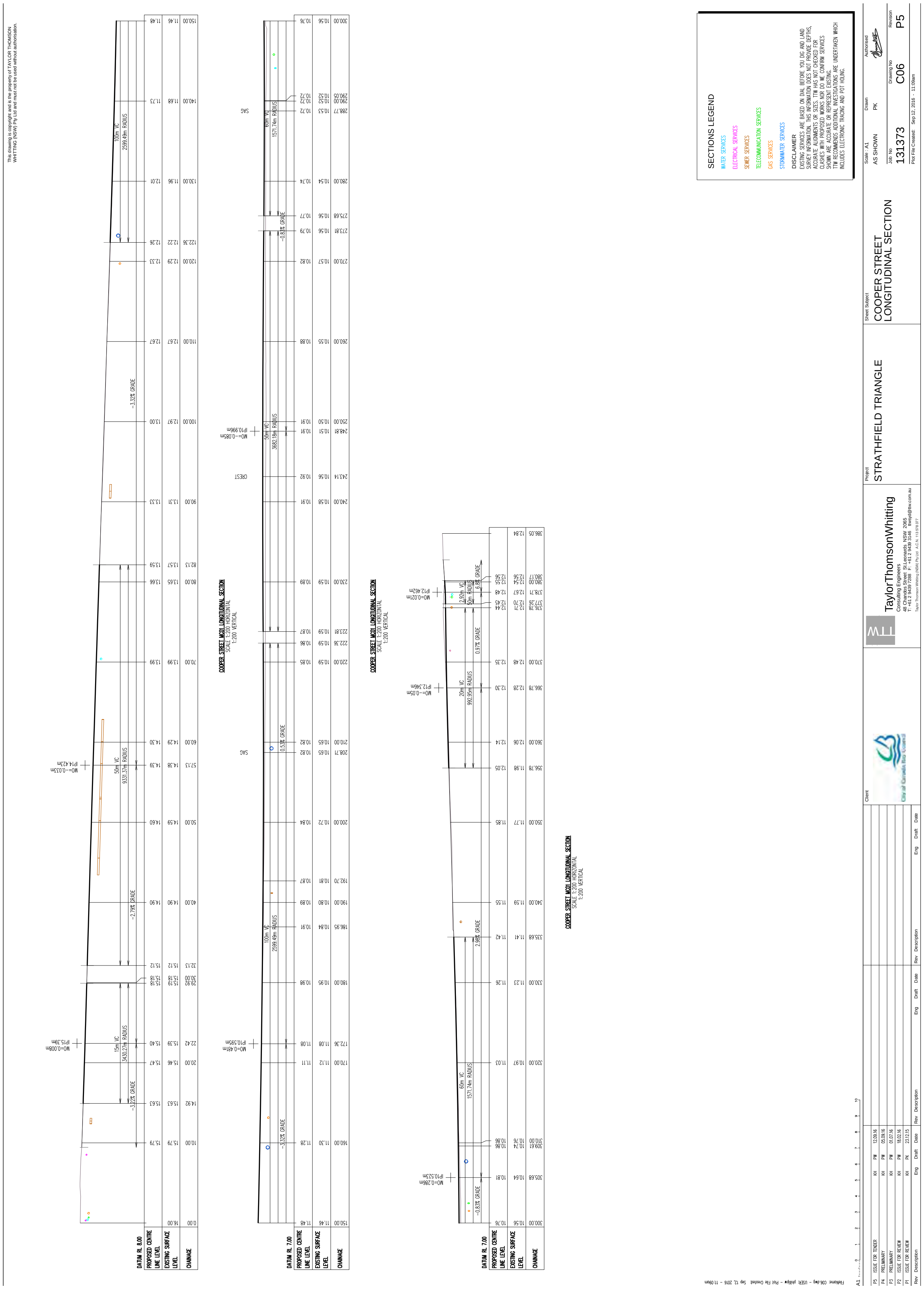
COOPER STREET
STRATHFIELD TRIANGLE
SITEWORKS PLAN SHEET 2
TaylorThomsonWhitting
131373
C03
P8


COOPER STREET
CLARENCE STREET
HILTS ROAD
PARRAMATTA ROAD
RAILWAY CORRIDOR
INSERT D
INSERT E
INSERT F
INSERT G
STRATHFIELD TRIANGLE
SITEWORKS PLAN SHEET 3
TaylorThomsonWhitting
131373
C04
P7


STRATHFIELD TRIANGLE
SITEWORKS PLAN SHEET 4
TaylorThomsonWhitting
131373
C05
P7
INSERT H
COOPER STREET
LEICESTER LANE
CHAPMAN STREET
MAIN NORTHERN RAILWAY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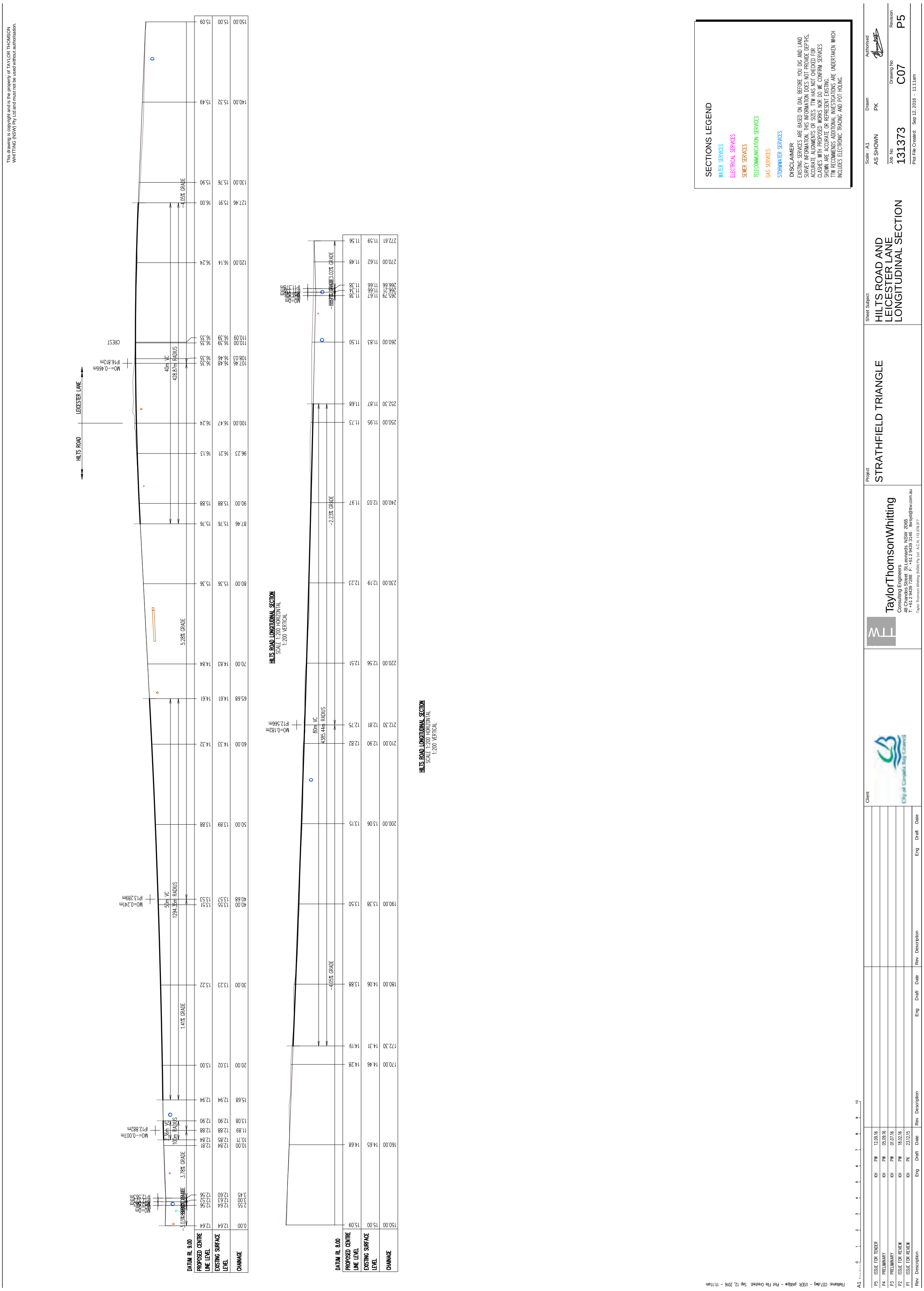
ELECTRICAL SERVICES
SEWER SERVICES
TELECOMMUNICATION SERVICES
GAS SERVICES
STORMWATER SERVICES
DISCLAIMER
STRATHFIELD TRIANGLE
COOPER STREET LONGITUDINAL SECTION
TaylorThomsonWhitting
AS SHOWN
PK
131373
C06
P5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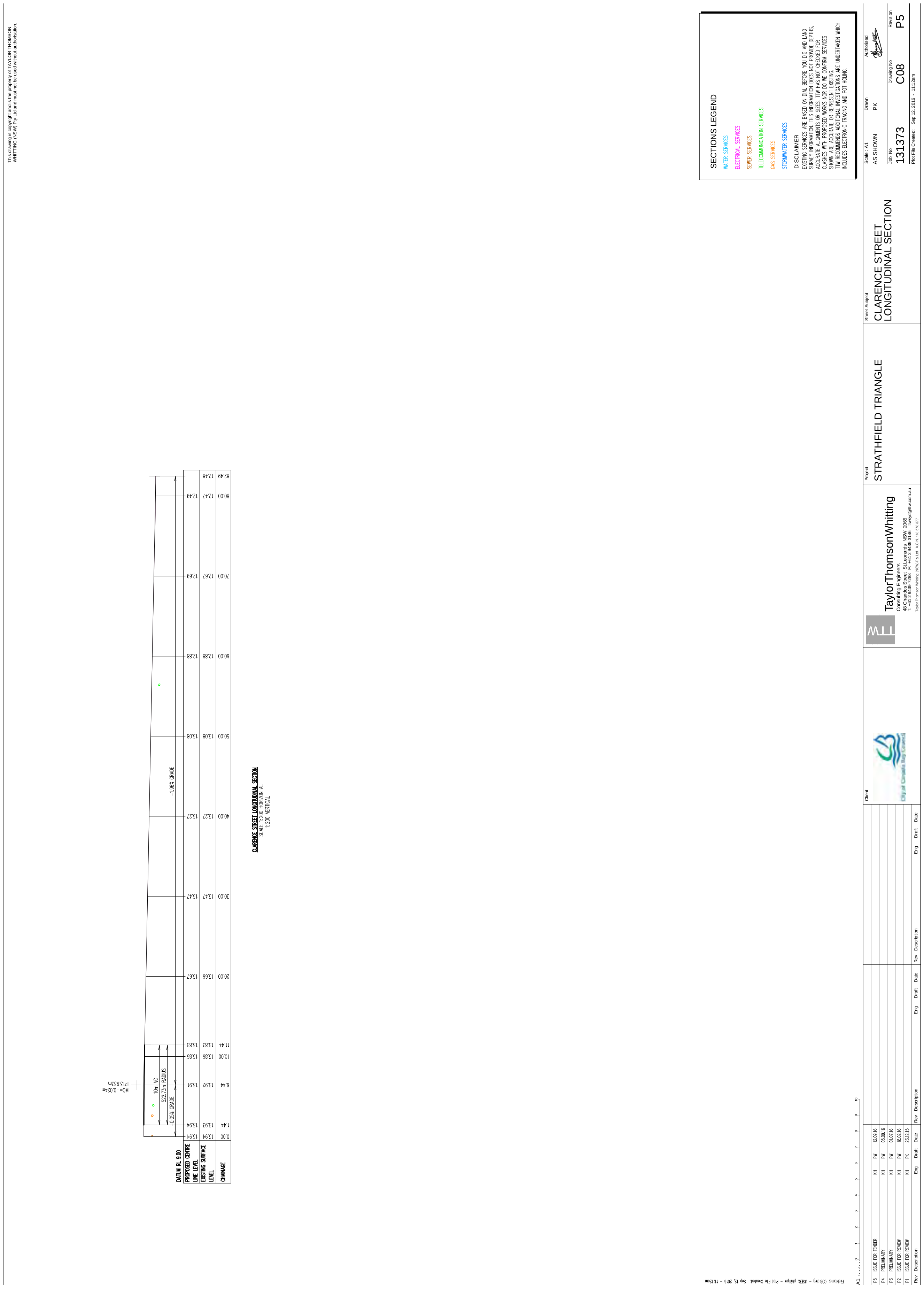
ELECTRICAL SERVICES
SEWER SERVICES
TELECOMMUNICATION SERVICES
GAS SERVICES
STORMWATER SERVICES
DISCLAIMER
TaylorThomsonWhitting
STRATHFIELD TRIANGLE
HILTS ROAD AND LEICESTER LANE LONGITUDINAL SECTION
AS SHOWN
PK
131373
C07
P5
HILTS ROAD LONGITUDINAL SECTION
HILTS ROAD
LEICESTER LANE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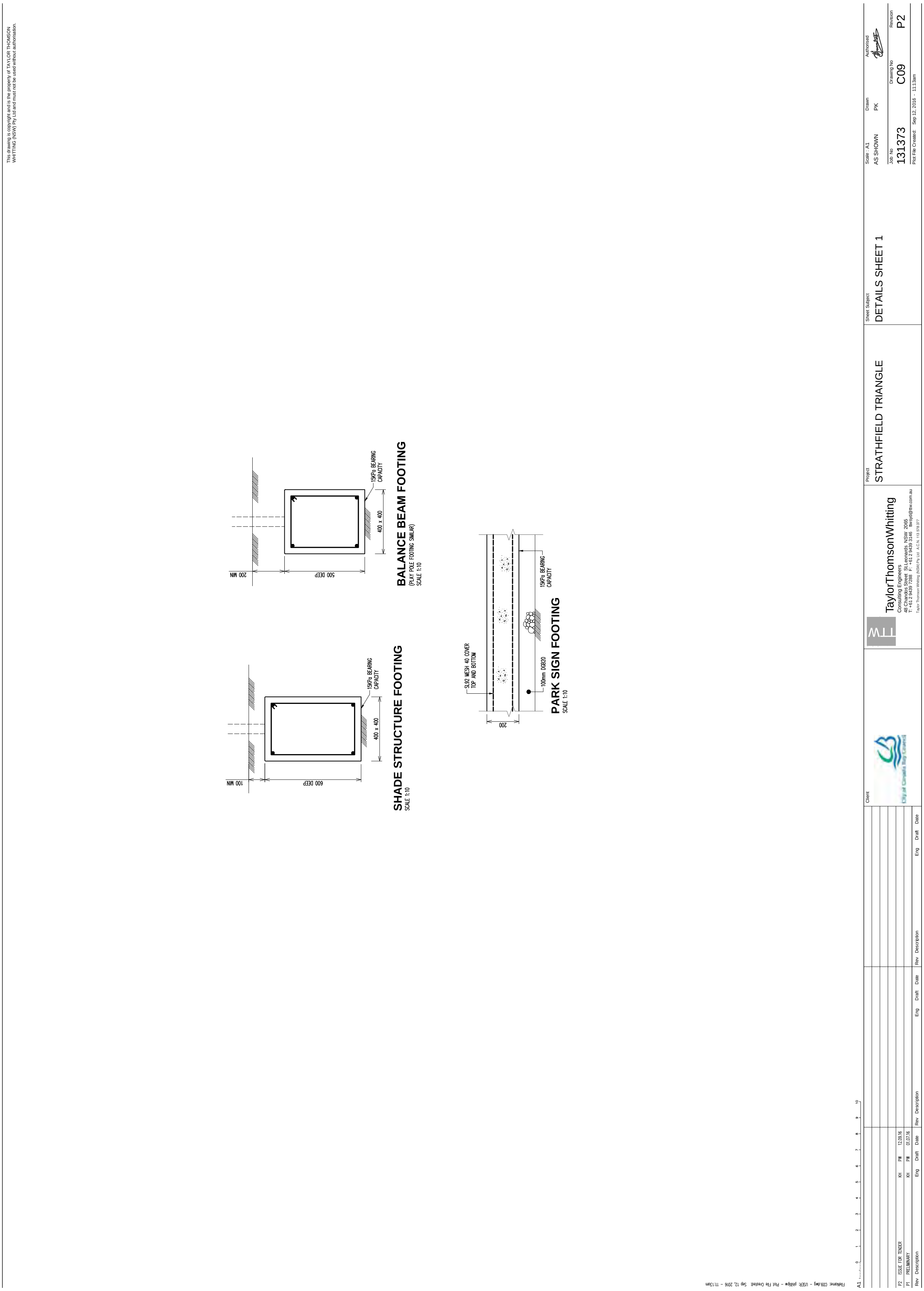
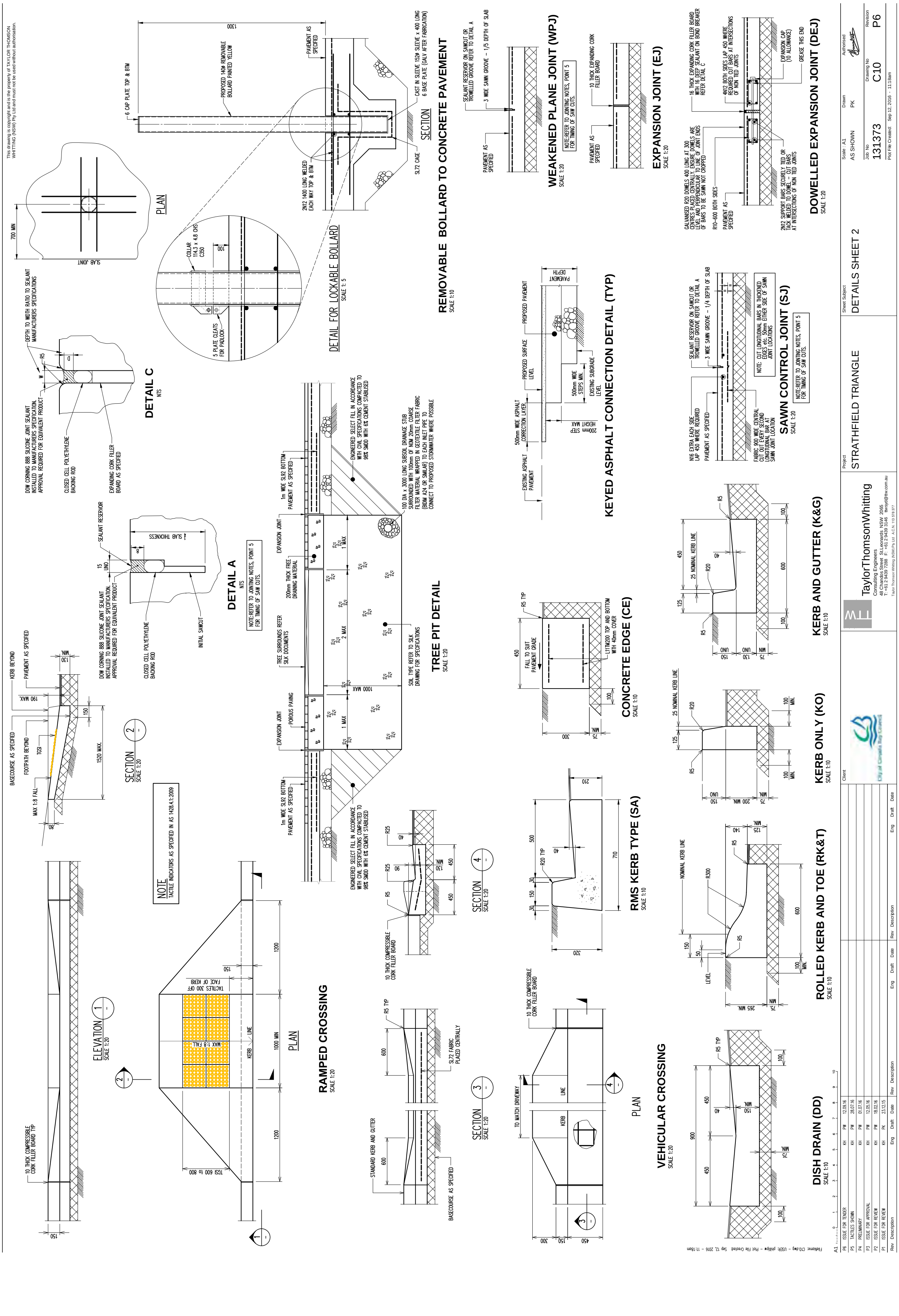
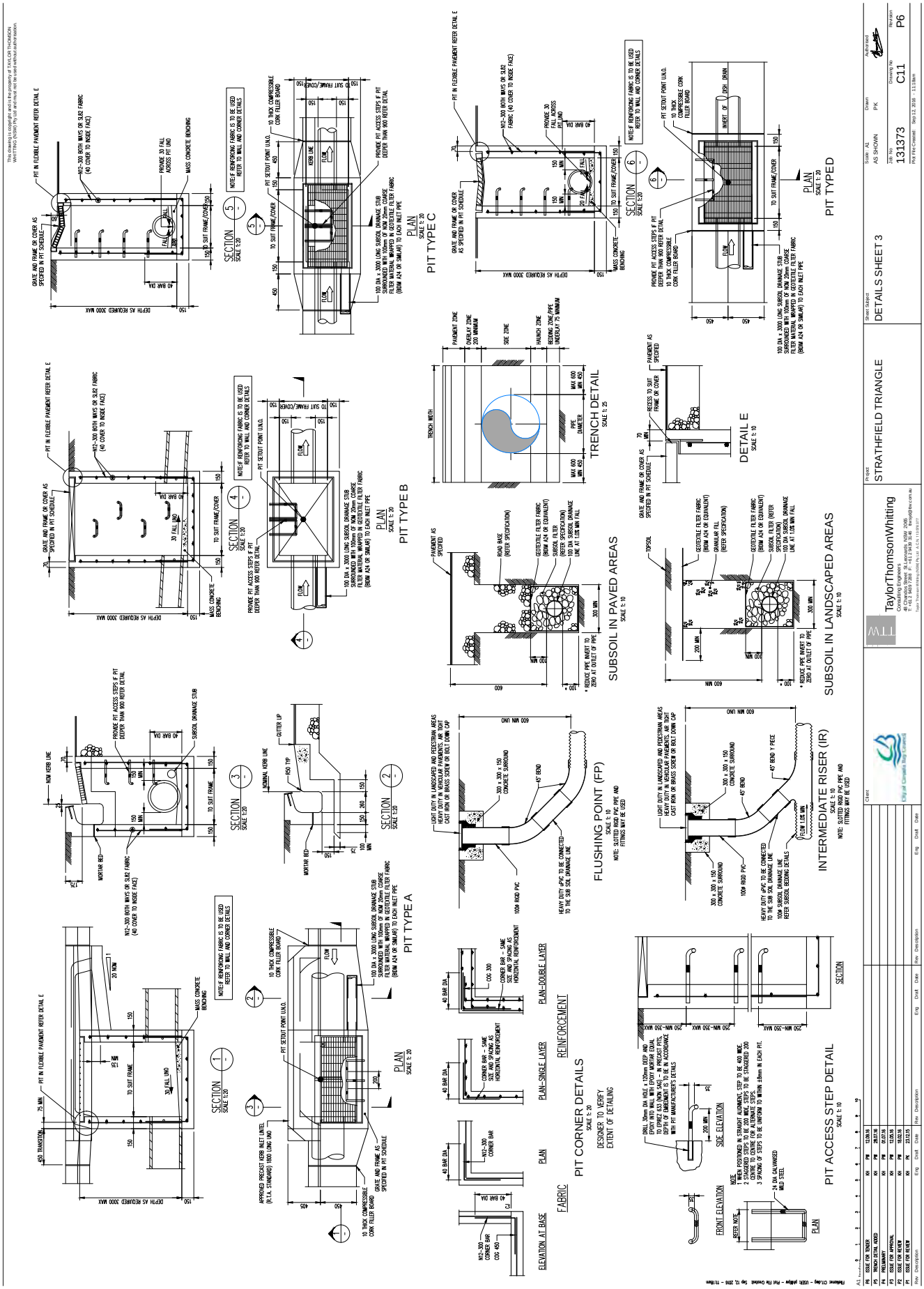
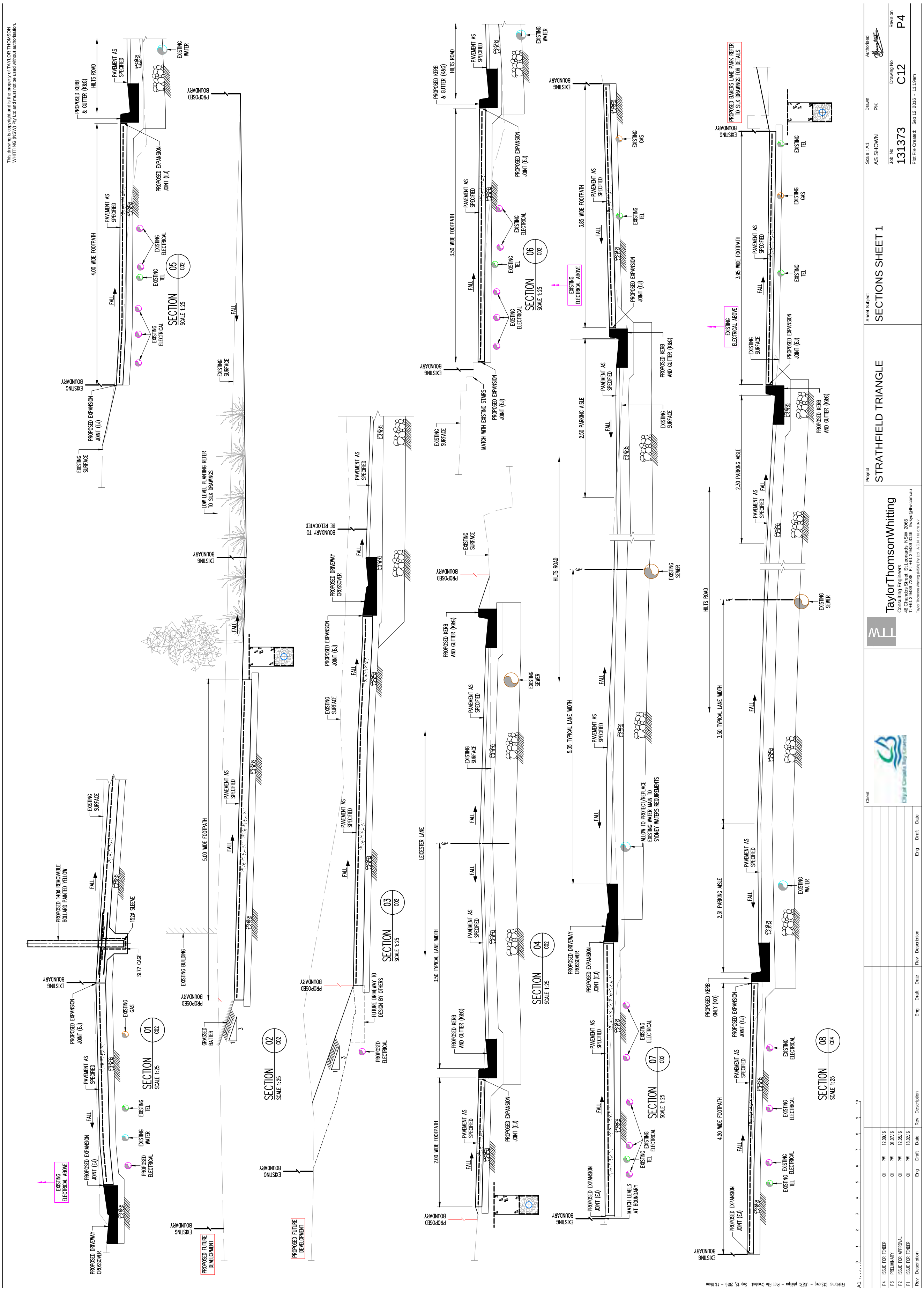
WATER SERVICES
ELECTRICAL SERVICES
SEWER SERVICES
TELECOMMUNICATION SERVICES
GAS SERVICES
STORMWATER SERVICES
DISCLAIMER
CLARENCE STREET LONGITUDINAL SECTION
DATUM RL 9.00
PROPOSED CENTRE LINE LEVEL
EXISTING SURFACE LEVEL
CHAINAGE
+1.96% GRADE
-0.05% GRADE
STRATHFIELD TRIANGLE
CLARENCE STREET
LONGITUDINAL SECTION
TaylorThomsonWhitting
Consulting Engineers
AS SHOWN
PK
131373
C08
P5
P5 ISSUE FOR TENDER
P4 PRELIMINARY
P3 PRELIMINARY
P2 ISSUE FOR REVIEW
P1 ISSUE FOR REVIEW


BALANCE BEAM FOOTING
(PLAY POLE FOOTING SIMILAR)
SCALE 1:10
200 MIN
500 DEEP
400 x 400
15KPa BEARING CAPACITY
SHADE STRUCTURE FOOTING
SCALE 1:10
100 MIN
600 DEEP
400 x 400
15KPa BEARING CAPACITY
PARK SIGN FOOTING
SCALE 1:10
SL92 MESH 40 COVER TOP AND BOTTOM
100mm DGB20
15KPa BEARING CAPACITY
200
This drawing is copyright and is the property of TAYLOR THOMSON WHITTING (NSW) Pty Ltd and must not be used without authorisation.
TaylorThomsonWhitting
Consulting Engineers
Project
STRATHFIELD TRIANGLE
Sheet Subject
DETAILS SHEET 1
Scale : A1
AS SHOWN
Drawn
PK
Job No
131373
Drawing No
C09
Revision
P2
Plot File Created: Sep 12, 2016 - 11:13am
P2 ISSUE FOR TENDER KH PW 12.09.16
P1 PRELIMINARY KH PW 05.07.16
Rev Description Eng Draft Date


REMOVABLE BOLLARD TO CONCRETE PAVEMENT
DETAIL FOR LOCKABLE BOLLARD
WEAKENED PLANE JOINT (WPJ)
EXPANSION JOINT (EJ)
DOWELLED EXPANSION JOINT (DEJ)
DETAIL C
DETAIL A
KEYED ASPHALT CONNECTION DETAIL (TYP)
SAWN CONTROL JOINT (SJ)
TREE PIT DETAIL
RAMPED CROSSING
CONCRETE EDGE (CE)
KERB AND GUTTER (K&G)
KERB ONLY (KO)
RMS KERB TYPE (SA)
ROLLED KERB AND TOE (RK&T)
VEHICULAR CROSSING
DISH DRAIN (DD)
TaylorThomsonWhitting
STRATHFIELD TRIANGLE
DETAILS SHEET 2
131373
C10
P6


PIT TYPE A
PIT TYPE B
PIT TYPE C
PIT TYPED
TRENCH DETAIL
DETAIL E
SUBSOIL IN PAVED AREAS
SUBSOIL IN LANDSCAPED AREAS
FLUSHING POINT (FP)
INTERMEDIATE RISER (IR)
PIT ACCESS STEP DETAIL
PIT CORNER DETAILS
REINFORCEMENT
FABRIC
DESIGNER TO VERIFY EXTENT OF DETAILING
STRATHFIELD TRIANGLE
DETAILS SHEET 3
TaylorThomsonWhitting
Consulting Engineers
131373
C11
P6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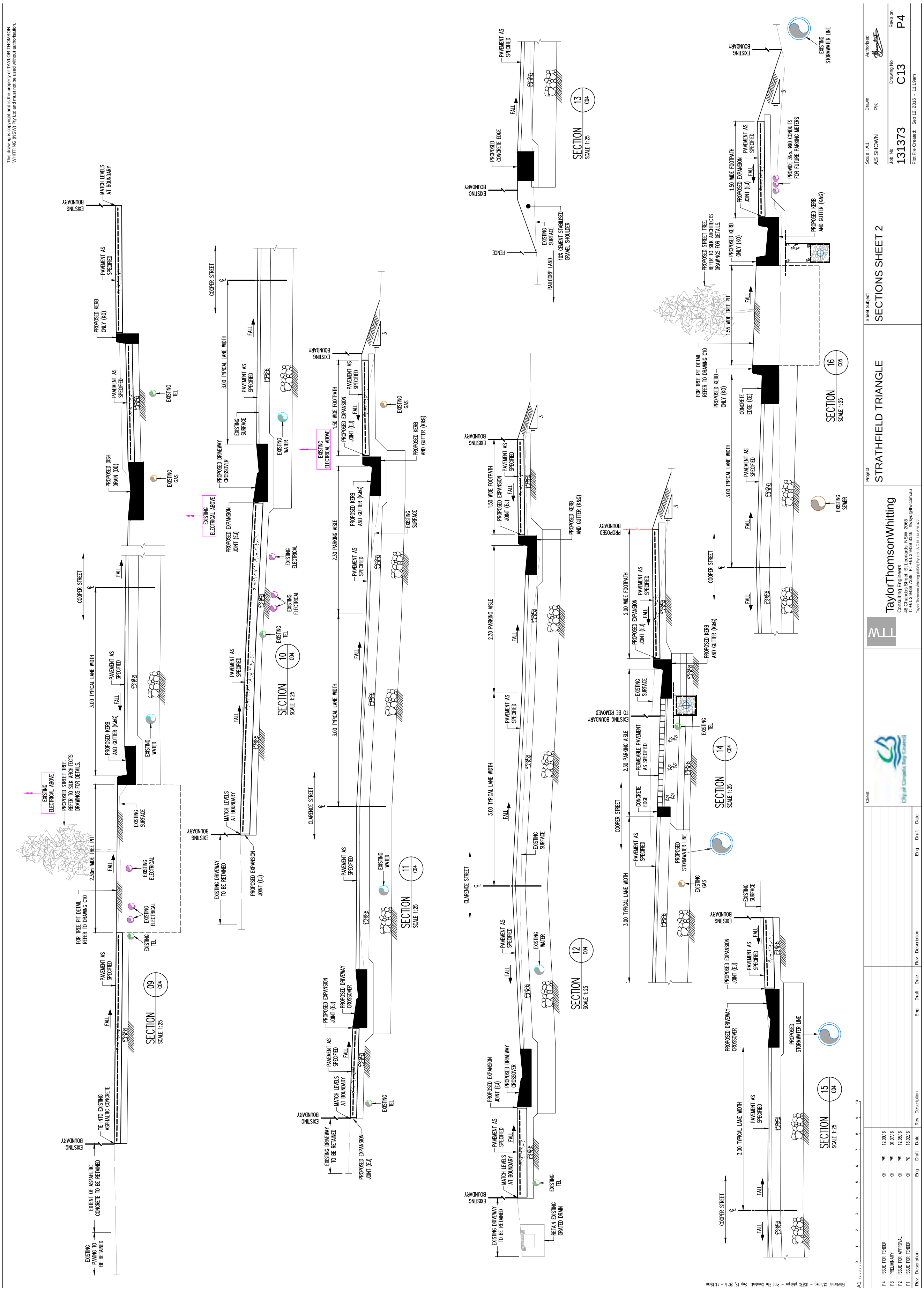
SECTION 02 C02 SCALE 1:25
SECTION 03 C02 SCALE 1:25
SECTION 04 C02 SCALE 1:25
SECTION 05 C02 SCALE 1:25
SECTION 06 C02 SCALE 1:25
SECTION 07 C02 SCALE 1:25
SECTION 08 C04 SCALE 1:25
HILTS ROAD
LEICESTER LANE
TaylorThomsonWhitting
STRATHFIELD TRIANGLE
SECTIONS SHEET 1
AS SHOWN
PK
131373
C12
P4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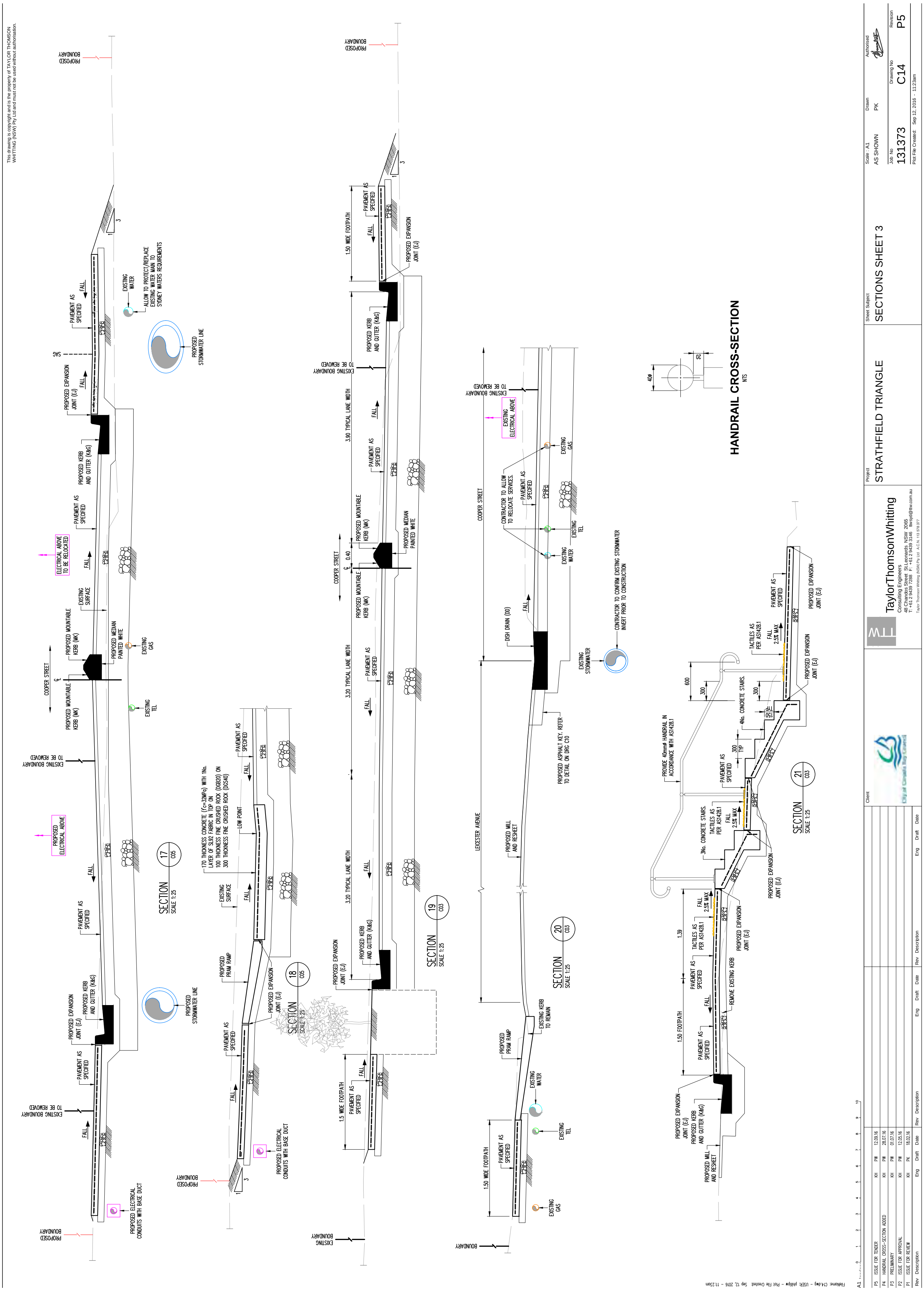
SECTION 10 C04 SCALE 1:25
SECTION 11 C04 SCALE 1:25
SECTION 12 C04 SCALE 1:25
SECTION 13 C04 SCALE 1:25
SECTION 14 C04 SCALE 1:25
SECTION 15 C04 SCALE 1:25
SECTION 16 C05 SCALE 1:25
STRATHFIELD TRIANGLE
SECTIONS SHEET 2
TaylorThomsonWhitting
131373
C13
P4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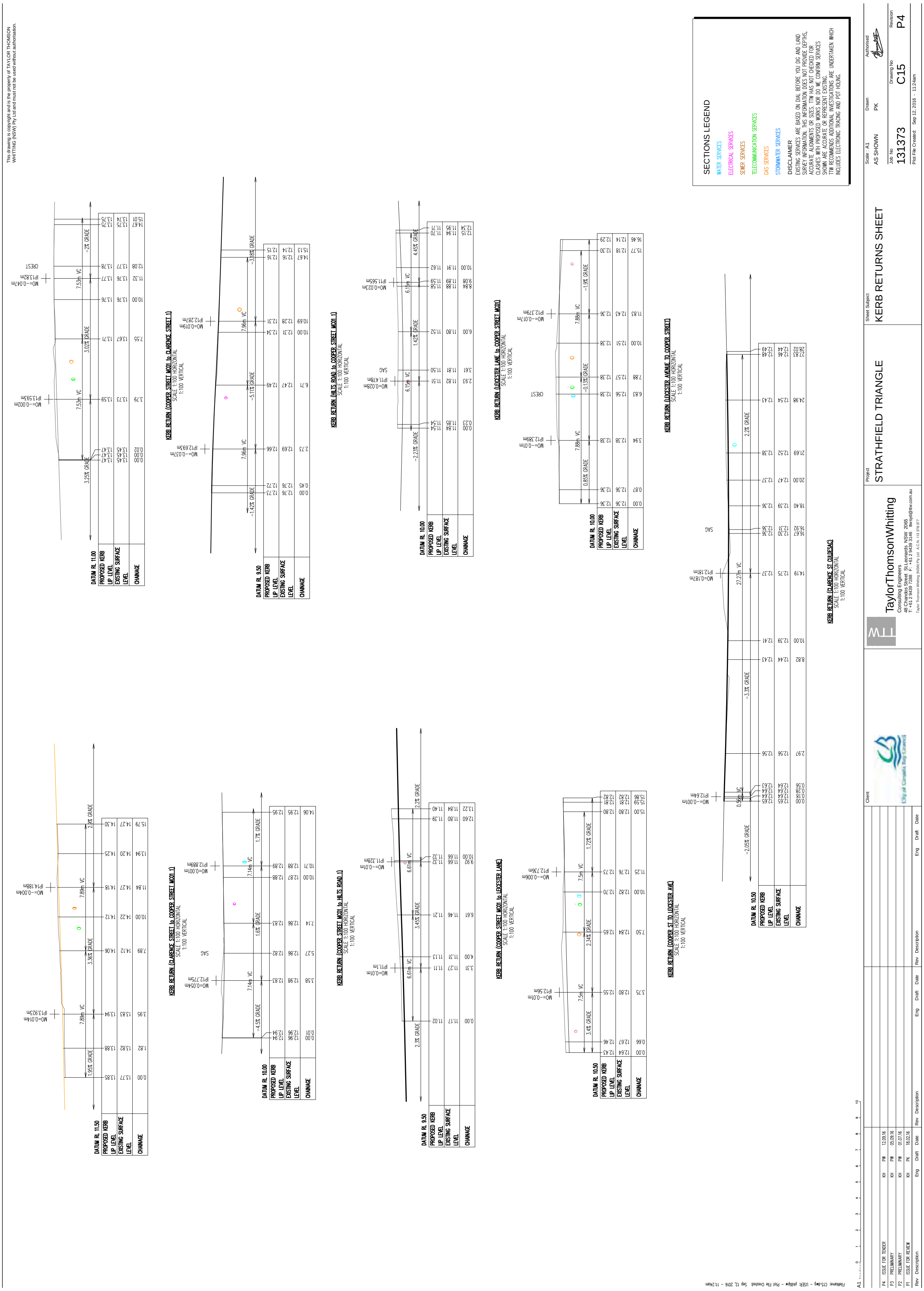
STRATHFIELD TRIANGLE
SECTIONS SHEET 3
TaylorThomsonWhitting
131373
C14
P5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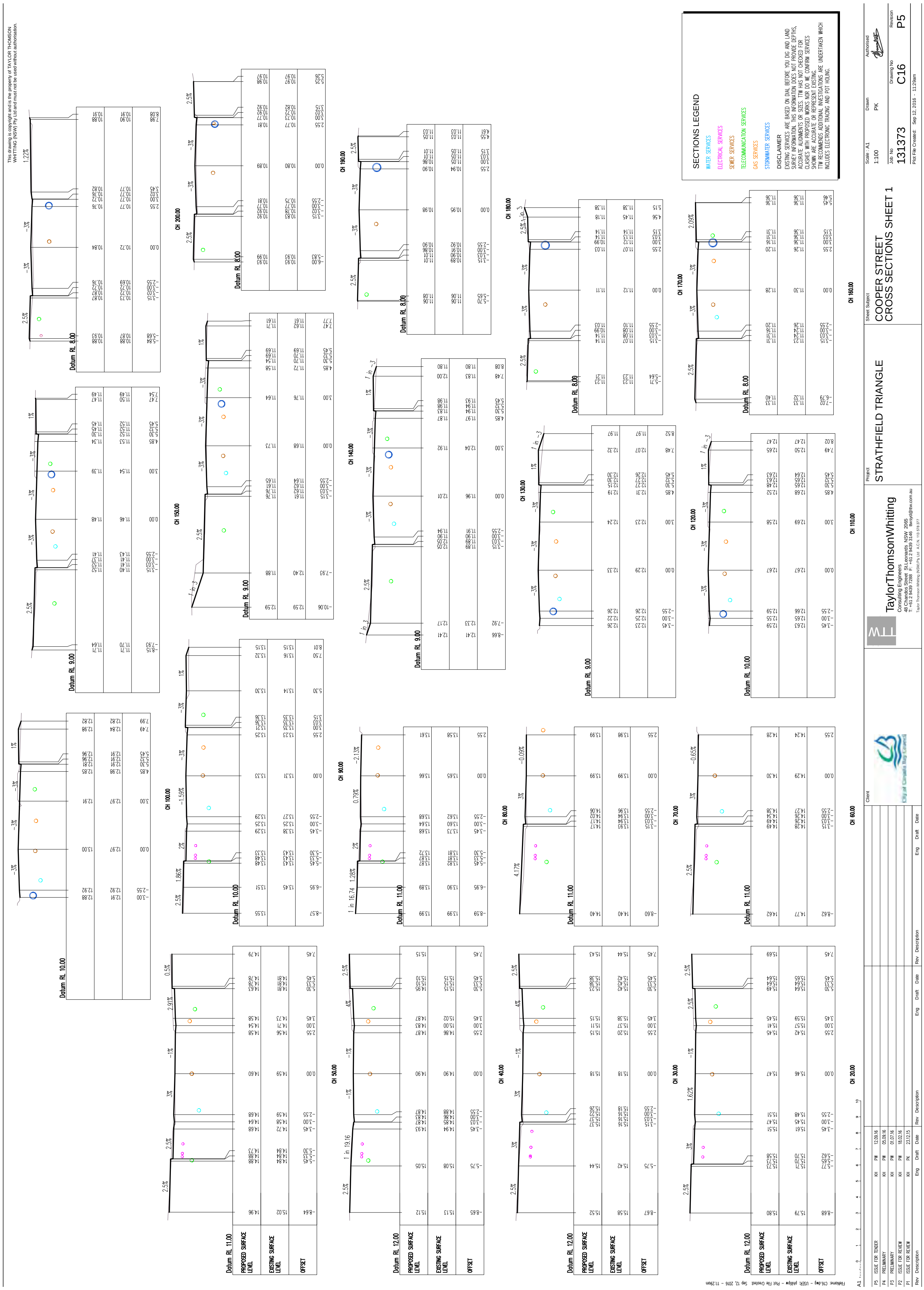
ELECTRICAL SERVICES
SEWER SERVICES
TELECOMMUNICATION SERVICES
GAS SERVICES
STORMWATER SERVICES
TaylorThomsonWhitting
STRATHFIELD TRIANGLE
KERB RETURNS SHEET
AS SHOWN
PK
131373
C15
P4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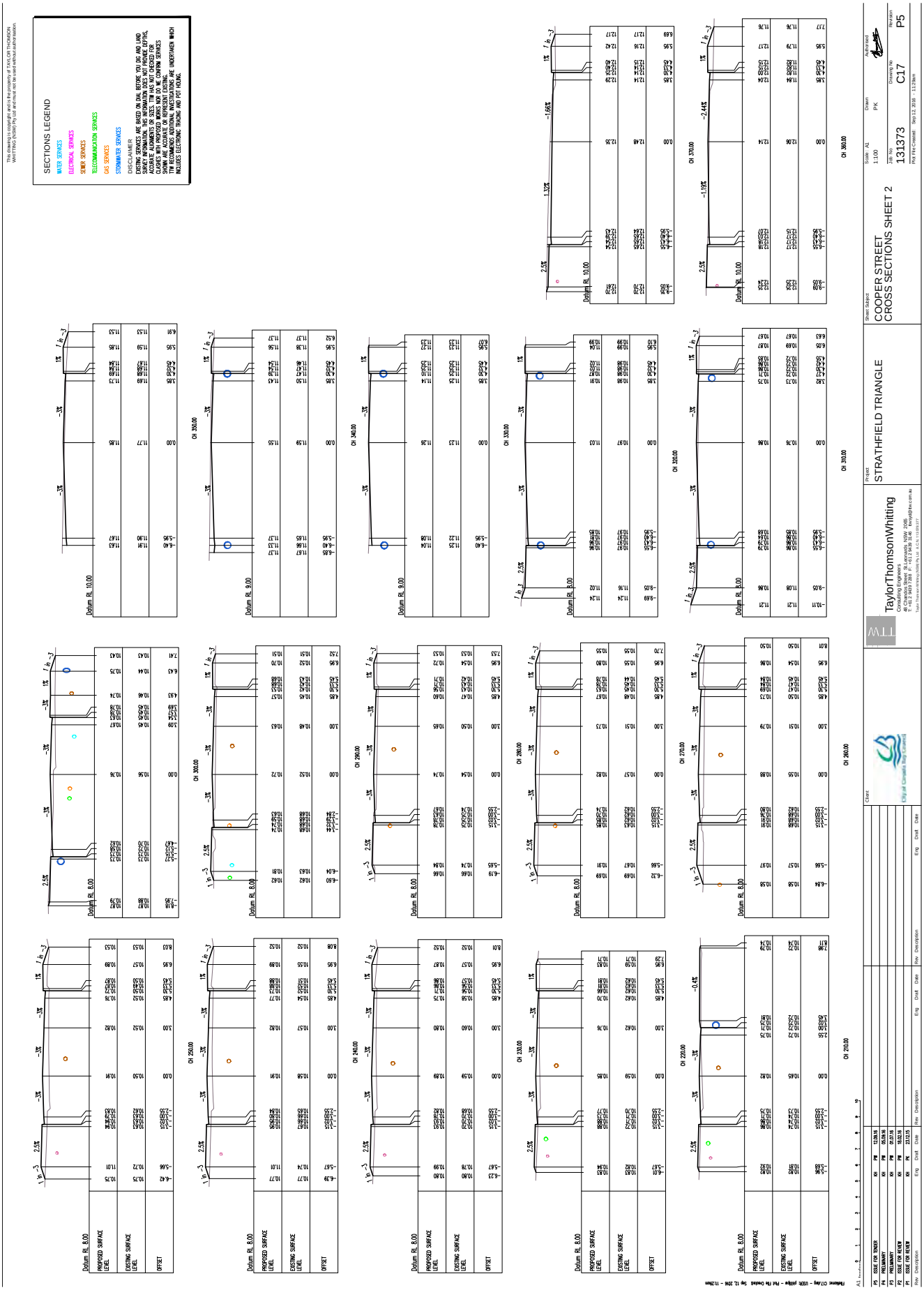
COOPER STREET
CROSS SECTIONS SHEET 1
STRATHFIELD TRIANGLE
TaylorThomsonWhitting
131373
C16
P5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WATER SERVICES
ELECTRICAL SERVICES
SEWER SERVICES
TELECOMMUNICATION SERVICES
GAS SERVICES
STORMWATER SERVICES
DISCLAIMER
EXISTING SERVICES ARE BASED ON DIAL BEFORE YOU DIG AND LAND SURVEY INFORMATION. THIS INFORMATION DOES NOT PROVIDE DEPTHS, ACCURATE ALIGNMENTS OR SIZES AND IS NOT SUFFICIENT TO CLASSIFY ALL HAZARDS AND CONSTRAINTS. SERVICES SHOWN ARE ACCURATE OR REPRESENT EXISTING.
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Datum RL 10.00
Datum RL 9.00
Datum RL 8.00
CH 380.00
CH 370.00
CH 360.00
CH 350.00
CH 340.00
CH 330.00
CH 320.00
CH 310.00
CH 300.00
CH 290.00
CH 280.00
CH 270.00
CH 260.00
CH 250.00
CH 240.00
CH 230.00
CH 220.00
CH 210.00
PROPOSED SURFACE LEVEL
EXISTING SURFACE LEVEL
OFFSET
Client
Project
STRATHFIELD TRIANGLE
Sheet Subject
COOPER STREET
CROSS SECTIONS SHEET 2
Scale: A1 1:100
Drawn PK
Job No 131373
Drawing No C17
Revision P5
Plot File Created: Sep 12, 2018 - 1:23pm
Authorised
TaylorThomsonWhitting
Consulting Engineers
48 Chandos Street St Leonards NSW 2065
Ph: (02) 9439 5533 Fax: (02) 9439 5544 Email: tsa@ttw.com.au
P5 ISSUE FOR TENDER KH PM 12.09.18
P4 PRELIMINARY KH PM 10.07.18
P3 ISSUE FOR REVIEW KH PM 18.02.18
P2 ISSUE FOR REVIEW KH PK 23.12.15
P1 ISSUE FOR REVIEW KH PK 23.11.15
Rev Description Eng Draft Date
Filename: C17.dwg - ISSUE - Jobno - Rev - File Created: Sep 12, 2018 - 1:23pm


SECTIONS LEGEND
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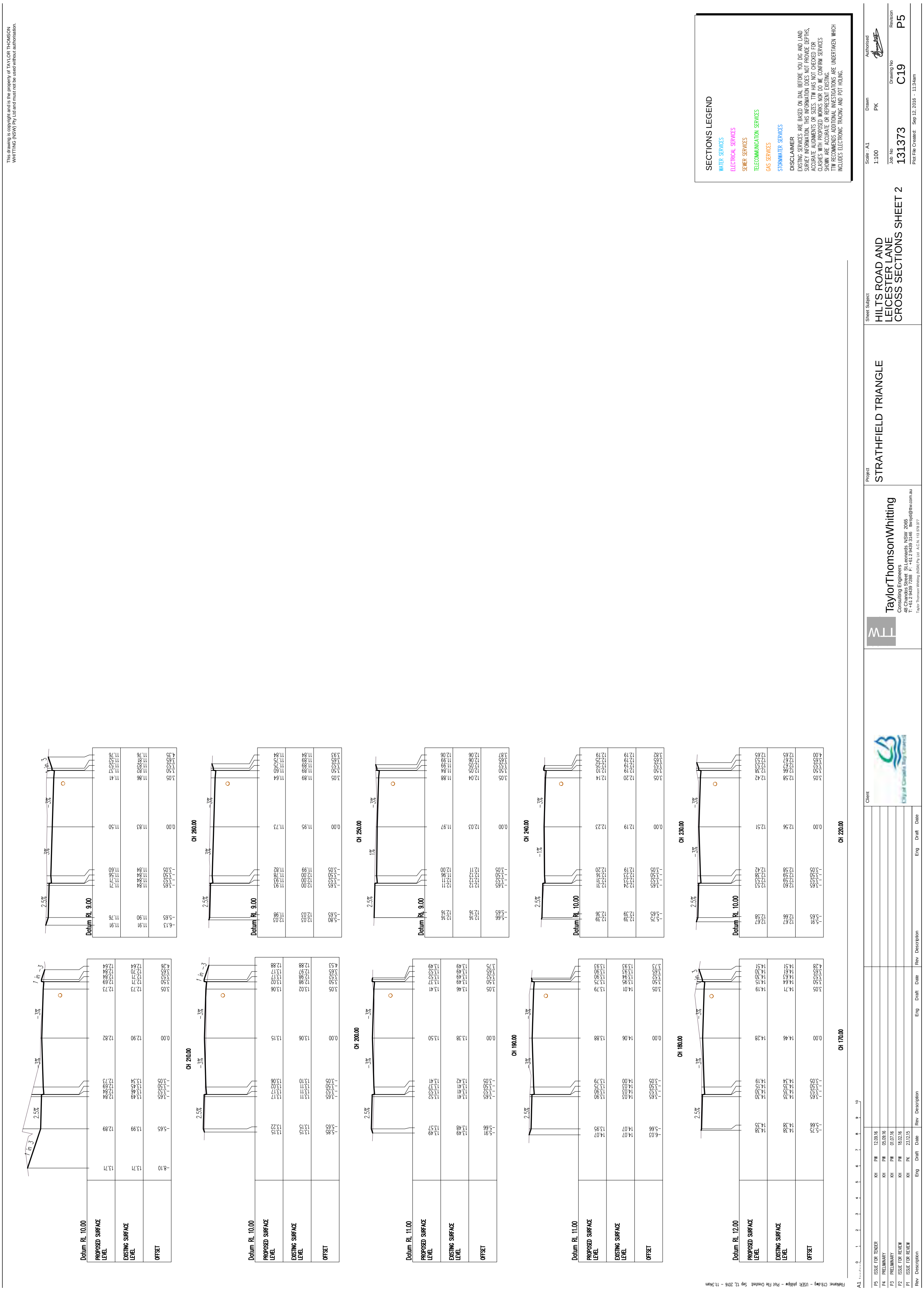
ELECTRICAL SERVICES
SEWER SERVICES
TELECOMMUNICATION SERVICES
GAS SERVICES
STORMWATER SERVICES
DISCLAIMER
STRATHFIELD TRIANGLE
HILTS ROAD AND
LEICESTER LANE
CROSS SECTIONS SHEET 1
TaylorThomsonWhitting
131373
C18
P5
1:100
PK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ELECTRICAL SERVICES
SEWER SERVICES
TELECOMMUNICATION SERVICES
GAS SERVICES
STORMWATER SERVICES
DISCLAIMER
TaylorThomsonWhitting
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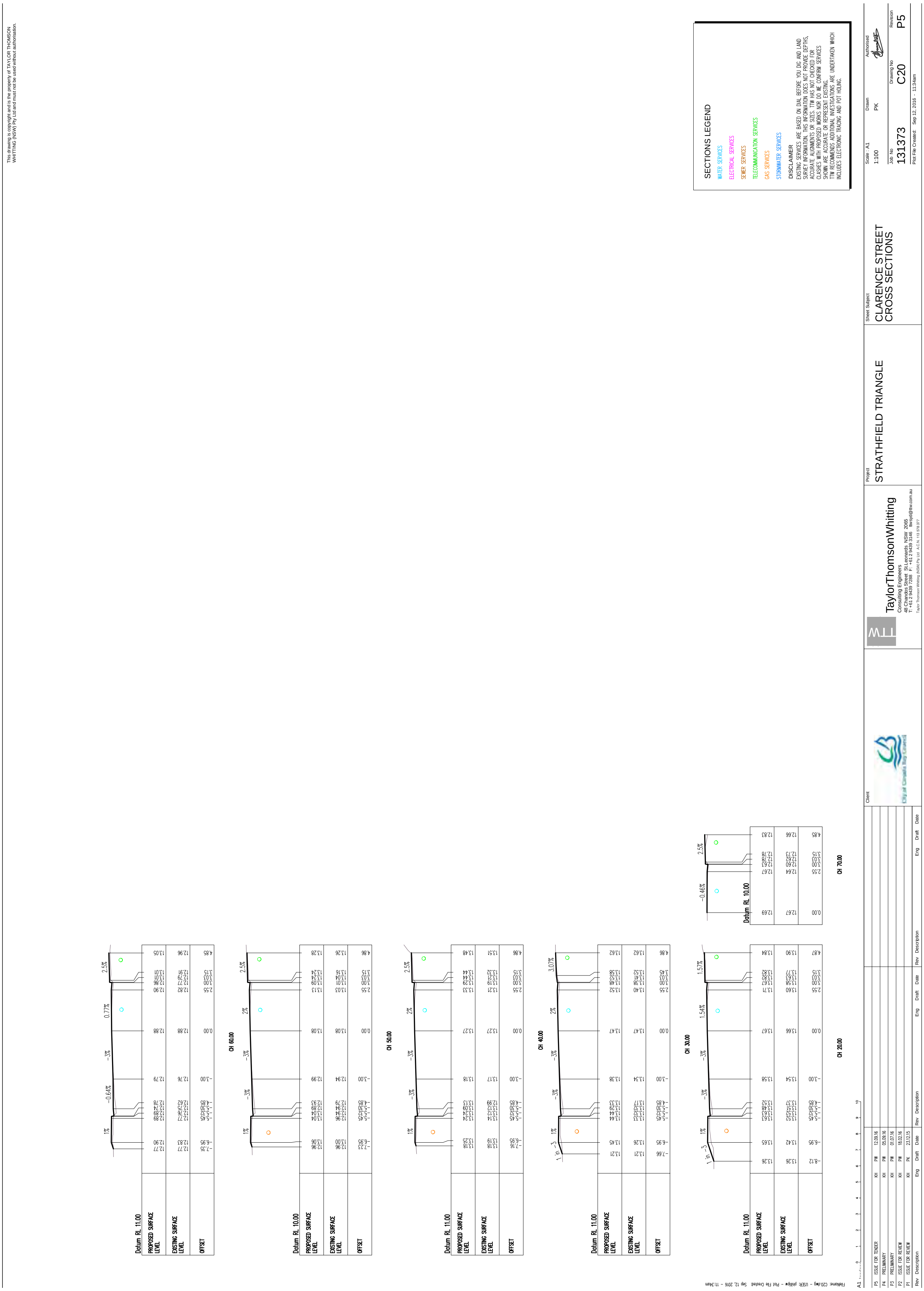
HILTS ROAD AND
LEICESTER LANE
CROSS SECTIONS SHEET 2
1:100
PK
131373
C19
P5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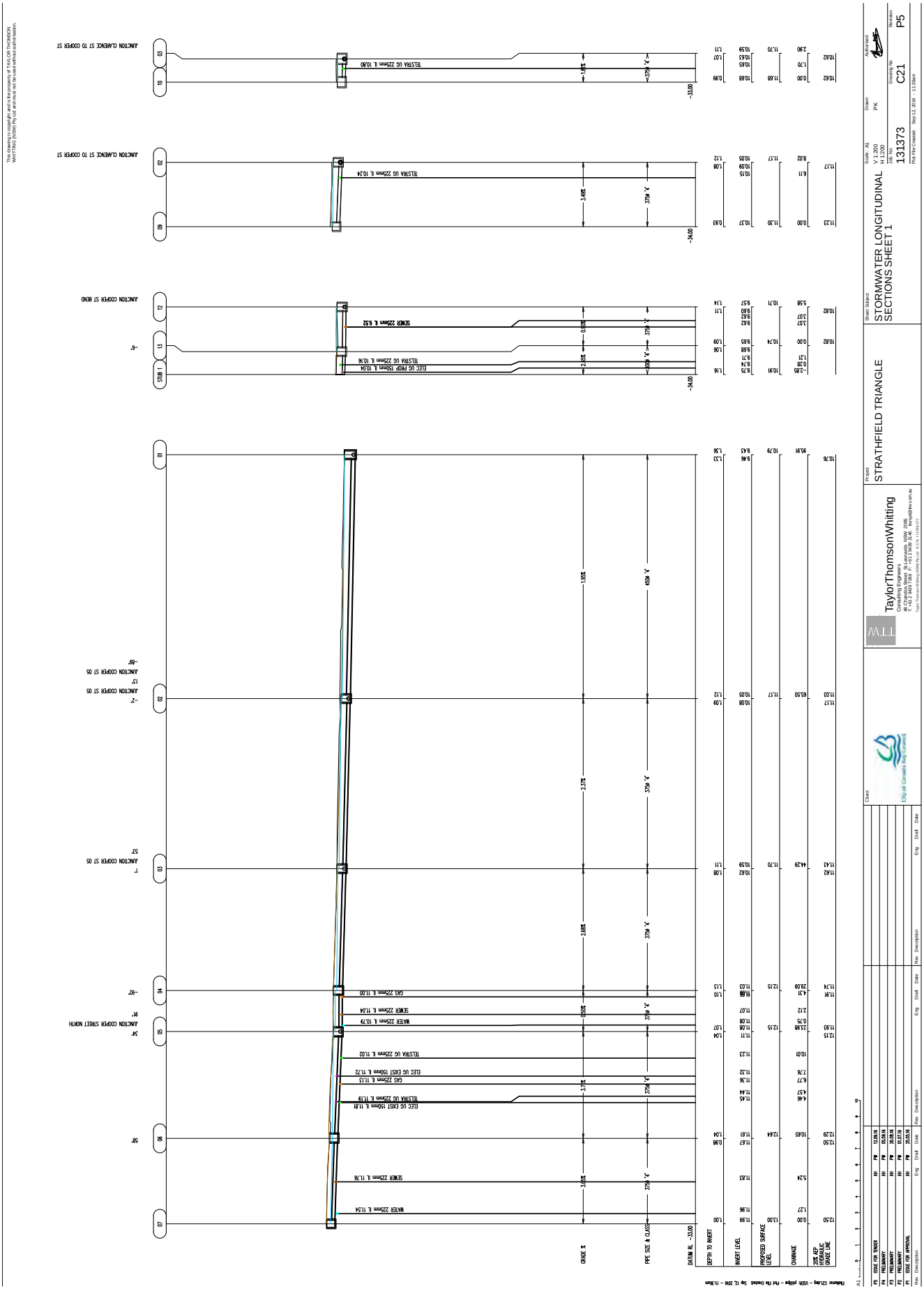
CLARENCE STREET
CROSS SECTIONS
TaylorThomsonWhitting
131373
C20
P5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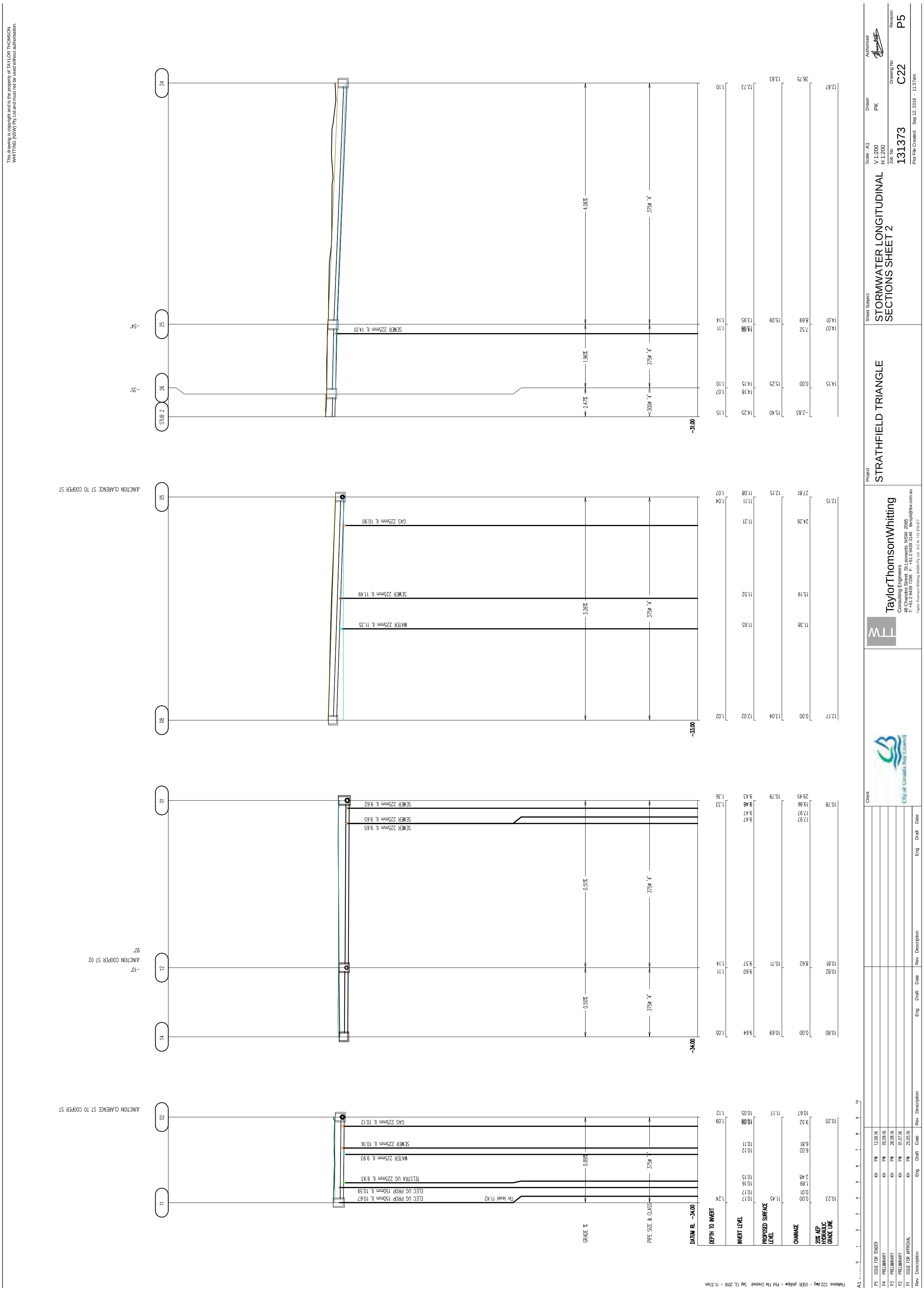
STORMWATER LONGITUDINAL SECTIONS SHEET 1
TaylorThomsonWhitting
Consulting Engineers
131373
C21
P5
JUNCTION CLARENCE ST TO COOPER ST
JUNCTION COOPER ST 66ND
JUNCTION COOPER ST 06
JUNCTION COOPER STREET NORTH
TESTRA US 225mm IL 10.80
TESTRA US 225mm IL 10.24
SEWER 225mm IL 9.52
ELEC US PROP 150mm IL 10.04
TESTRA US 225mm IL 10.36
TESTRA US 225mm IL 11.54
SEWER 225mm IL 11.76
ELEC US EXIST 150mm IL 11.81
TESTRA US 225mm IL 11.19
GAS 225mm IL 11.13
ELEC US EXIST 150mm IL 11.72
TESTRA US 225mm IL 11.02
WATER 225mm IL 10.79
SEWER 225mm IL 11.04
GAS 225mm IL 11.00
DATUM RL -33.00
DEPTH TO INVERT
INVERT LEVEL
PROPOSED SURFACE LEVEL
CHAINAGE
GRADE %
PIPE SIZE & CLASS
P5 ISSUE FOR TENDER
P4 PRELIMINARY
P3 PRELIMINARY
P2 PRELIMINARY
P1 ISSUE FOR APPROVAL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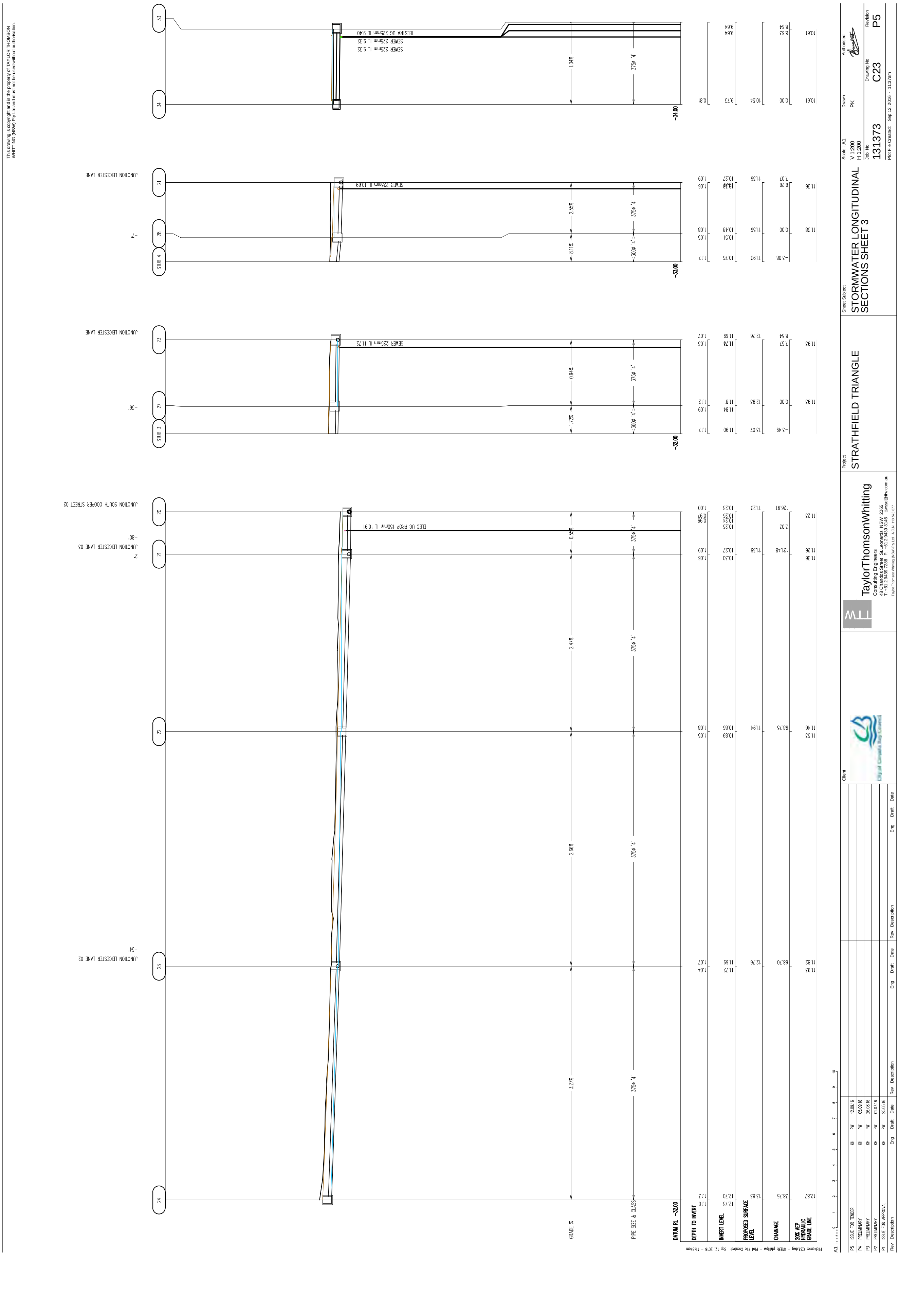
TaylorThomsonWhitting
Consulting Engineers
131373
C22
P5
DATUM RL
DEPTH TO INVERT
INVERT LEVEL
PROPOSED SURFACE LEVEL
CHAINAGE
20% AEP HYDRAULIC GRADE LINE
GRADE %
PIPE SIZE & CLASS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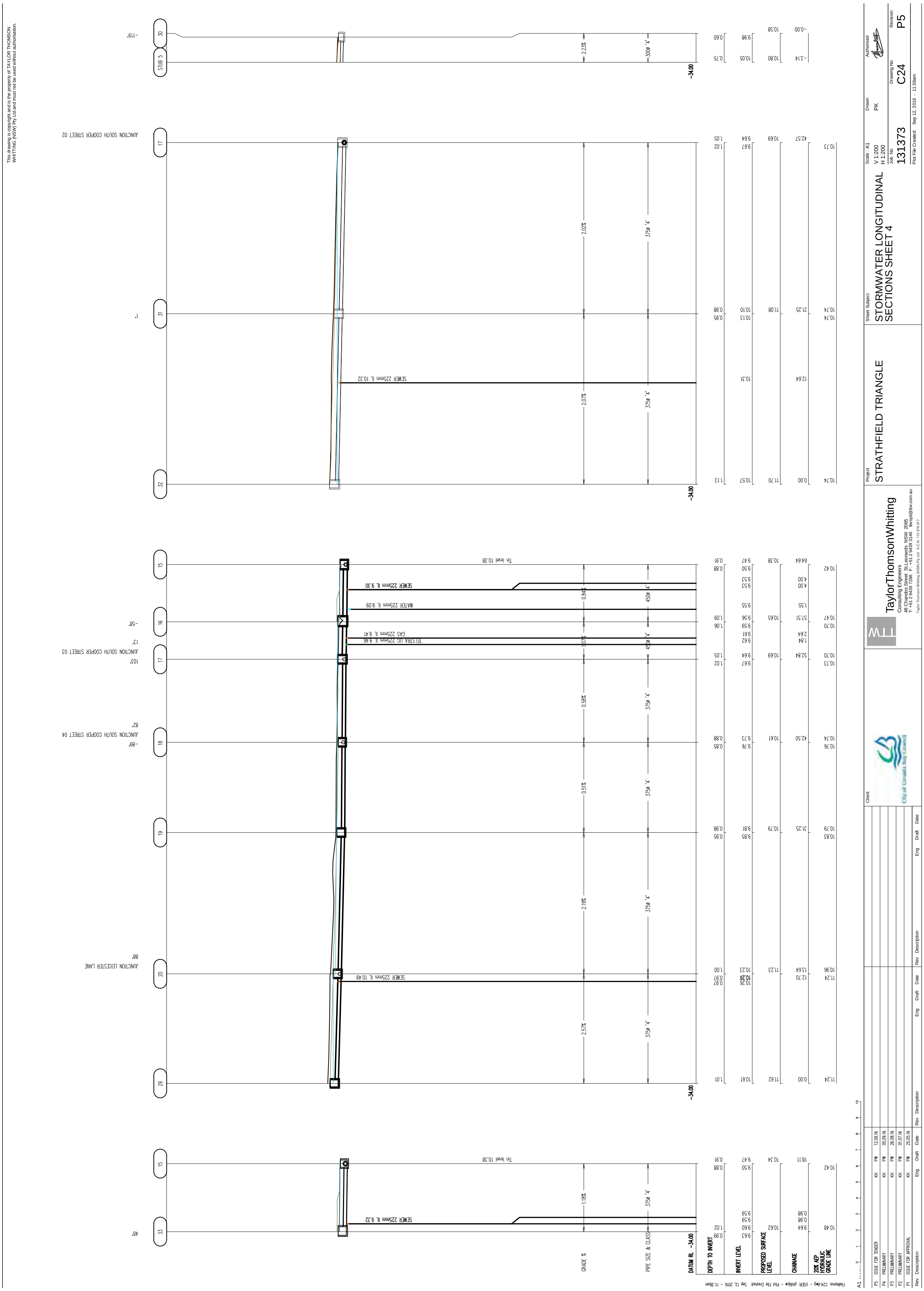
TaylorThomsonWhitting
131373
C23
P5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SECTIONS SHEET 4
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TaylorThomsonWhitting
Consulting Engineers
131373
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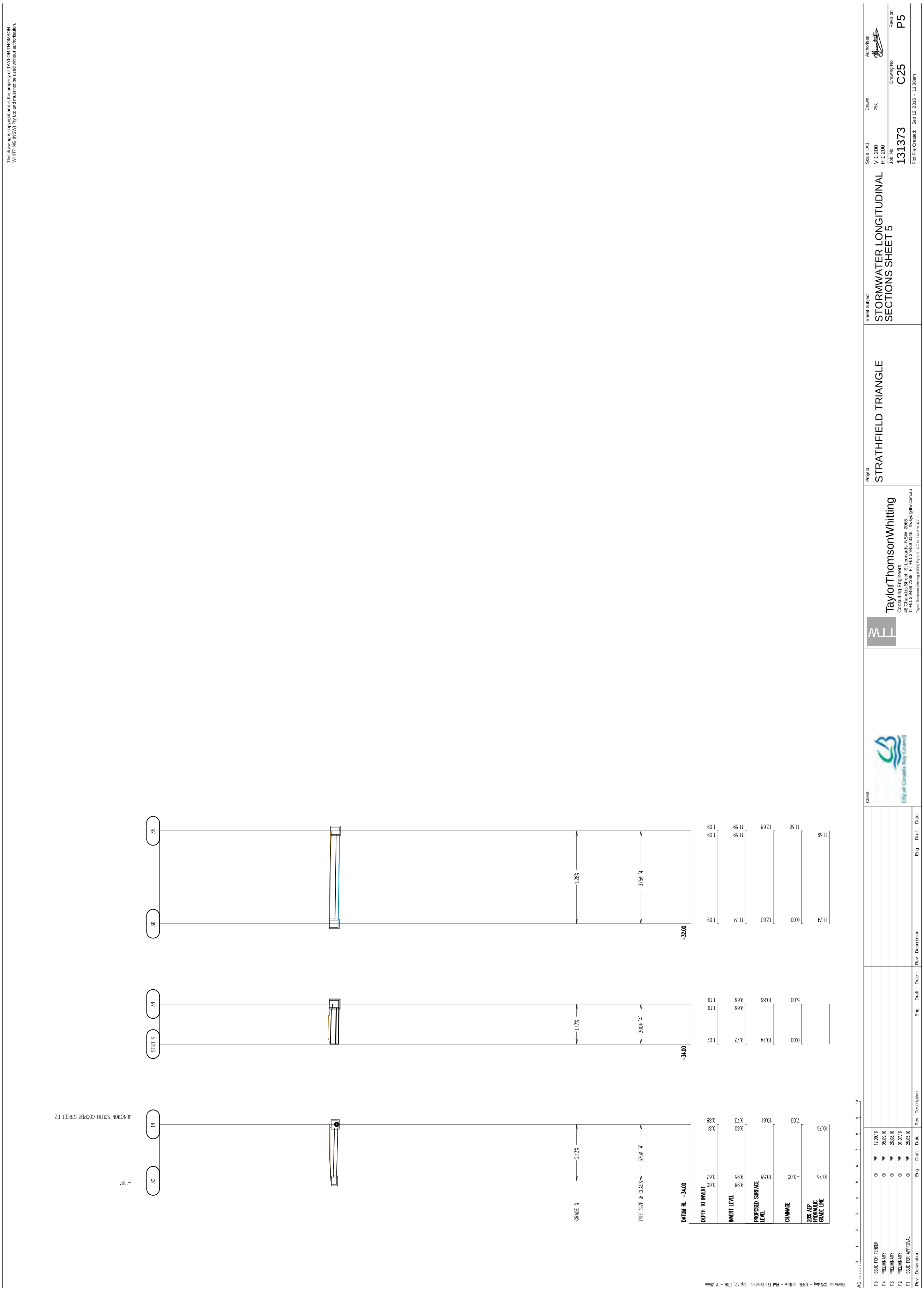
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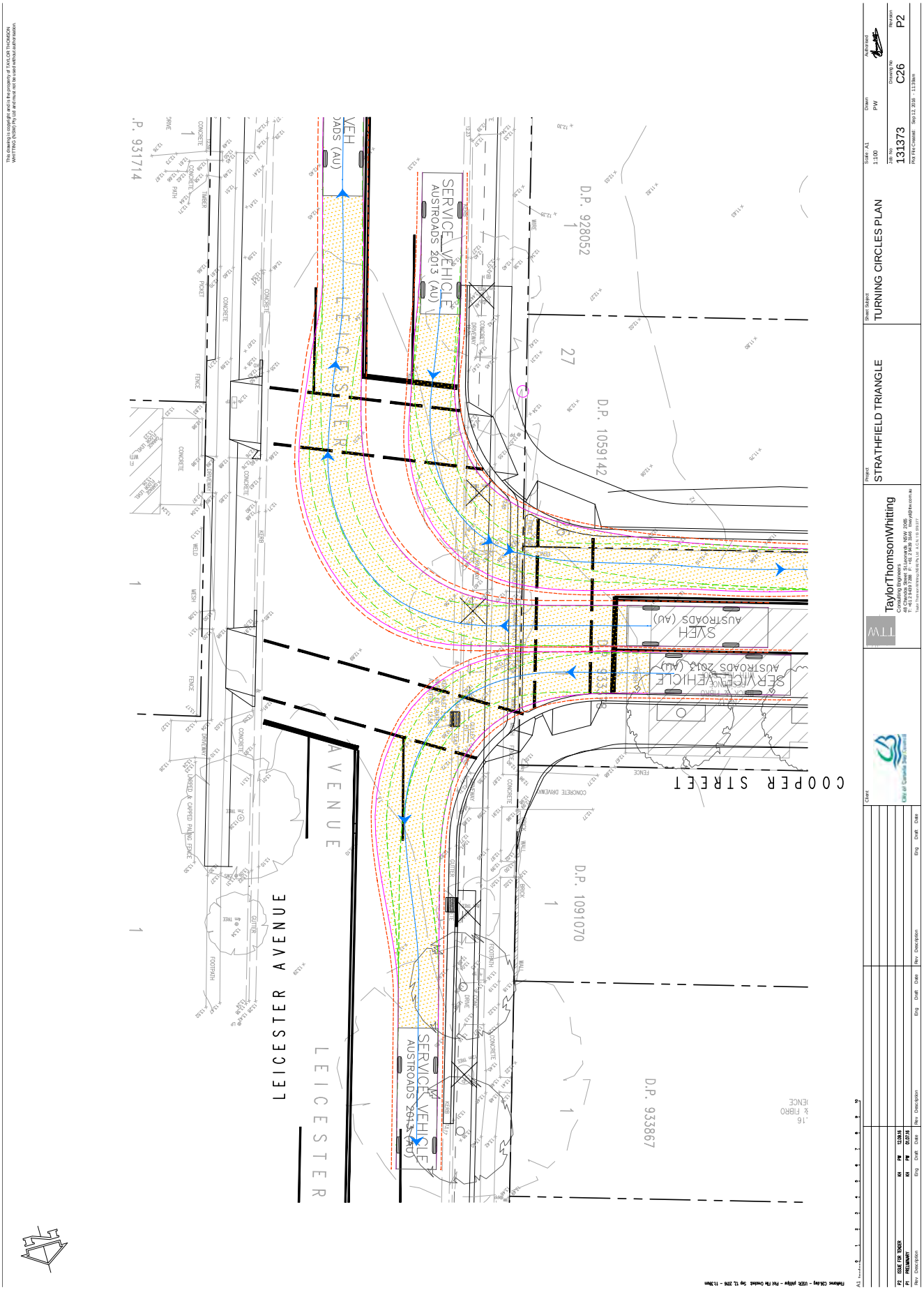
TaylorThomsonWhitting
Consulting Engineers
131373
C25
P5
V 1:200
H 1:200
PK
JUNCTION SOUTH COOPER STREET 02
DATUM RL -34.00
DEPTH TO INVERT
INVERT LEVEL
PROPOSED SURFACE LEVEL
CHAINAGE
20% AEP HYDRAULIC GRADE LINE
GRADE %
PIPE SIZE & CLASS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COOPER STREET
SERVICE VEHICLE
AUSTROADS 2013 (AU)
D.P. 928052
D.P. 105942
D.P. 1091070
D.P. 933867
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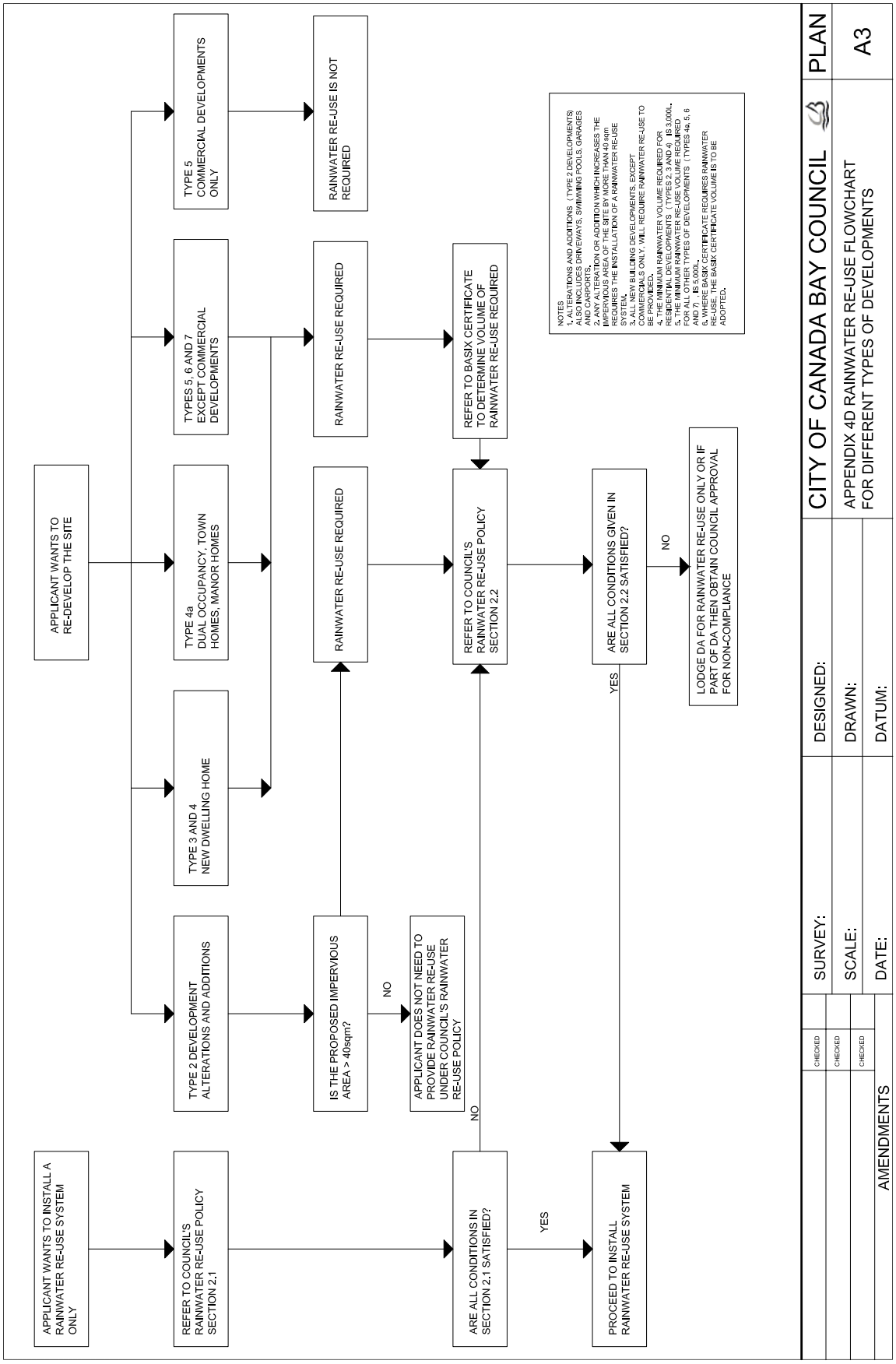
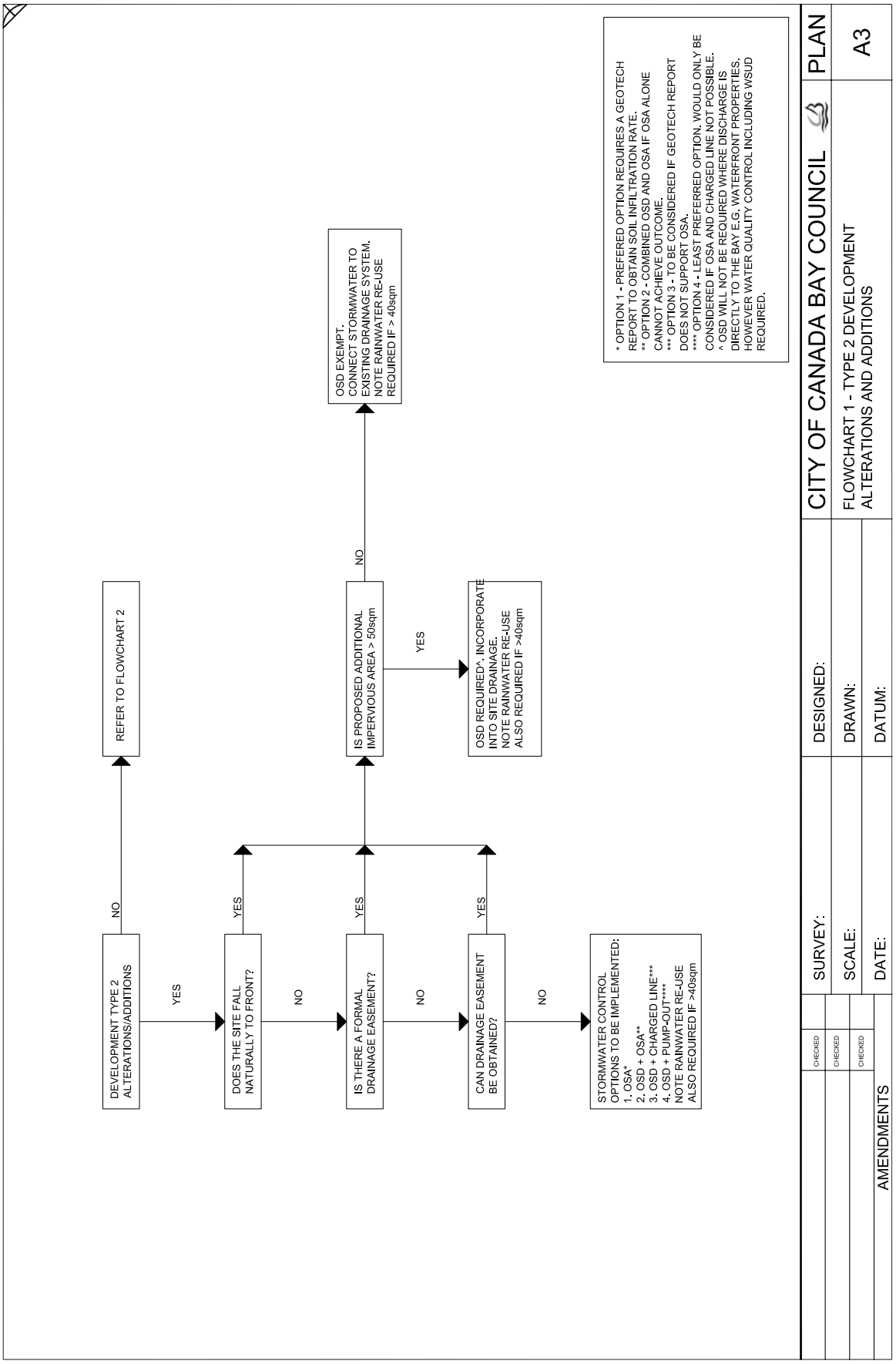
TaylorThomsonWhitting
STRATHFIELD TRIANGLE
TURNING CIRCLES PLAN
Job No 131373
Drawing No C26
Revision P2

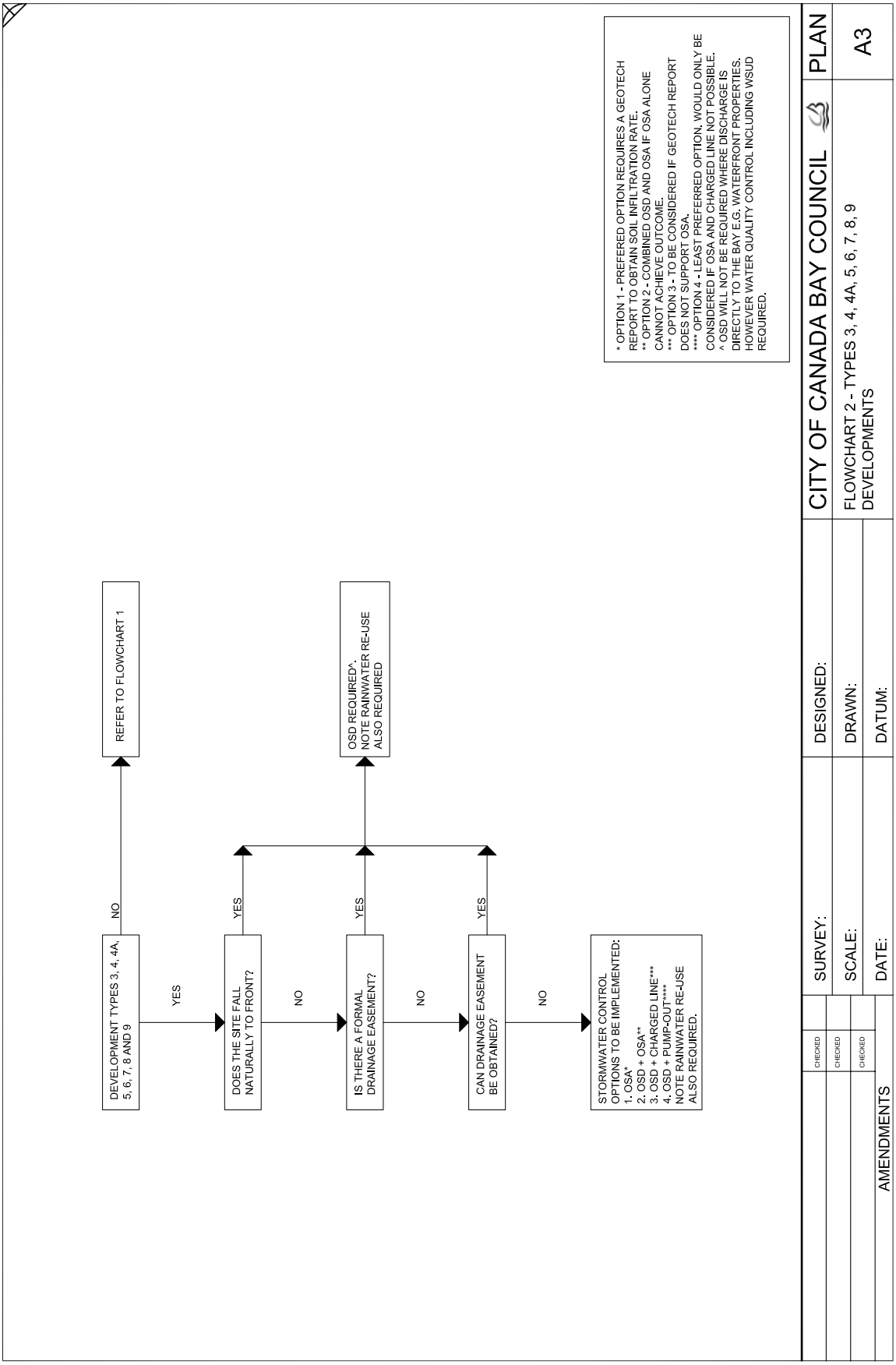
Flow Charts Rainwater Reuse



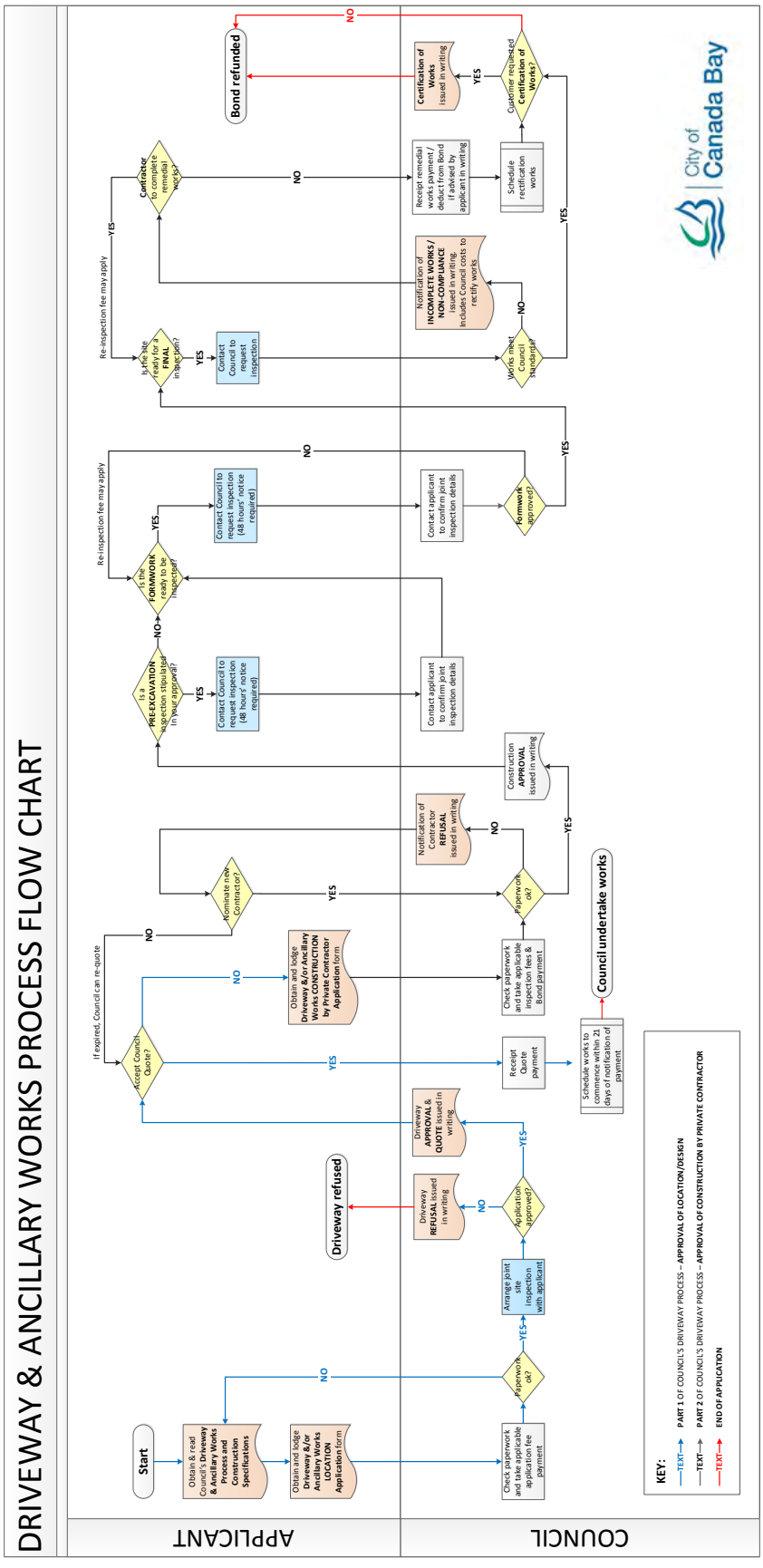
Stormwater Management Type 2 Developments



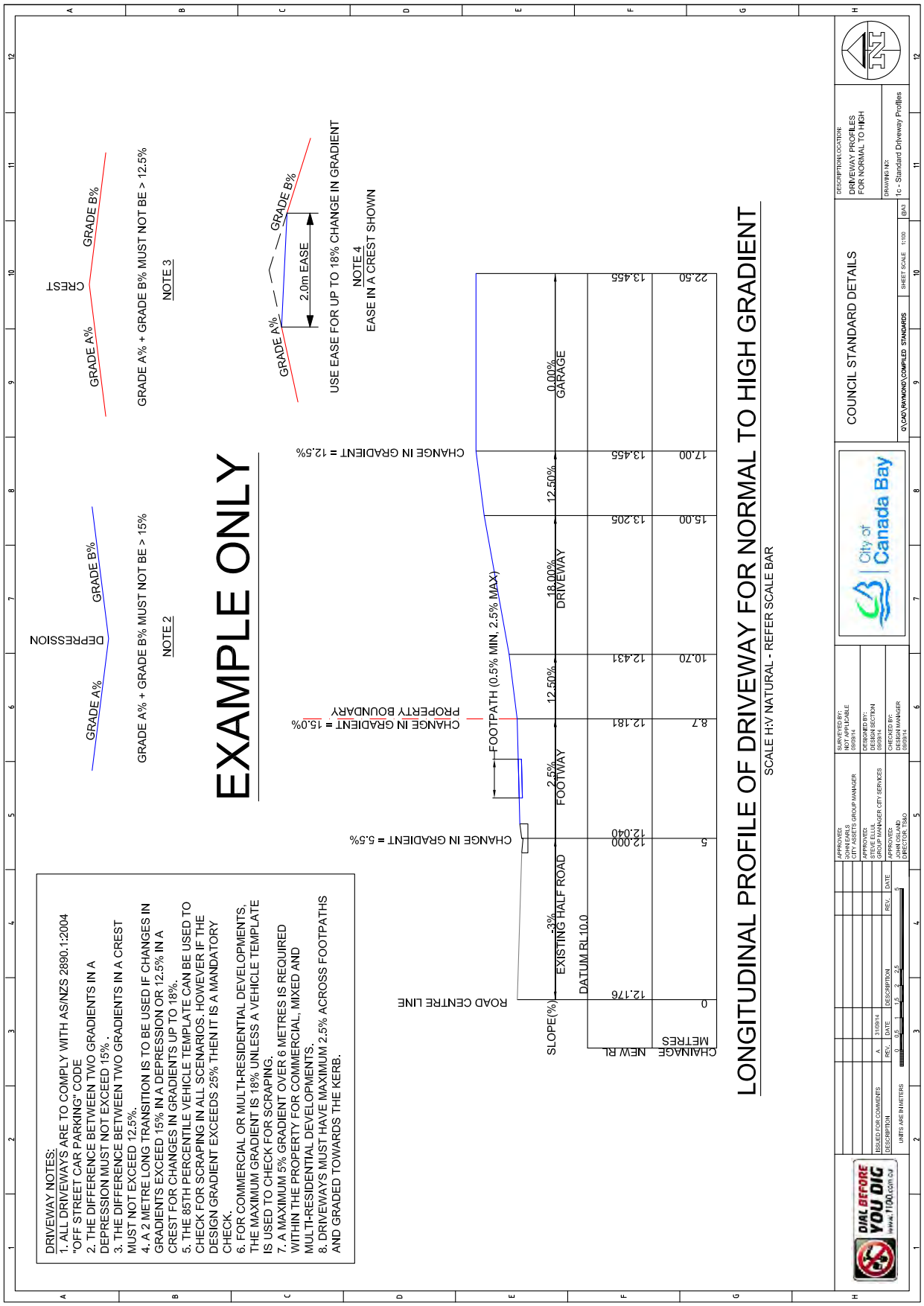
Stormwater Management Type 3 to 9 Developments

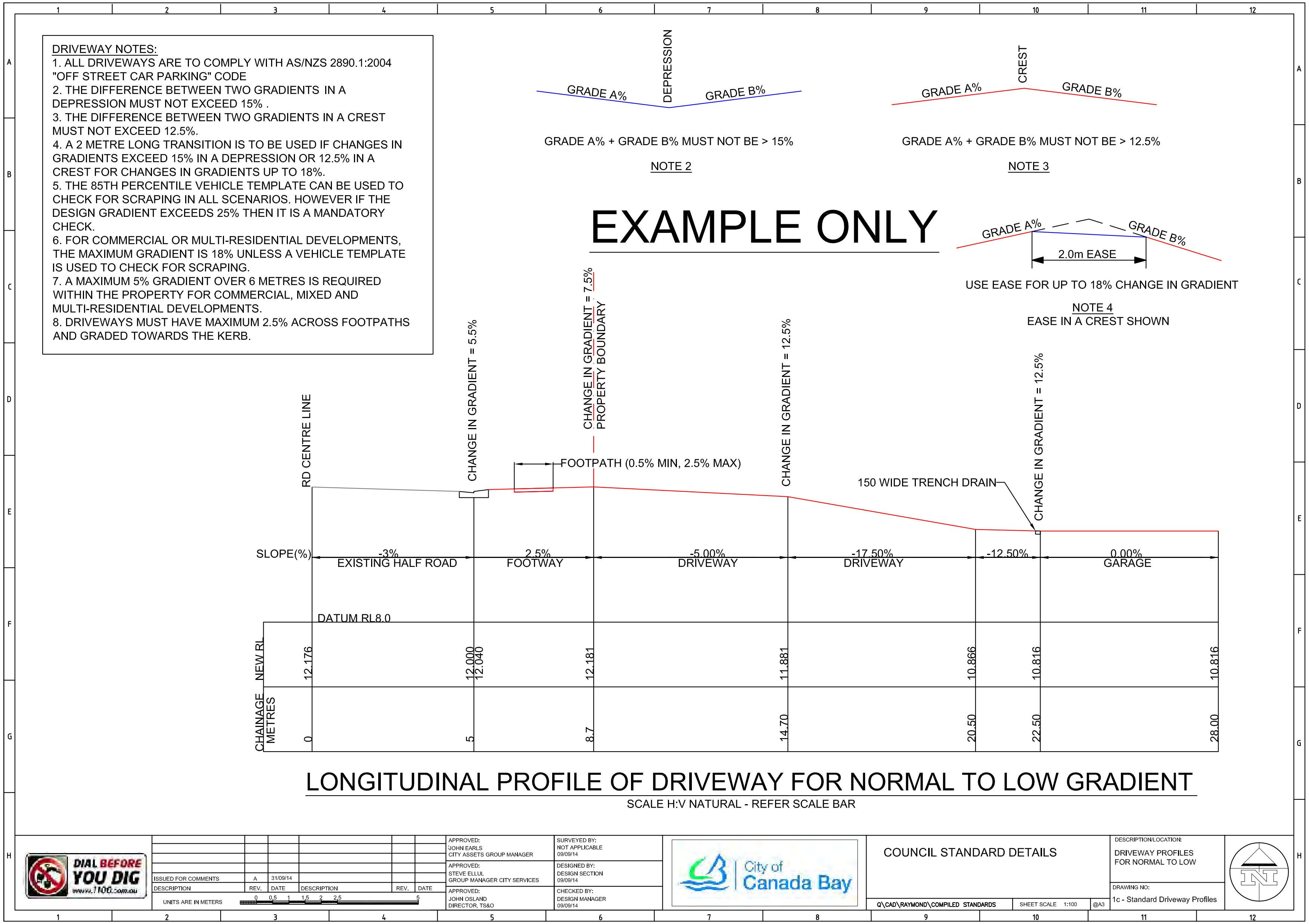


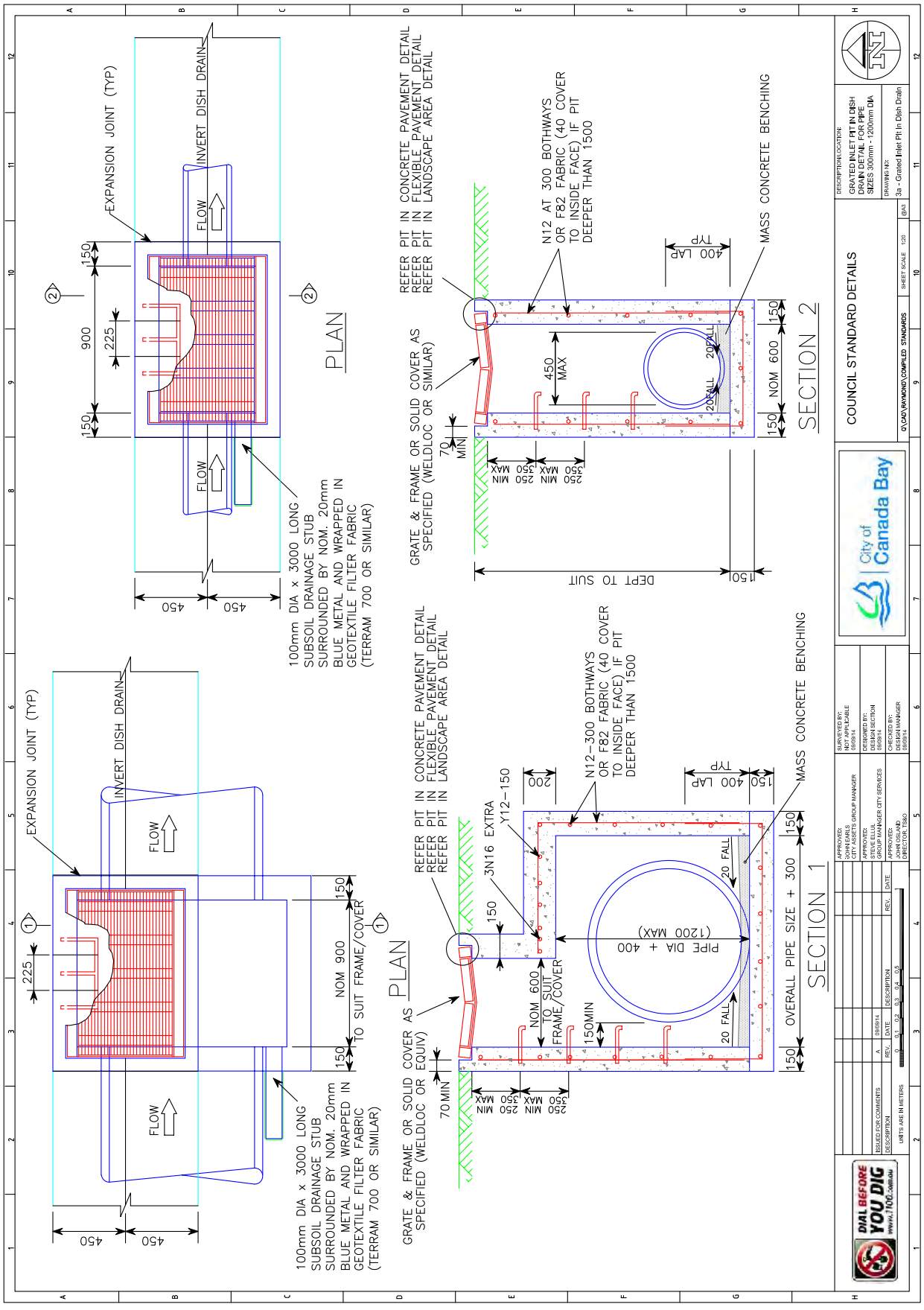
Driveway and Ancillary Works

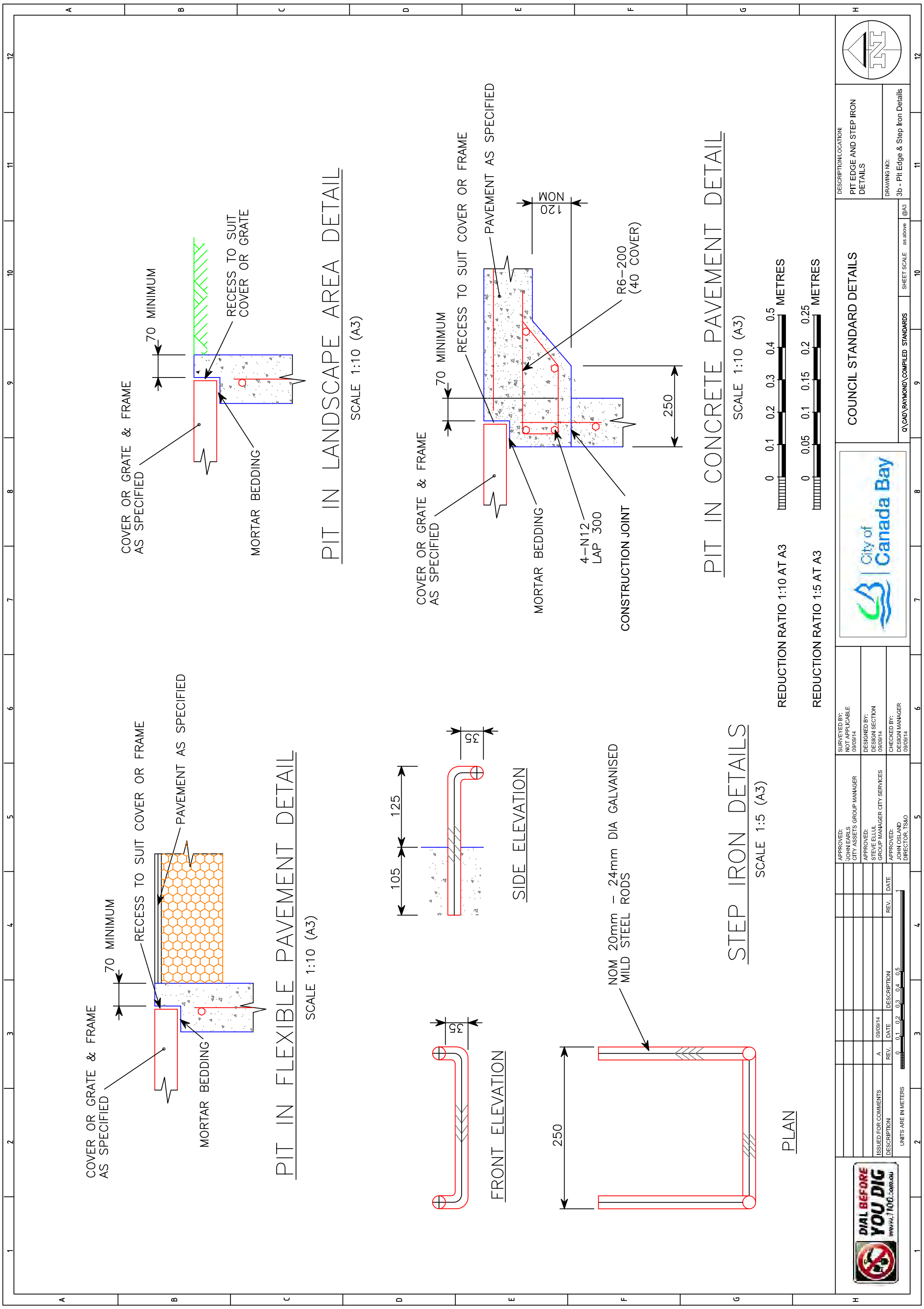


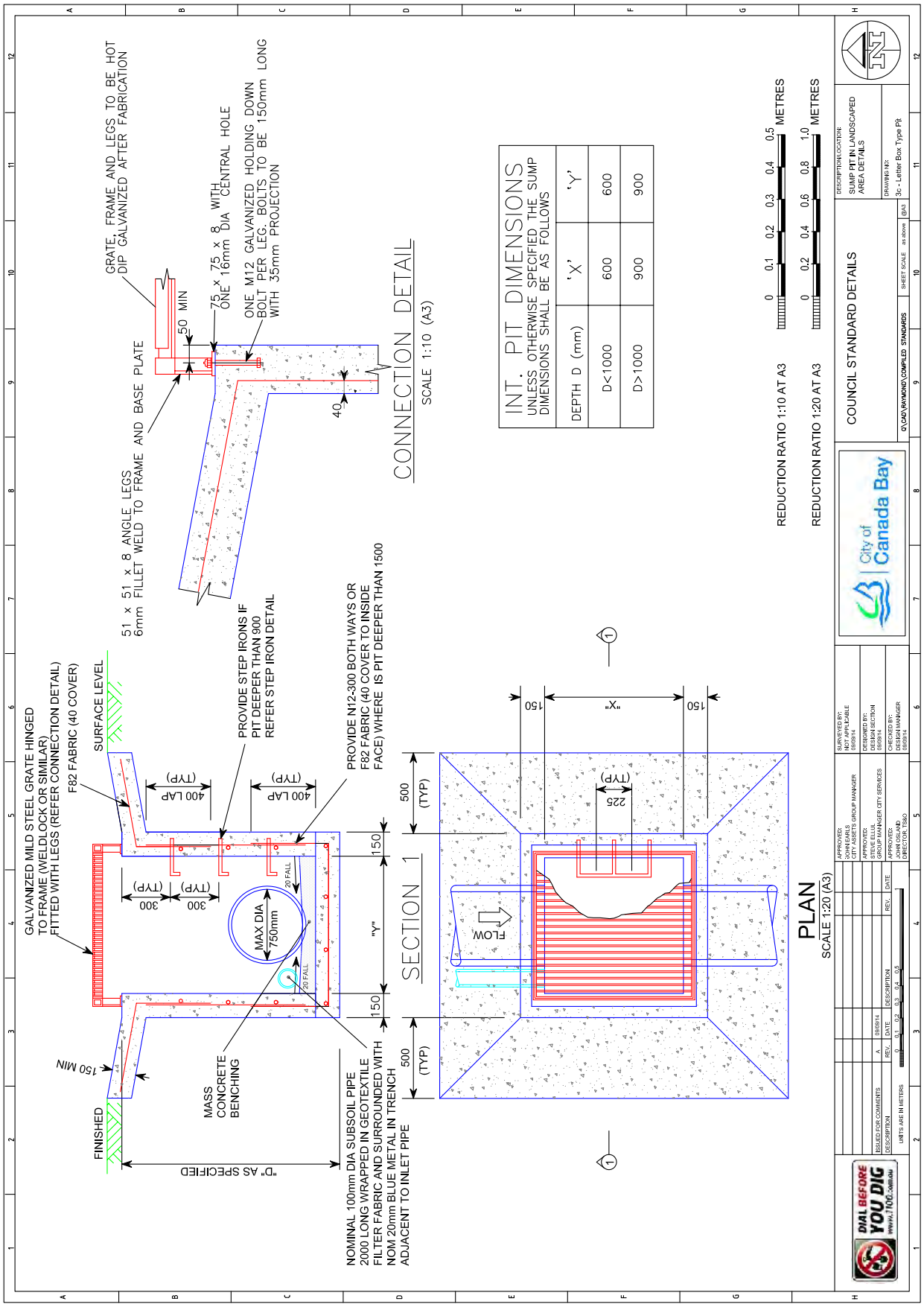
Standard Engineering Drawings

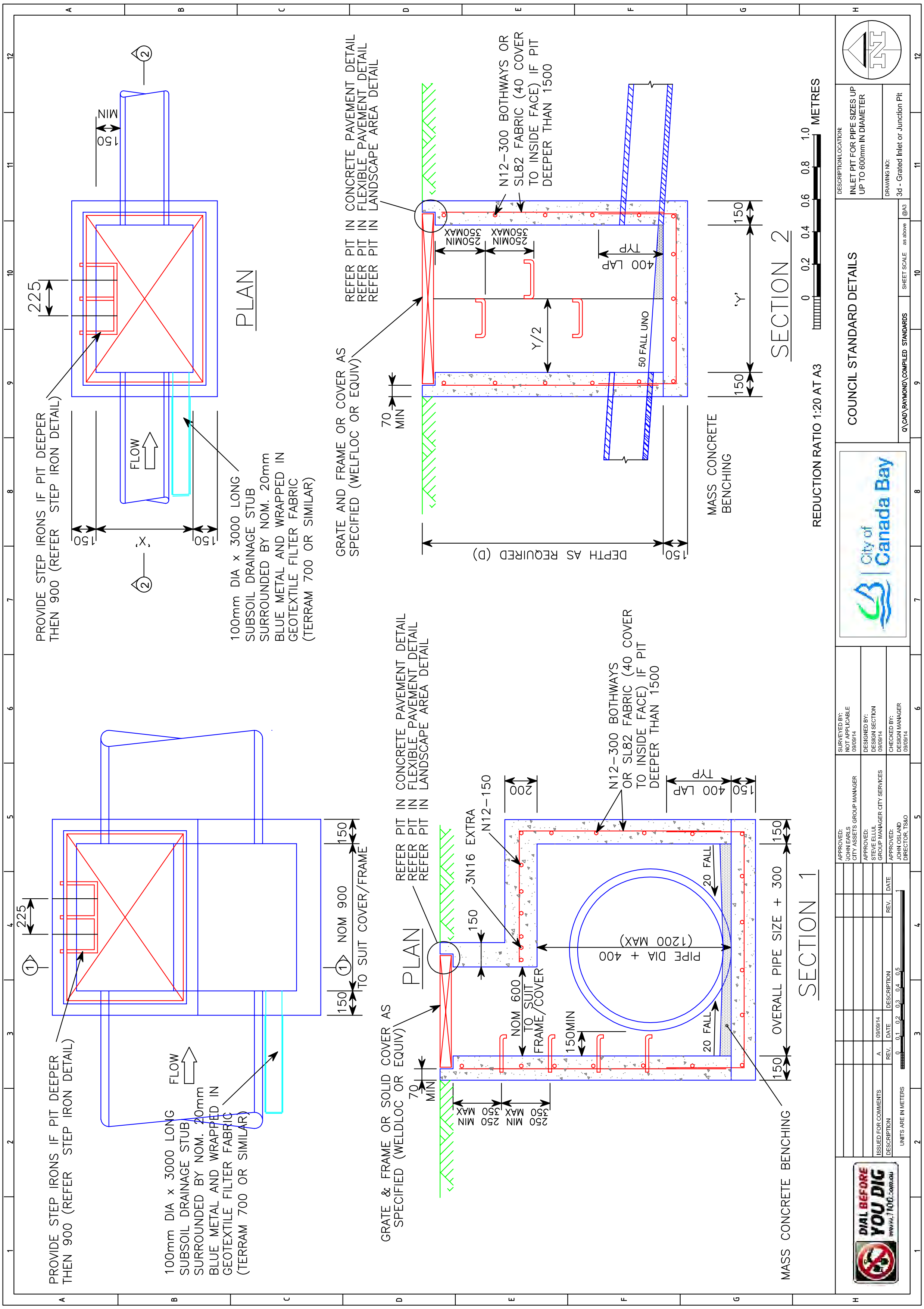


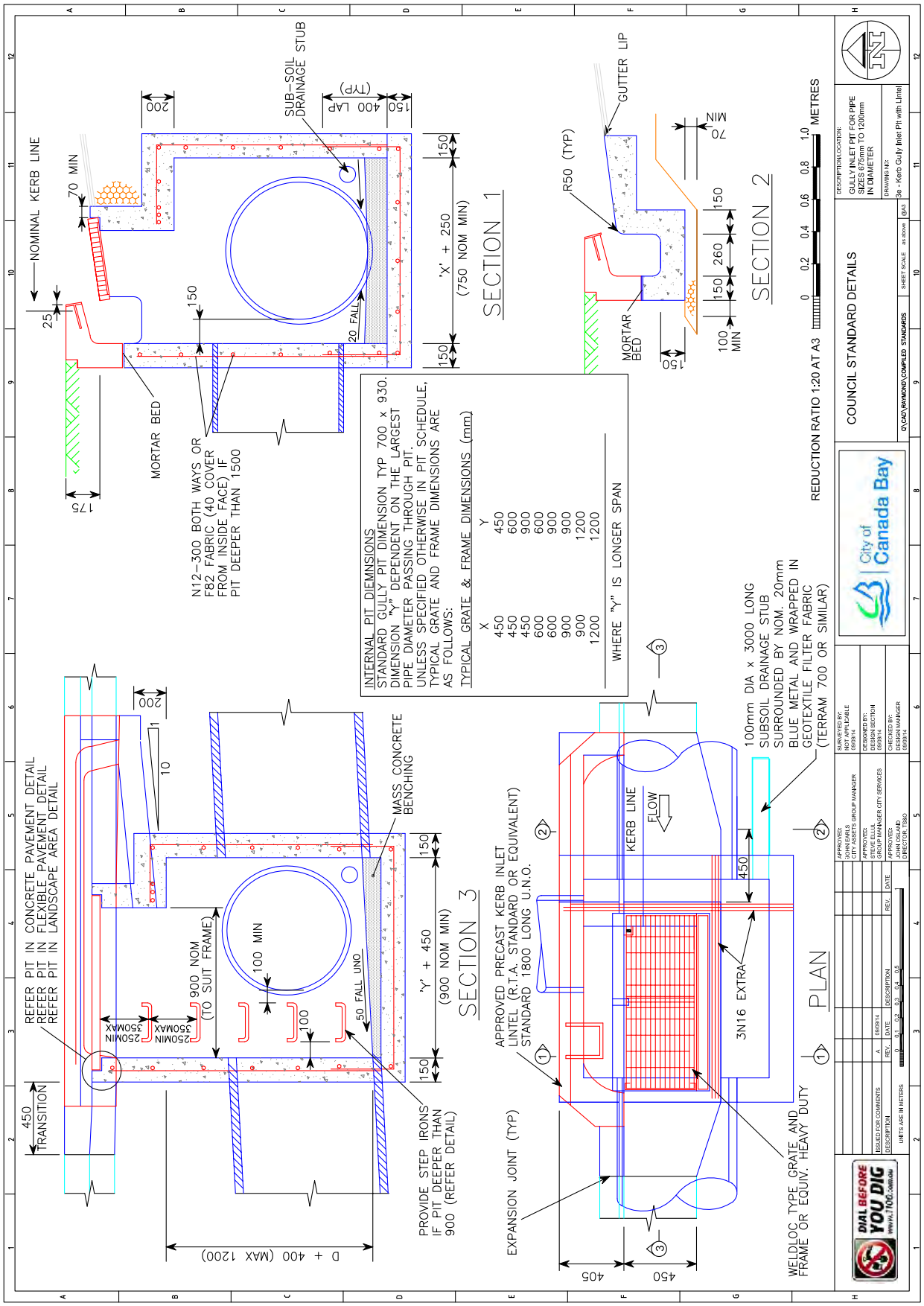

DRIVEWAY NOTES:
1. ALL DRIVEWAYS ARE TO COMPLY WITH AS/NZS 2890.1:2004 "OFF STREET CAR PARKING" CODE
2. THE DIFFERENCE BETWEEN TWO GRADIENTS IN A DEPRESSION MUST NOT EXCEED 15% .
3. THE DIFFERENCE BETWEEN TWO GRADIENTS IN A CREST MUST NOT EXCEED 12.5%.
4. A 2 METRE LONG TRANSITION IS TO BE USED IF CHANGES IN GRADIENTS EXCEED 15% IN A DEPRESSION OR 12.5% IN A CREST FOR CHANGES IN GRADIENTS UP TO 18%.
5. THE 85TH PERCENTILE VEHICLE TEMPLATE CAN BE USED TO CHECK FOR SCRAPING IN ALL SCENARIOS. HOWEVER IF THE DESIGN GRADIENT EXCEEDS 25% THEN IT IS A MANDATORY CHECK.
6. FOR COMMERCIAL OR MULTI-RESIDENTIAL DEVELOPMENTS, THE MAXIMUM GRADIENT IS 18% UNLESS A VEHICLE TEMPLATE IS USED TO CHECK FOR SCRAPING.
7. A MAXIMUM 5% GRADIENT OVER 6 METRES IS REQUIRED WITHIN THE PROPERTY FOR COMMERCIAL, MIXED AND MULTI-RESIDENTIAL DEVELOPMENTS.
8. DRIVEWAYS MUST HAVE MAXIMUM 2.5% ACROSS FOOTPATHS AND GRADED TOWARDS THE KERB.
GRADE A%
DEPRESSION
GRADE B%
GRADE A% + GRADE B% MUST NOT BE > 15%
NOTE 2
GRADE A%
CREST
GRADE B%
GRADE A% + GRADE B% MUST NOT BE > 12.5%
NOTE 3
EXAMPLE ONLY
GRADE A%
GRADE B%
2.0m EASE
USE EASE FOR UP TO 18% CHANGE IN GRADIENT
NOTE 4
EASE IN A CREST SHOWN
RD CENTRE LINE
CHANGE IN GRADIENT = 5.5%
FOOTPATH (0.5% MIN, 2.5% MAX)
CHANGE IN GRADIENT = 7.5%
PROPERTY BOUNDARY
CHANGE IN GRADIENT = 12.5%
150 WIDE TRENCH DRAIN
CHANGE IN GRADIENT = 12.5%
SLOPE(%)
-3%
EXISTING HALF ROAD
2.5%
FOOTWAY
-5.00%
DRIVEWAY
-17.50%
DRIVEWAY
-12.50%
0.00%
GARAGE
DATUM RL8.0
NEW RL
12.176
12.000
12.040
12.181
11.881
10.866
10.816
10.816
CHAINAGE METRES
0
5
8.7
14.70
20.50
22.50
28.00
LONGITUDINAL PROFILE OF DRIVEWAY FOR NORMAL TO LOW GRADIENT
SCALE H:V NATURAL - REFER SCALE BAR
DIAL BEFORE YOU DIG
www.1100.com.au
ISSUED FOR COMMENTS
A
31/09/14
DESCRIPTION
REV.
DATE
DESCRIPTION
REV.
DATE
UNITS ARE IN METERS
0
0.5
1
1.5
2
2.5
5
APPROVED:
JOHN EARLS
CITY ASSETS GROUP MANAGER
APPROVED:
STEVE ELLUL
GROUP MANAGER CITY SERVICES
APPROVED:
JOHN OSLAND
DIRECTOR, TS&O
SURVEYED BY:
NOT APPLICABLE
09/09/14
DESIGNED BY:
DESIGN SECTION
09/09/14
CHECKED BY:
DESIGN MANAGER
09/09/14
City of Canada Bay
COUNCIL STANDARD DETAILS
Q:\CAD\RAYMOND\COMPILED STANDARDS
SHEET SCALE
1:100
@A3
DESCRIPTION/LOCATION:
DRIVEWAY PROFILES
FOR NORMAL TO LOW
DRAWING NO:
1c - Standard Driveway Profiles

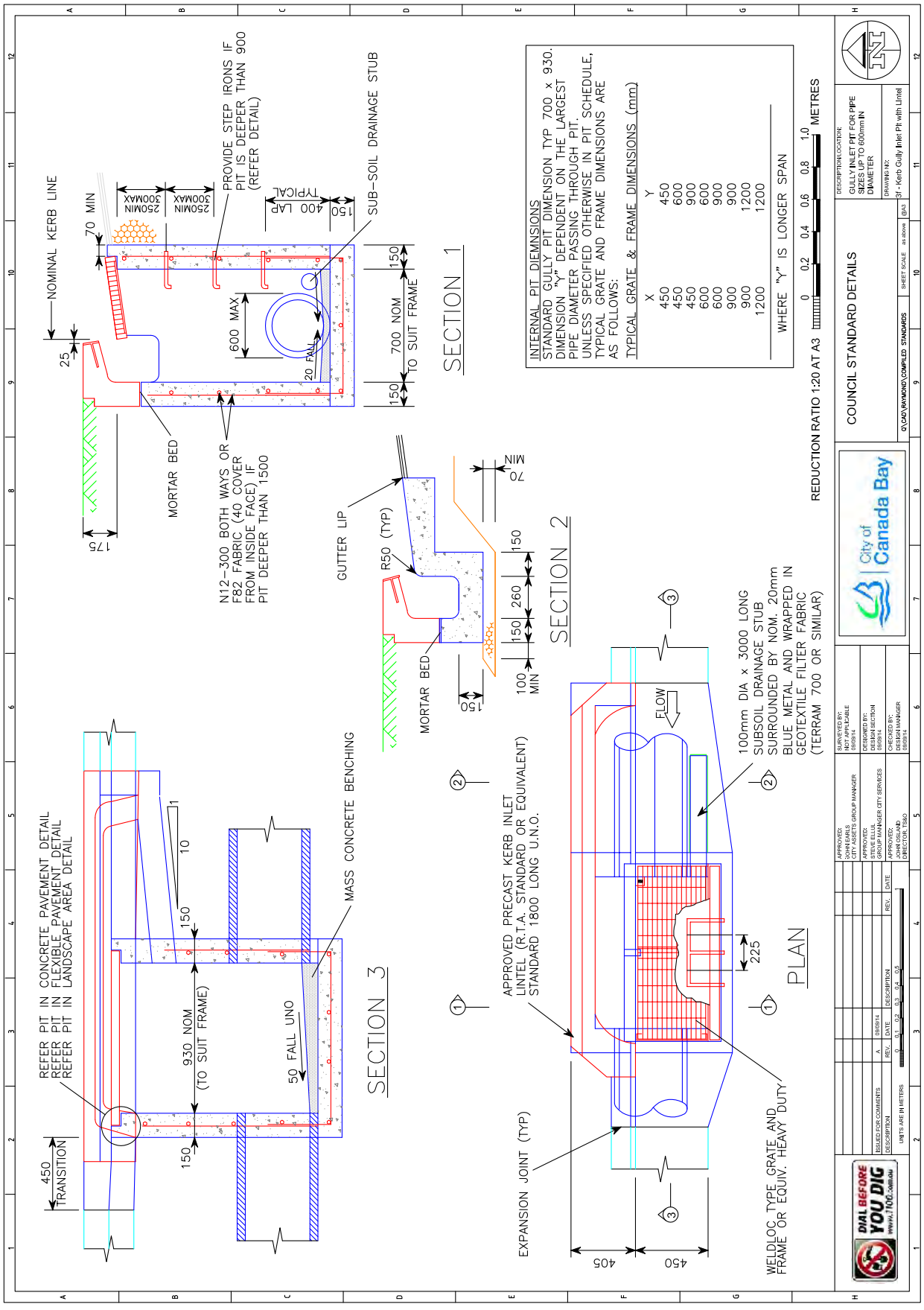

EXPANSION JOINT (TYP)
INVERT DISH DRAIN
FLOW
225
900
150
150
450
450
PLAN
100mm DIA x 3000 LONG SUBSOIL DRAINAGE STUB SURROUNDED BY NOM. 20mm BLUE METAL AND WRAPPED IN GEOTEXTILE FILTER FABRIC (TERRAM 700 OR SIMILAR)
NOM 900
TO SUIT FRAME/COVER
GRATE & FRAME OR SOLID COVER AS SPECIFIED (WELDLOC OR EQUIV)
70 MIN
REFER PIT IN CONCRETE PAVEMENT DETAIL
REFER PIT IN FLEXIBLE PAVEMENT DETAIL
REFER PIT IN LANDSCAPE AREA DETAIL
3N16 EXTRA Y12-150
N12-300 BOTHWAYS OR F82 FABRIC (40 COVER TO INSIDE FACE) IF PIT DEEPER THAN 1500
400 LAP
TYP
NOM 600 TO SUIT FRAME/COVER
150MIN
PIPE DIA + 400 (1200 MAX)
20 FALL
OVERALL PIPE SIZE + 300
MASS CONCRETE BENCHING
SECTION 1
N12 AT 300 BOTHWAYS OR F82 FABRIC (40 COVER TO INSIDE FACE) IF PIT DEEPER THAN 1500
450 MAX
DEPT TO SUIT
SECTION 2
COUNCIL STANDARD DETAILS
GRATED INLET PIT IN DISH DRAIN DETAIL FOR PIPE SIZES 300mm - 1200mm DIA
3a - Grated Inlet Pit in Dish Drain
DRAWING NO:
SHEET SCALE 1:20 @A3
Q:\CAD\RAYMOND\COMPILED STANDARDS
City of Canada Bay
DIAL BEFORE YOU DIG
UNITS ARE IN METERS
ISSUED FOR COMMENTS
DESCRIPTION
DATE
REV.


PIT IN FLEXIBLE PAVEMENT DETAIL
SCALE 1:10 (A3)
COVER OR GRATE & FRAME AS SPECIFIED
70 MINIMUM
RECESS TO SUIT COVER OR FRAME
PAVEMENT AS SPECIFIED
MORTAR BEDDING
PIT IN LANDSCAPE AREA DETAIL
SCALE 1:10 (A3)
COVER OR GRATE & FRAME AS SPECIFIED
70 MINIMUM
RECESS TO SUIT COVER OR GRATE
MORTAR BEDDING
PIT IN CONCRETE PAVEMENT DETAIL
SCALE 1:10 (A3)
COVER OR GRATE & FRAME AS SPECIFIED
70 MINIMUM
RECESS TO SUIT COVER OR FRAME
PAVEMENT AS SPECIFIED
120 NOM
R6–200 (40 COVER)
250
MORTAR BEDDING
4–N12 LAP 300
CONSTRUCTION JOINT
STEP IRON DETAILS
SCALE 1:5 (A3)
FRONT ELEVATION
SIDE ELEVATION
PLAN
35
125
105
250
NOM 20mm – 24mm DIA GALVANISED MILD STEEL RODS
REDUCTION RATIO 1:10 AT A3
REDUCTION RATIO 1:5 AT A3
METRES
COUNCIL STANDARD DETAILS
City of Canada Bay
DESCRIPTION/LOCATION: PIT EDGE AND STEP IRON DETAILS
DRAWING NO: 3b - Pit Edge & Step Iron Details
SHEET SCALE as above @A3
UNITS ARE IN METERS
ISSUED FOR COMMENTS
DIAL BEFORE YOU DIG www.1100.com.au


GRATE, FRAME AND LEGS TO BE HOT DIP GALVANIZED AFTER FABRICATION
50 MIN
75 x 75 x 8 WITH ONE 16mm DIA CENTRAL HOLE
ONE M12 GALVANIZED HOLDING DOWN BOLT PER LEG. BOLTS TO BE 150mm LONG WITH 35mm PROJECTION
51 x 51 x 8 ANGLE LEGS 6mm FILLET WELD TO FRAME AND BASE PLATE
40
CONNECTION DETAIL
SCALE 1:10 (A3)
INT. PIT DIMENSIONS
UNLESS OTHERWISE SPECIFIED THE SUMP DIMENSIONS SHALL BE AS FOLLOWS
DEPTH D (mm) | 'X' | 'Y'
D<1000 | 600 | 600
D>1000 | 900 | 900
REDUCTION RATIO 1:10 AT A3
REDUCTION RATIO 1:20 AT A3
METRES
GALVANIZED MILD STEEL GRATE HINGED TO FRAME (WELDLOCK OR SIMILAR) FITTED WITH LEGS (REFER CONNECTION DETAIL)
F82 FABRIC (40 COVER)
SURFACE LEVEL
PROVIDE STEP IRONS IF PIT DEEPER THAN 900 REFER STEP IRON DETAIL
PROVIDE N12-300 BOTH WAYS OR F82 FABRIC (40 COVER TO INSIDE FACE) WHERE IS PIT DEEPER THAN 1500
400 LAP (TYP)
300 (TYP)
MAX DIA 750mm
20 FALL
"Y"
150
500 (TYP)
150 MIN
FINISHED
MASS CONCRETE BENCHING
"D" AS SPECIFIED
NOMINAL 100mm DIA SUBSOIL PIPE 2000 LONG WRAPPED IN GEOTEXTILE FILTER FABRIC AND SURROUNDED WITH NOM 20mm BLUE METAL IN TRENCH ADJACENT TO INLET PIPE
SECTION 1
FLOW
"X"
225
PLAN
SCALE 1:20 (A3)
COUNCIL STANDARD DETAILS
City of Canada Bay
SUMP PIT IN LANDSCAPED AREA DETAILS
DRAWING NO: 3c - Letter Box Type Pit
SHEET SCALE as above @A3
Q:\CAD\RAYMOND\COMPILED STANDARDS
DIAL BEFORE YOU DIG
ISSUED FOR COMMENTS
UNITS ARE IN METERS


PROVIDE STEP IRONS IF PIT DEEPER THEN 900 (REFER STEP IRON DETAIL)
100mm DIA x 3000 LONG SUBSOIL DRAINAGE STUB SURROUNDED BY NOM. 20mm BLUE METAL AND WRAPPED IN GEOTEXTILE FILTER FABRIC (TERRAM 700 OR SIMILAR)
FLOW
225
150
NOM 900
TO SUIT COVER/FRAME
PLAN
GRATE & FRAME OR SOLID COVER AS SPECIFIED (WELDLOC OR EQUIV)
REFER PIT IN CONCRETE PAVEMENT DETAIL
REFER PIT IN FLEXIBLE PAVEMENT DETAIL
REFER PIT IN LANDSCAPE AREA DETAIL
70 MIN
250 MIN 350 MAX
250 MIN 350 MAX
3N16 EXTRA
N12-150
200
NOM 600 TO SUIT FRAME/COVER
150MIN
N12-300 BOTHWAYS OR SL82 FABRIC (40 COVER TO INSIDE FACE) IF PIT DEEPER THAN 1500
400 LAP TYP
PIPE DIA + 400 (1200 MAX)
20 FALL
OVERALL PIPE SIZE + 300
SECTION 1
MASS CONCRETE BENCHING
150 MIN
'X'
GRATE AND FRAME OR COVER AS SPECIFIED (WELFLOC OR EQUIV)
DEPTH AS REQUIRED (D)
Y/2
50 FALL UNO
'Y'
SECTION 2
REDUCTION RATIO 1:20 AT A3
METRES
COUNCIL STANDARD DETAILS
City of Canada Bay
DESCRIPTION/LOCATION: INLET PIT FOR PIPE SIZES UP UP TO 600mm IN DIAMETER
DRAWING NO: 3d - Grated Inlet or Junction Pit
SHEET SCALE as above @A3
DIAL BEFORE YOU DIG www.1100.com.au
UNITS ARE IN METERS
ISSUED FOR COMMENTS


COUNCIL STANDARD DETAILS
GULLY INLET PIT FOR PIPE SIZES 675mm TO 1200mm IN DIAMETER
3a - Kerb Gully Inlet Pit with Lintel
REDUCTION RATIO 1:20 AT A3
METRES
SECTION 1
SECTION 2
SECTION 3
PLAN
NOMINAL KERB LINE
70 MIN
SUB-SOIL DRAINAGE STUB
MORTAR BED
GUTTER LIP
R50 (TYP)
INTERNAL PIT DIEMNSIONS
STANDARD GULLY PIT DIMENSION TYP 700 x 930.
DIMENSION "Y" DEPENDENT ON THE LARGEST PIPE DIAMETER PASSING THROUGH PIT.
UNLESS SPECIFIED OTHERWISE IN PIT SCHEDULE, TYPICAL GRATE AND FRAME DIMENSIONS ARE AS FOLLOWS:
TYPICAL GRATE & FRAME DIMENSIONS (mm)
X Y
450 450
450 600
450 900
600 600
600 900
900 900
900 1200
1200 1200
WHERE "Y" IS LONGER SPAN
N12-300 BOTH WAYS OR F82 FABRIC (40 COVER FROM INSIDE FACE) IF PIT DEEPER THAN 1500
REFER PIT IN CONCRETE PAVEMENT DETAIL
REFER PIT IN FLEXIBLE PAVEMENT DETAIL
REFER PIT IN LANDSCAPE AREA DETAIL
MASS CONCRETE BENCHING
PROVIDE STEP IRONS IF PIT DEEPER THAN 900 (REFER DETAIL)
APPROVED PRECAST KERB INLET LINTEL (R.T.A. STANDARD OR EQUIVALENT) STANDARD 1800 LONG U.N.O.
EXPANSION JOINT (TYP)
100mm DIA x 3000 LONG SUBSOIL DRAINAGE STUB SURROUNDED BY NOM. 20mm BLUE METAL AND WRAPPED IN GEOTEXTILE FILTER FABRIC (TERRAM 700 OR SIMILAR)
3N16 EXTRA
WELDLOC TYPE GRATE AND FRAME OR EQUIV. HEAVY DUTY
KERB LINE
FLOW
DIAL BEFORE YOU DIG
City of Canada Bay


COUNCIL STANDARD DETAILS
GULLY INLET PIT FOR PIPE SIZES UP TO 600mm IN DIAMETER
3I - Kerb Gully Inlet Pit with Lintel
REDUCTION RATIO 1:20 AT A3
METRES
SECTION 1
SECTION 2
SECTION 3
PLAN
NOMINAL KERB LINE
PROVIDE STEP IRONS IF PIT IS DEEPER THAN 900 (REFER DETAIL)
SUB-SOIL DRAINAGE STUB
MORTAR BED
N12-300 BOTH WAYS OR F82 FABRIC (40 COVER FROM INSIDE FACE) IF PIT DEEPER THAN 1500
TO SUIT FRAME
GUTTER LIP
R50 (TYP)
APPROVED PRECAST KERB INLET LINTEL (R.T.A. STANDARD OR EQUIVALENT) STANDARD 1800 LONG U.N.O.
100mm DIA x 3000 LONG SUBSOIL DRAINAGE STUB SURROUNDED BY NOM. 20mm BLUE METAL AND WRAPPED IN GEOTEXTILE FILTER FABRIC (TERRAM 700 OR SIMILAR)
EXPANSION JOINT (TYP)
WELDLOC TYPE GRATE AND FRAME OR EQUIV. HEAVY DUTY
REFER PIT IN CONCRETE PAVEMENT DETAIL
REFER PIT IN FLEXIBLE PAVEMENT DETAIL
REFER PIT IN LANDSCAPE AREA DETAIL
MASS CONCRETE BENCHING
INTERNAL PIT DIEMNSIONS
STANDARD GULLY PIT DIMENSION TYP 700 x 930.
DIMENSION "Y" DEPENDENT ON THE LARGEST PIPE DIAMETER PASSING THROUGH PIT.
UNLESS SPECIFIED OTHERWISE IN PIT SCHEDULE, TYPICAL GRATE AND FRAME DIMENSIONS ARE AS FOLLOWS:
TYPICAL GRATE & FRAME DIMENSIONS (mm)
X Y
450 450
450 600
450 900
600 600
600 900
900 900
900 1200
1200 1200
WHERE "Y" IS LONGER SPAN
DIAL BEFORE YOU DIG
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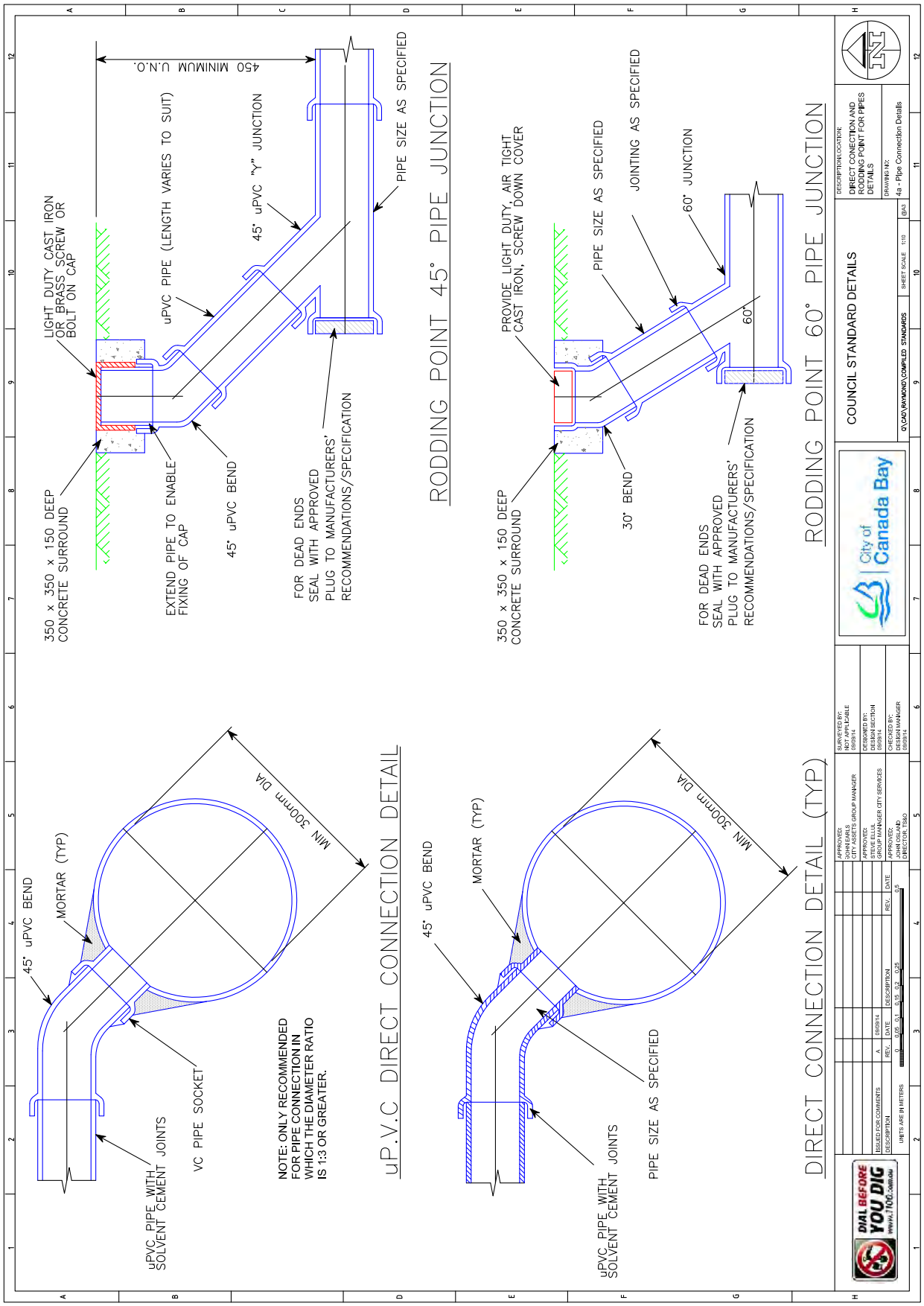
RODDING POINT 45° PIPE JUNCTION
450 MINIMUM U.N.O.
LIGHT DUTY CAST IRON OR BRASS SCREW OR BOLT ON CAP
uPVC PIPE (LENGTH VARIES TO SUIT)
45° uPVC "Y" JUNCTION
PIPE SIZE AS SPECIFIED
350 x 350 x 150 DEEP CONCRETE SURROUND
EXTEND PIPE TO ENABLE FIXING OF CAP
45° uPVC BEND
FOR DEAD ENDS SEAL WITH APPROVED PLUG TO MANUFACTURERS' RECOMMENDATIONS/SPECIFICATION
RODDING POINT 60° PIPE JUNCTION
PROVIDE LIGHT DUTY, AIR TIGHT CAST IRON, SCREW DOWN COVER
PIPE SIZE AS SPECIFIED
JOINTING AS SPECIFIED
60° JUNCTION
60°
350 x 350 x 150 DEEP CONCRETE SURROUND
30° BEND
FOR DEAD ENDS SEAL WITH APPROVED PLUG TO MANUFACTURERS' RECOMMENDATIONS/SPECIFICATION
uP.V.C DIRECT CONNECTION DETAIL
45° uPVC BEND
MORTAR (TYP)
MIN 300mm DIA
uPVC PIPE WITH SOLVENT CEMENT JOINTS
VC PIPE SOCKET
NOTE: ONLY RECOMMENDED FOR PIPE CONNECTION IN WHICH THE DIAMETER RATIO IS 1:3 OR GREATER.
DIRECT CONNECTION DETAIL (TYP)
45° uPVC BEND
MORTAR (TYP)
MIN 300mm DIA
uPVC PIPE WITH SOLVENT CEMENT JOINTS
PIPE SIZE AS SPECIFIED
COUNCIL STANDARD DETAILS
City of Canada Bay
DIRECT CONNECTION AND RODDING POINT FOR PIPES DETAILS
4a - Pipe Connection Details
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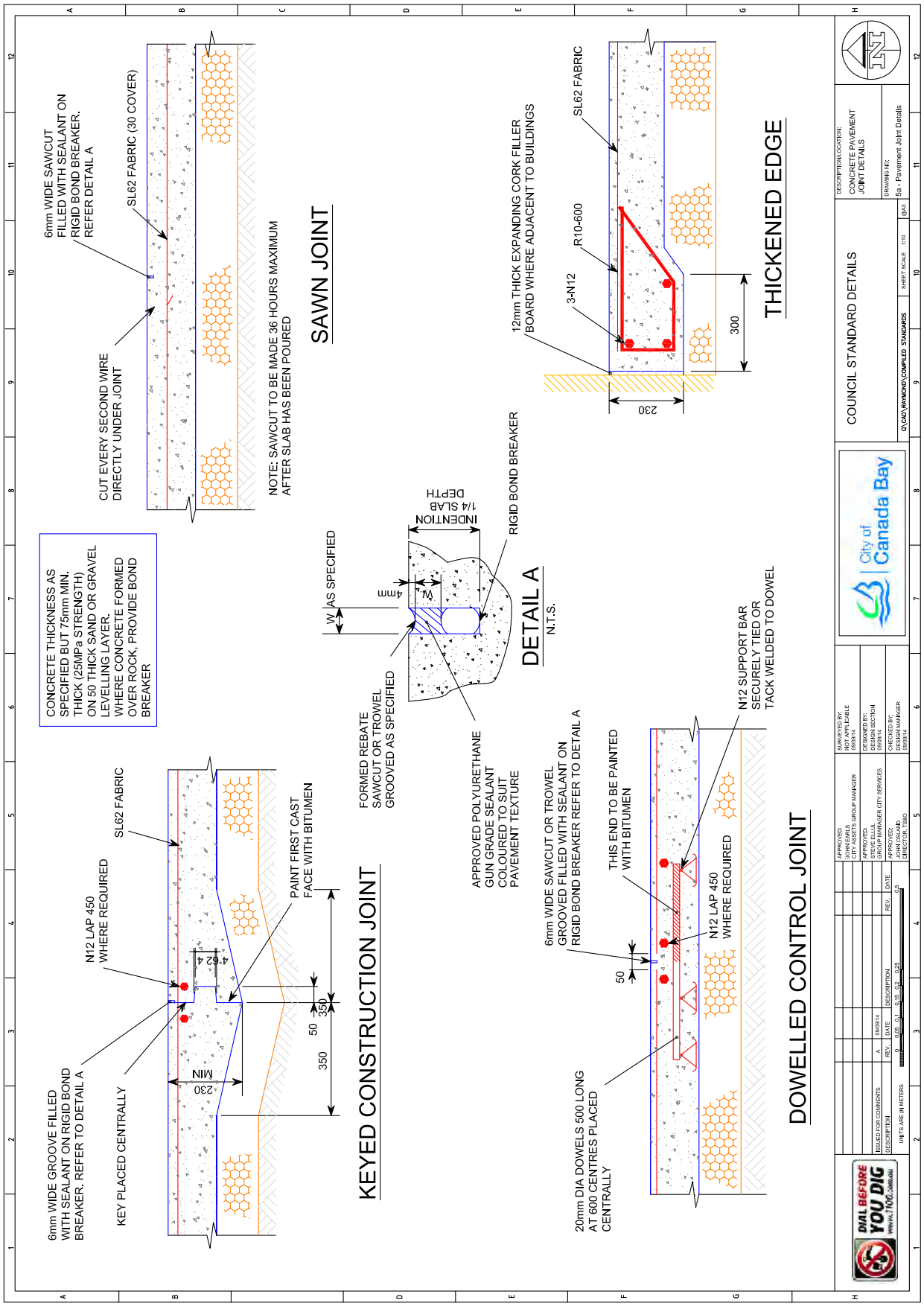
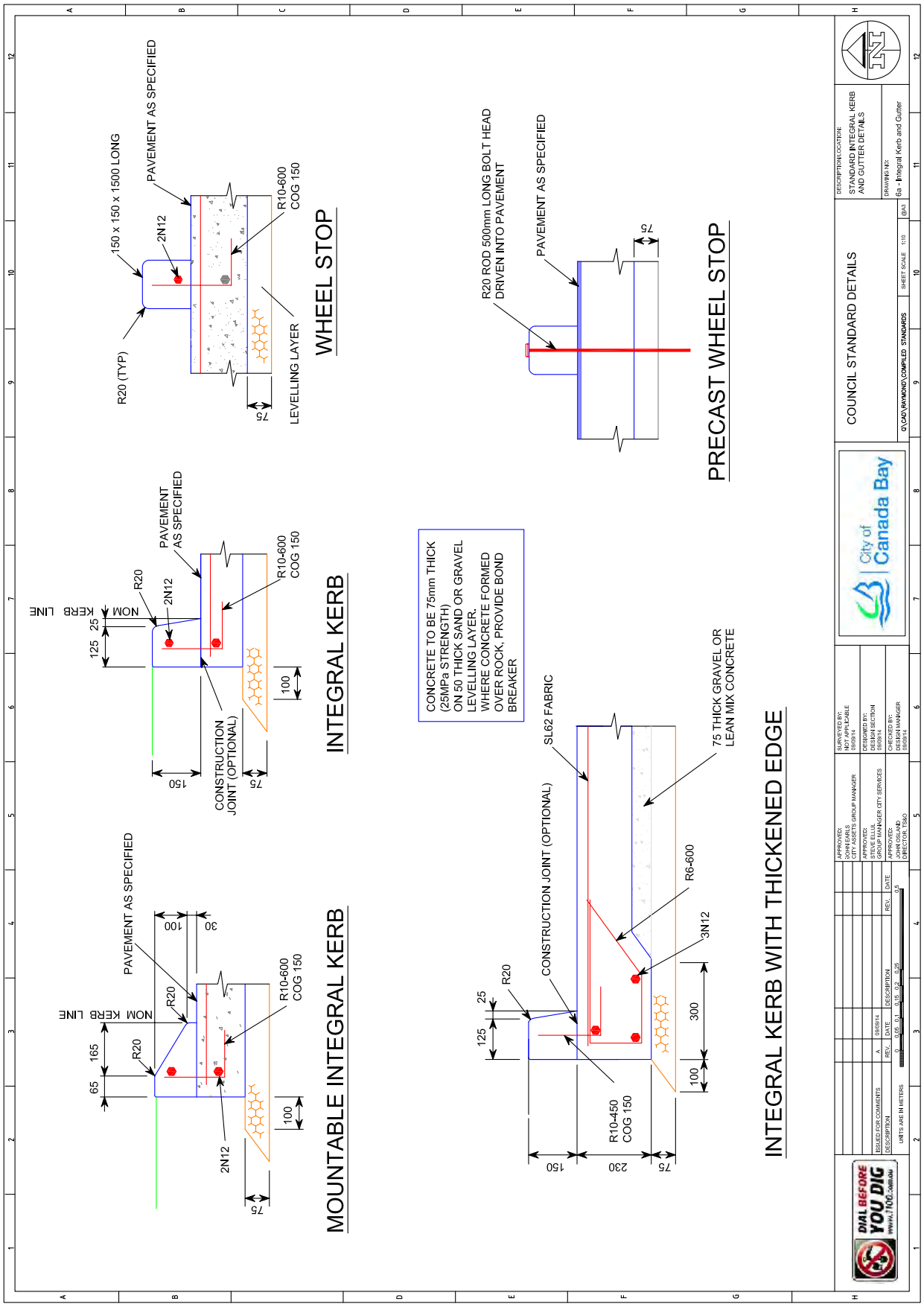
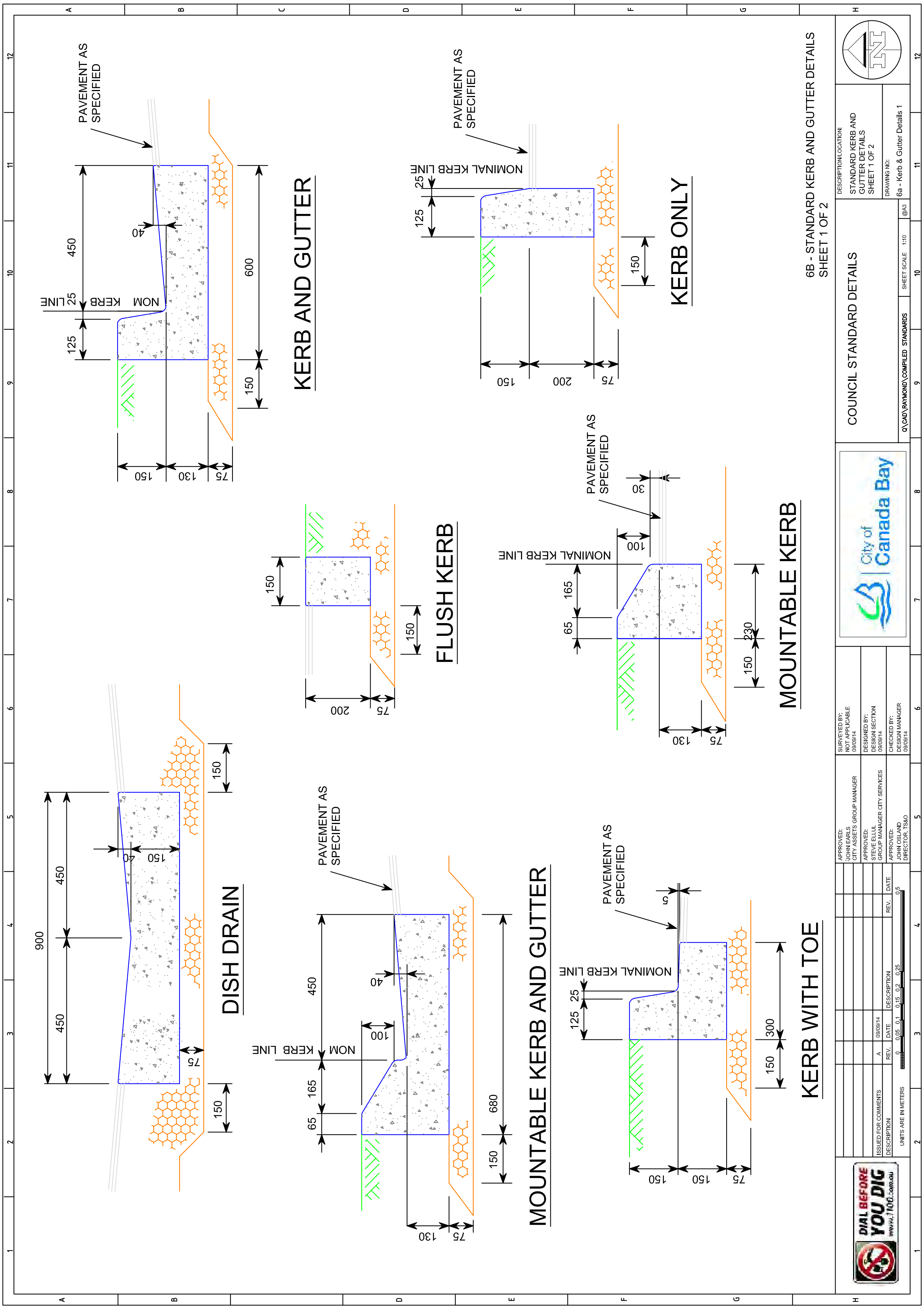
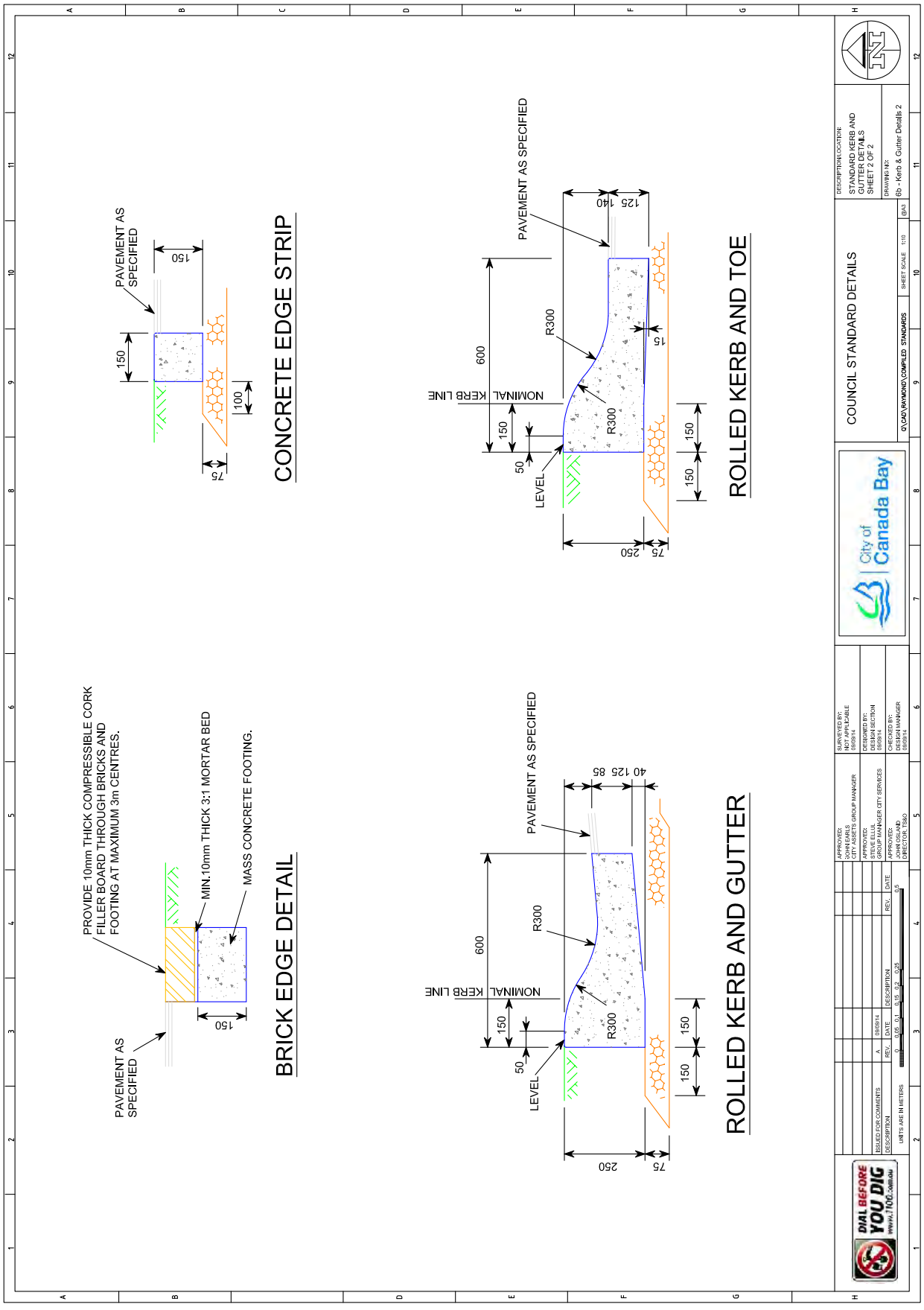
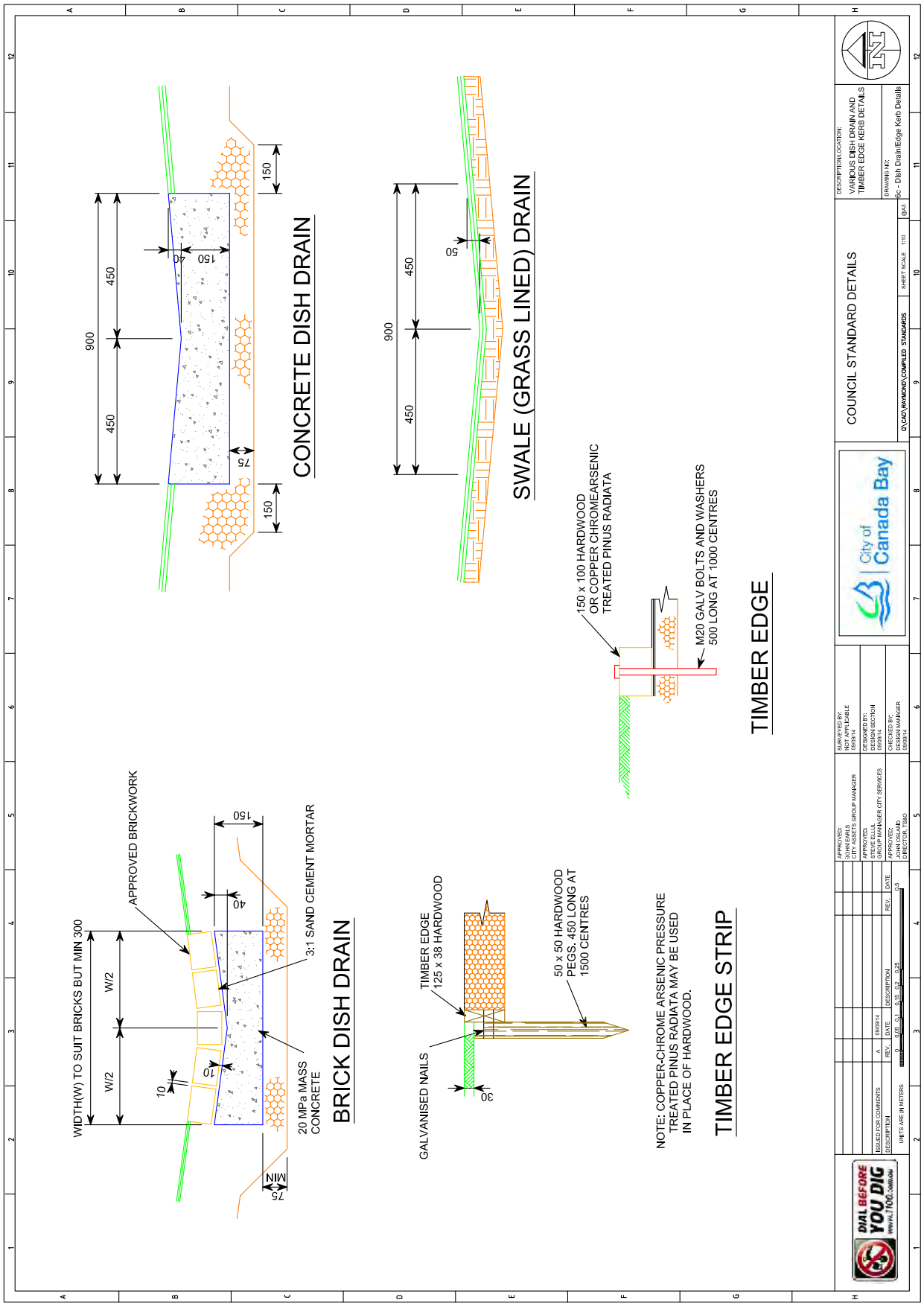
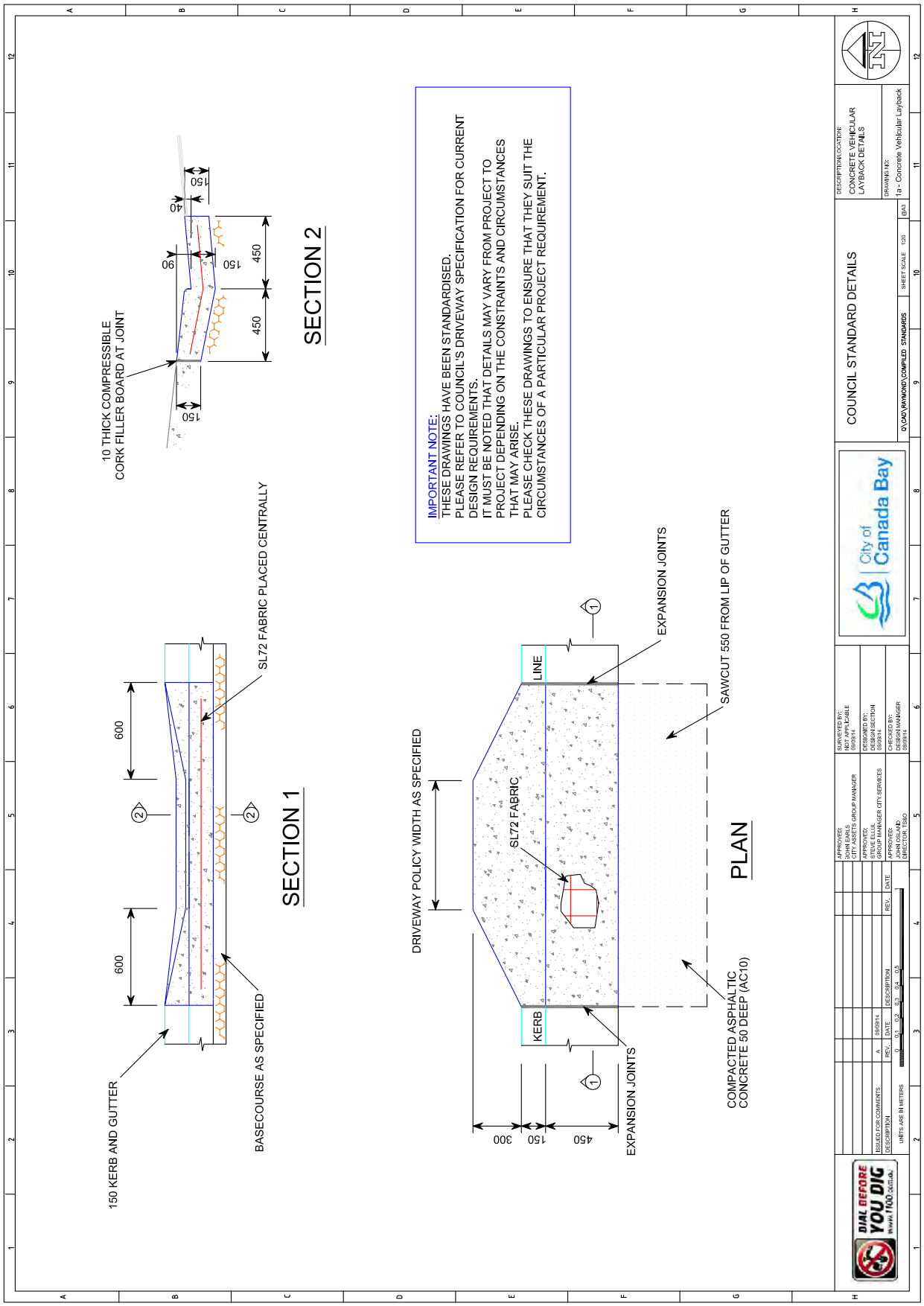

SAWN JOINT
6mm WIDE SAWCUT FILLED WITH SEALANT ON RIGID BOND BREAKER. REFER DETAIL A
SL62 FABRIC (30 COVER)
CUT EVERY SECOND WIRE DIRECTLY UNDER JOINT
NOTE: SAWCUT TO BE MADE 36 HOURS MAXIMUM AFTER SLAB HAS BEEN POURED
CONCRETE THICKNESS AS SPECIFIED BUT 75mm MIN. THICK (25MPa STRENGTH) ON 50 THICK SAND OR GRAVEL LEVELLING LAYER. WHERE CONCRETE FORMED OVER ROCK, PROVIDE BOND BREAKER
DETAIL A
N.T.S.
W AS SPECIFIED
4mm
W
INDENTION
1/4 SLAB DEPTH
RIGID BOND BREAKER
FORMED REBATE SAWCUT OR TROWEL GROOVED AS SPECIFIED
APPROVED POLYURETHANE GUN GRADE SEALANT COLOURED TO SUIT PAVEMENT TEXTURE
THICKENED EDGE
SL62 FABRIC
R10-600
3-N12
12mm THICK EXPANDING CORK FILLER BOARD WHERE ADJACENT TO BUILDINGS
230
300
KEYED CONSTRUCTION JOINT
6mm WIDE GROOVE FILLED WITH SEALANT ON RIGID BOND BREAKER. REFER TO DETAIL A
KEY PLACED CENTRALLY
N12 LAP 450 WHERE REQUIRED
SL62 FABRIC
PAINT FIRST CAST FACE WITH BITUMEN
MIN 230
47
62
4
50
350
350
DOWELLED CONTROL JOINT
6mm WIDE SAWCUT OR TROWEL GROOVED FILLED WITH SEALANT ON RIGID BOND BREAKER REFER TO DETAIL A
THIS END TO BE PAINTED WITH BITUMEN
50
N12 LAP 450 WHERE REQUIRED
N12 SUPPORT BAR SECURELY TIED OR TACK WELDED TO DOWEL
20mm DIA DOWELS 500 LONG AT 600 CENTRES PLACED CENTRALLY
COUNCIL STANDARD DETAILS
City of Canada Bay
DESCRIPTION/LOCATION: CONCRETE PAVEMENT JOINT DETAILS
DRAWING NO: 5a - Pavement Joint Details
SHEET SCALE 1:10 @A3
O:\CAD\RAYMOND\COMPILED STANDARDS
APPROVED: MANAGER CITY ASSETS GROUP MANAGER 08/09/14
APPROVED: STEVE ELLUL GROUP MANAGER CITY SERVICES 08/09/14
APPROVED: JOHN OSLAND DIRECTOR, TS&O
SURVEYED BY: NEIL MACKENZIE 08/09/14
DESIGNED BY: DESIGN SECTION 08/09/14
CHECKED BY: DESIGN MANAGER 08/09/14
ISSUED FOR COMMENTS A 08/09/14
DESCRIPTION REV. DATE DESCRIPTION REV. DATE
UNITS ARE IN METERS 0 0.05 0.1 0.15 0.2 0.25 0.5
DIAL BEFORE YOU DIG www.1100.com.au


WHEEL STOP
150 x 150 x 1500 LONG
PAVEMENT AS SPECIFIED
2N12
R10-600
COG 150
R20 (TYP)
LEVELLING LAYER
75
INTEGRAL KERB
PAVEMENT
AS SPECIFIED
R20
2N12
R10-600
COG 150
NOM KERB LINE
25
125
100
150
CONSTRUCTION
JOINT (OPTIONAL)
75
MOUNTABLE INTEGRAL KERB
PAVEMENT AS SPECIFIED
100
30
R20
R10-600
COG 150
NOM KERB LINE
165
65
R20
2N12
75
PRECAST WHEEL STOP
R20 ROD 500mm LONG BOLT HEAD
DRIVEN INTO PAVEMENT
PAVEMENT AS SPECIFIED
75
CONCRETE TO BE 75mm THICK
(25MPa STRENGTH)
ON 50 THICK SAND OR GRAVEL
LEVELLING LAYER.
WHERE CONCRETE FORMED
OVER ROCK, PROVIDE BOND
BREAKER
SL62 FABRIC
75 THICK GRAVEL OR
LEAN MIX CONCRETE
R6-600
3N12
25
R20
CONSTRUCTION JOINT (OPTIONAL)
125
300
100
R10-450
COG 150
150
230
75
INTEGRAL KERB WITH THICKENED EDGE
COUNCIL STANDARD DETAILS
City of Canada Bay
STANDARD INTEGRAL KERB
AND GUTTER DETAILS
6a - Integral Kerb and Gutter
DIAL BEFORE YOU DIG
UNITS ARE IN METERS


KERB AND GUTTER
FLUSH KERB
KERB ONLY
DISH DRAIN
MOUNTABLE KERB AND GUTTER
MOUNTABLE KERB
KERB WITH TOE
PAVEMENT AS SPECIFIED
NOMINAL KERB LINE
6B - STANDARD KERB AND GUTTER DETAILS
SHEET 1 OF 2
COUNCIL STANDARD DETAILS
City of Canada Bay
DIAL BEFORE YOU DIG
STANDARD KERB AND GUTTER DETAILS SHEET 1 OF 2
6a - Kerb & Gutter Details 1
UNITS ARE IN METERS


CONCRETE EDGE STRIP
PAVEMENT AS SPECIFIED
150
150
100
75
ROLLED KERB AND TOE
PAVEMENT AS SPECIFIED
125 140
R300
15
NOMINAL KERB LINE
600
150
50
LEVEL
R300
150
150
75 250
BRICK EDGE DETAIL
PROVIDE 10mm THICK COMPRESSIBLE CORK FILLER BOARD THROUGH BRICKS AND FOOTING AT MAXIMUM 3m CENTRES.
MIN.10mm THICK 3:1 MORTAR BED
MASS CONCRETE FOOTING.
PAVEMENT AS SPECIFIED
150
ROLLED KERB AND GUTTER
PAVEMENT AS SPECIFIED
40 125 85
R300
NOMINAL KERB LINE
600
150
50
LEVEL
R300
150
150
75 250
COUNCIL STANDARD DETAILS
City of Canada Bay
DESCRIPTION/LOCATION:
STANDARD KERB AND GUTTER DETAILS
SHEET 2 OF 2
DRAWING NO:
6b - Kerb & Gutter Details 2
Q:\CAD\RAYMOND\COMPILED STANDARDS
SHEET SCALE 1:10 @A3
DIAL BEFORE YOU DIG
UNITS ARE IN METERS
ISSUED FOR COMMENTS
DESCRIPTION
DATE
REV.


CONCRETE DISH DRAIN
SWALE (GRASS LINED) DRAIN
TIMBER EDGE
BRICK DISH DRAIN
TIMBER EDGE STRIP
NOTE: COPPER-CHROME ARSENIC PRESSURE TREATED PINUS RADIATA MAY BE USED IN PLACE OF HARDWOOD.
COUNCIL STANDARD DETAILS
City of Canada Bay
DIAL BEFORE YOU DIG


SECTION 2
10 THICK COMPRESSIBLE
CORK FILLER BOARD AT JOINT
150
40
90
150
450
450
150
SECTION 1
SL72 FABRIC PLACED CENTRALLY
600
600
150 KERB AND GUTTER
BASECOURSE AS SPECIFIED
IMPORTANT NOTE:
THESE DRAWINGS HAVE BEEN STANDARDISED.
PLEASE REFER TO COUNCIL'S DRIVEWAY SPECIFICATION FOR CURRENT
DESIGN REQUIREMENTS.
IT MUST BE NOTED THAT DETAILS MAY VARY FROM PROJECT TO
PROJECT DEPENDING ON THE CONSTRAINTS AND CIRCUMSTANCES
THAT MAY ARISE.
PLEASE CHECK THESE DRAWINGS TO ENSURE THAT THEY SUIT THE
CIRCUMSTANCES OF A PARTICULAR PROJECT REQUIREMENT.
DRIVEWAY POLICY WIDTH AS SPECIFIED
EXPANSION JOINTS
SAWCUT 550 FROM LIP OF GUTTER
LINE
SL72 FABRIC
KERB
300
150
450
EXPANSION JOINTS
COMPACTED ASPHALTIC
CONCRETE 50 DEEP (AC10)
PLAN
COUNCIL STANDARD DETAILS
City of Canada Bay
CONCRETE VEHICULAR LAYBACK DETAILS
1a - Concrete Vehicular Layback
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