INSYNC SERVICES
PTY LTD

Stormwater Drainage

Section 75W Submission Report

Mixed Residential Development

23-37 Lindfield Avenue, Lindfield

Client:

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File: 20120033 Section 75W Submission Report

Review and Approval Record

Rev	Date	Description of Release	Prepared By	Reviewed By	Approved By
A	22/08/12	Draft Development Application	BL	RW	BL
B	12/11/12	Draft Section 75W Submission	BL	RW	BL
C	27/11/12	Section 75W Submission	BL	BL	BL

Contents

1 Introduction

1.1 Background

Insync Services Pty Ltd have been engaged by Anka (Civic Centre) Pty Ltd, to provide a stormwater drainage concept design and report in association with the Section 75W Application for the proposed mixed residential development at 23-37 Lindfield Avenue, Lindifeld.

The aim of this Section 75W Application stormwater drainage report is as follows;

- To determine site stormwater management requirements in association with the proposed development.
- To determine Water Sensitive Urban Design initiatives for the development.

1.2 Development Description

The mixed residential development at 23-37 Lindfield Avenue, and 11 Havilah Lane Lindfield will provide approximately 12,142m^2 of gross floor area, including the following indicative facilities;

- 2 levels of basement parking for 162 vehicles.
- 1 level of podium including approximately 2,316m^2 gross floor area of retail.
- 112 residential apartments in two towers above the podium level.

1.3 Site Description

The proposed mixed residential development at 23-37 Linfield Avenue and 11 Havilah Lane Lindfield, will be constructed on a site bounded by existing buildings to the north, Havilah Lane to the east, Kochia Lane to the south, and Lindfield Avenue to the west.

The site has an overall area of approximately 3,099m^2, and all existing buildings on the site will be demolished to make way for the proposed development.

2 Design Data

2.1 Development Control Plan

Stormwater controls described herein have been extracted from DCP47 – Water Management Development Control Plan, as prepared by Ku Ring Gai Municipal Council.

2.2 Site Classification

DCP 47 determines various site types as follows;

- TYPE 1 – minor alterations & additions to a single detached dwelling with an impervious area increase less than 100m^2.
- TYPE 2 – major alterations & additions to a single detached dwelling with an impervious area increase more than 100m^2.
- TYPE 3 – new single detached dwellings.
- TYPE 4 – dual occupancies.
- TYPE 5 – Multi-unit developments.
- TYPE 6 – business, commercial or retail premises.
- TYPE 7 – open space.
- TYPE 8 – sub-divisions.
- TYPE 9 – any other development

2.3 Location Classification

DCP 47 determines various site locations as follows;

- LOCATION A – land that drains directly to a Council or Sydney Water drainage system in the road or drainage reserve (including a gutter, pipe or road) without the need for stormwater runoff to pass over another private property. This includes land traversed by or immediately adjoining a trunk drainage system where a legal right to connect already exists.
- LOCATION B – land that drains directly to a natural waterbody (see Dictionary of Definitions) that traverses (crosses) or intersects the subject site. At least one bank of the waterbody must be located within or immediately adjacent to the subject site.
- LOCATION C – land that drains directly to bushland.
- LOCATION D – Any other land, being land that must pass its stormwater over one or more intervening downstream private properties or public land to reach a recognised drainage system in a road reserve, drainage reserve or waterbody. This includes land where a private drainage easement is required (whether or not this has been obtained) and properties that are traversed by or immediately adjoining a trunk drainage system where there is no existing legal right to connect to the system.

2.4 Maximum Impervious Area

Clause 4.4.1 of DCP 47 defines the maximum built –upon (impervious) area for various development types as follows;

	LOCATION A	LOCATION B	LOCATION C	LOCATION D
TYPE 1 TYPE 2 TYPE 3	60% unless otherwise stated in DCP38 under built-upon area provisions.	60% unless otherwise stated in DCP38 under built-upon area provisions.	35% or not greater than the existing, whichever is the greater 35%	60% unless otherwise stated in DCP38 built-upon area provisions or in 5.7.7 of this DCP
TYPE 4	60% except where dual occ code	60% except where dual occ code	35%	60% except where dual occ code

	requires less	requires less		requires less
TYPE 5	60%	60%	35%	60%
TYPE 6	100%	100%	35%	Generally 100%
TYPE 7	Determined on merit	Determined on merit	35%	Determined on merit
TYPE 8	Not applicable	Not applicable	Not applicable	Not applicable
TYPE 9	Determined on merit	Determined on merit	35%	Determined on merit

2.5 Rainwater Tank Requirements

Clause 6.4 of DCP 47 defines the mandatory rainwater tank requirements for various development types as follows;

	DESCRIPTION	MINIMUM TANK STORAGE VOLUME	MINIMUM USE OF RETAINED WATER
TYPE 1	Alts & Adds <50m^2	A tank is desirable but not mandatory, unless BASIX overrides this requirement.	
	Alts & Adds 50m^2 – 100m^2	2000L or as determined by BASIX	Garden irrigation only or as determined by BASIX
TYPE 2	Alts & Adds >100m^2	3000L or as determined by BASIX	Garden irrigation only, or as determined by BASIX
TYPE 3	Single dellings	As determined by BASIX	As determined by BASIX
TYPE 4	Dual occupancy - 1 new dwelling	As determined by BASIX for the new dwelling plus 5000L of storage for the existing dwelling to be retained	As determined by BASXI for new dwelling, garden irrigation for the existing dwelling to be retained.
	Dual occupancy - 2 new dwellings	As determined by BASIX for each dwelling	As determined by BASIX for each dwelling
TYPE 5	Multi-unit development	1000L per unit or 20m^3, whichever is the greater, or as determined by BASIX	All irrigation, toilet flushing and laundry or as determined by BASIX
TYPE 6	Business, commercial, retail	1000L per 100m^2 floor space or as determined by BASIX	Plumbed to all toilets and for garden irrigation, or as determined by BASIX
TYPE 7	Open space	2000L for every five toilets or part thereof in any building erected	For watering open space areas, as determined by Council
TYPE 8	Subdivision	5000L for any dwelling to be retained on a newly created lot	Garden irrigation only
TYPE 9	Any other development	As determined by Council, dependent on development type	

2.6 Stormwater Management – LOCATION A & LOCATION B

Clause 6.7 of DCP 47 defines the stormwater management controls for LOCATION A and LOCATION B properties as follows;

	DETENTION REQUIREMENTS	DESIGN PARAMETERS
TYPE 1	Not required	Not required

TYPE 2	Not required	Not required
TYPE 3	Required	Clause 6.7.1
TYPE 4	Required	Clause 6.7.2
TYPE 5	Required	Clause 6.7.2
TYPE 6	Required	Clause 6.7.2
TYPE 7	As determined by Council	As determined by Council
TYPE 8	As determined by Council	As determined by Council
TYPE 9	As determined by Council	As determined by Council

Generally on-site stormwater detention is required to be provided in accordance with permissible site discharge rates and minimum site storage requirements that have been calculated for specific catchments within the local government area as follows;

Code	Catchment Area	Permitted Site Discharge (L/s/ha)	Minimum OSD Storage Volume (m^3/ha)
AC1	Avondale Creek	102	398
AC2	Avondale Creek	166	241
BB1	Blackbutt Creek	141	302
BB2	Blackbutt Creek	166	241
BC1	Cowan Creek	96	414
BC2	Cowan Creek	166	241
BG1	Blue Gum Creek	147	287
BG2	Blue Gum Creek	166	241
CC	Coups Creek	132	325
CR	Fox Valley	166	241
FV1	Fox Valley	129	332
FV2	Gordon Creek	166	241
GC1	Gordon Creek	128	336
GC2	Ku-Ring-Gai Creek	166	241
KC1	Ku-Ring-Gai Creek	139	308
KC2	Lady Game Creek	166	241
LG1	Lady Game Creek	147	287
LG2	Lane Cove River	166	241
LC	Lane Cove River	166	241
LQ1	Loftberg Quarry Creek	153	272
LQ2	Loftberg Quarry Creek	166	241
LJ1	Lovers Jump Creek	94	417
LJ2	Lovers Jump Creek	166	241
MH	Middle Harbour	166	241
MC1	Moores Creek	136	315
MC2	Moores Creek	166	241
RC1	Rocky Creek	124	345
RC2	Rocky Creek	166	241

SG1	Spring Gully Creek	134	320
SG2	Spring Gully Creek	166	241

Generally any required rainwater storage volume that has to be provided in accordance with Clause 6.4 can be deducted from the minimum on-site stormwater detention site storage requirement volume up to a maximum of 50% of the required volume, or 25% of the required volume in the case of TYPE 5 and TYPE 6 developments which include 9 or more dwellings or units.

2.7 Stormwater Management – LOCATION C

Clause 6.8 of DCP 47 defines the stormwater management controls for LOCATION C properties as follows;

The primary aim for Location C properties is to ensure minimal adverse impact to the natural environment. Disposal from Location C properties must involve devices that dissipate or retain flows that would otherwise be directed to bushland area.

Rainwater storage tanks are required.
On-site stormwater detention is not required.

2.8 Stormwater Management – LOCATION D

Clause 6.9 of DCP 47 defines the stormwater management controls for LOCATION D properties as follows;

It is the responsibility of the design engineer to propose a stormwater management system that is appropriate to the development, site and site context. Council will determine proposals based upon merit.

2.9 Water Quality Controls

Chapter 8 of DCP 47 defines the water quality controls as follows;

	Pre-Construction	Post Construction
TYPE 1	Clause 8.1 & Clause 8.2	Not required
TYPE 2	Clause 8.1 & Clause 8.2	Not required
TYPE 3	Clause 8.1 & Clause 8.2	Not required
TYPE 4	Clause 8.1 & Clause 8.2	Clause 8.3
TYPE 5	Clause 8.1 & Clause 8.2	Clause 8.3
TYPE 6	Clause 8.1 & Clause 8.2	Clause 8.3
TYPE 7	Clause 8.1 & Clause 8.2	Clause 8.3
TYPE 8	Clause 8.1 & Clause 8.2, if physical works are undertaken	Clause 8.3, if physical works are undertaken
TYPE 9	Clause 8.1 & Clause 8.2	Clause 8.3

Where required, post construction water quality shall be provided for all stormwater flows from regular rainfall events (1 & 2 year ARI), treated to the following minimum standards;

Pollutant	Baseline Annual Pollutant Load (kg/ha/yr)	Standard To Be Achieved (hg/ha/yr)
Gross Pollutants	500	30% (70% reduction) = 150
Total Suspended Solids	900	20% (80% reduction = 180
Total Phosphorus	2	55% (45% reduction) = 1.1
Total Nitrogen	15	55% (45% reduction) = 8.25

2.10 Rainfall Intensity

The Ku Ring Gai local government area, is subject to the following rainfall intensities;

- 5 Year ARI storm of 5 minutes duration with a rainfall intensity of 157mm/h
- 20 year ARI storm of 5 minutes duration with a rainfall intensity of 201mm/h
- 100 Year ARI storm of 5 minutes duration with a rainfall intensity of 257mm/h

3 Assessment

3.1 Development Assessment

The proposed development has been assessed as follows with regard to the requirements of DCP47;

1. Site Area 3,099m^2
2. Number Of Units 112
3. Development Type 5
4. Location A
5. Rainwater Storage 1,000L per unit, totalling 112,000L
6. Stormwater Detention Required
7. Catchment Gordon Creek 1 (GC1)
8. Water Quality Required

3.2 Overland Flow

The site is located at a high point within the local catchment area, bounded on three sides by existing roadways and on the remaining side by an existing building. As such there is no significant overland flow entering the site that would require any dedicated capture and transfer pipework system.

Some minor overland flow may be expected from the rear of existing properties at 39 & 41 Lindfield Avenue, which will continue to travel overland through the associated right of way and drainage easement into Havilah Lane.

3.3 Site Stormwater Connection

A site stormwater connection for the development will be facilitated by the removal of redundant sections of Havilah Lane stormwater main that are currently located within the development site (but retain connection of 39 & 41 Lindfield Avenue sites) and making a new 375mm connection to the remaining stormwater main just inside the development sites north east boundary.

3.4 System Description

Stormwater detention will be provided via a combination of rainwater storage and dedicated on-site stormwater detention storage. The combined facility shall be constructed with in-situ concrete, having two tank chambers separated by an internal wall forming a weir overflow between the two chambers.

The first chamber of the combined tank structure is a rainwater storage tank suspended at high level within the lower ground level carpark slab, and having the tank footprint located outside the ground floor building line. The rainwater storage tank will be accessed via two separate 900mm square pit covers located outside of the main building line, adjacent to Kochia Lane. Rainwater from roof levels of the building will be piped to discharge directly into the rainwater storage tank, after which any excess discharge into the rainwater storage tank will overflow into the stormwater detention tank. Key dimensions of the rainwater storage tank are as follows;

- Top Water Level RL 98.40
- Tank Volume 112.000m^3
- Applied Credit Towards Detention 15.619m^3 (25% of Site Storage Requirement)

The second chamber of the combined tank structure is a stormwater detention tank suspended at high level above the lower ground level carpark slab, and having the tank footprint located outside the ground floor building line. The stormwater detention tank will be accessed via two separate 900mm square pit covers located outside of the main building line, adjacent to Kochia Lane. Stormwater run-off from all balcony and podium areas will be piped to discharge directly

into the stormwater detention tank. Detention tank outlet control will be provided by an orifice plate to limit site stormwater discharge to the maximum flow of 23.8L/s as determined for the site stormwater controls. An internal overflow weir will be provided to allow for full 100 year ARI overflow in the event of a control outlet blockage. Key dimensions of the stormwater detention tank are as follows;

- Tank Base Area 63.00m^2
- Top Water Level RL 97.35
- Tank Base Level RL 96.55
- Required Tank Volume 62.476m^3
- Provided Tank Volume 50.400m^3 (25% deduction for rainwater storage)
- Permissible Site Discharge 23.8L/s
- Orifice Diameter 112mm

It can be seen that the total minimum site storage requirement of 62.476m^3 has been achieved with the proposed design as follow;

Dedicated Stormwater Detention Volume	50.400m^3
Applied Rainwater Storage Volume	15.619m^3
Total Site Storage Provision	**66.019m^3**

3.5 Water Quality

Stormwater quality will be addressed via four separate treatment processes as follows;

- Vehicular pollution will be dealt with via a Gross Pollutant Trap installed to treat run-off from all carpark areas, prior to discharge of the run-off into the stormwater detention tank.
- A dedicated vehicle wash bay has been provided which includes an oil separation plant to capture all run-off from the wash down process, and provide the required pre-treatment (oil & grease removal) prior to discharge of the waste water into the sewer drainage system.
- Roof water from the development will discharge into the rainwater storage tank, which will provide for a reduction in total suspended solids by settlement over time as well as tank inlet screening.
- The on-site stormwater detention tank will be designed to incorporate a silt trap as the final water quality process prior to discharge of stormwater from the site to the Councils stormwater drainage system.

We therefore confirm that the development will meet Council minimum requirements in terms of Water Quality, via inclusion of the treatment processes outlined above.

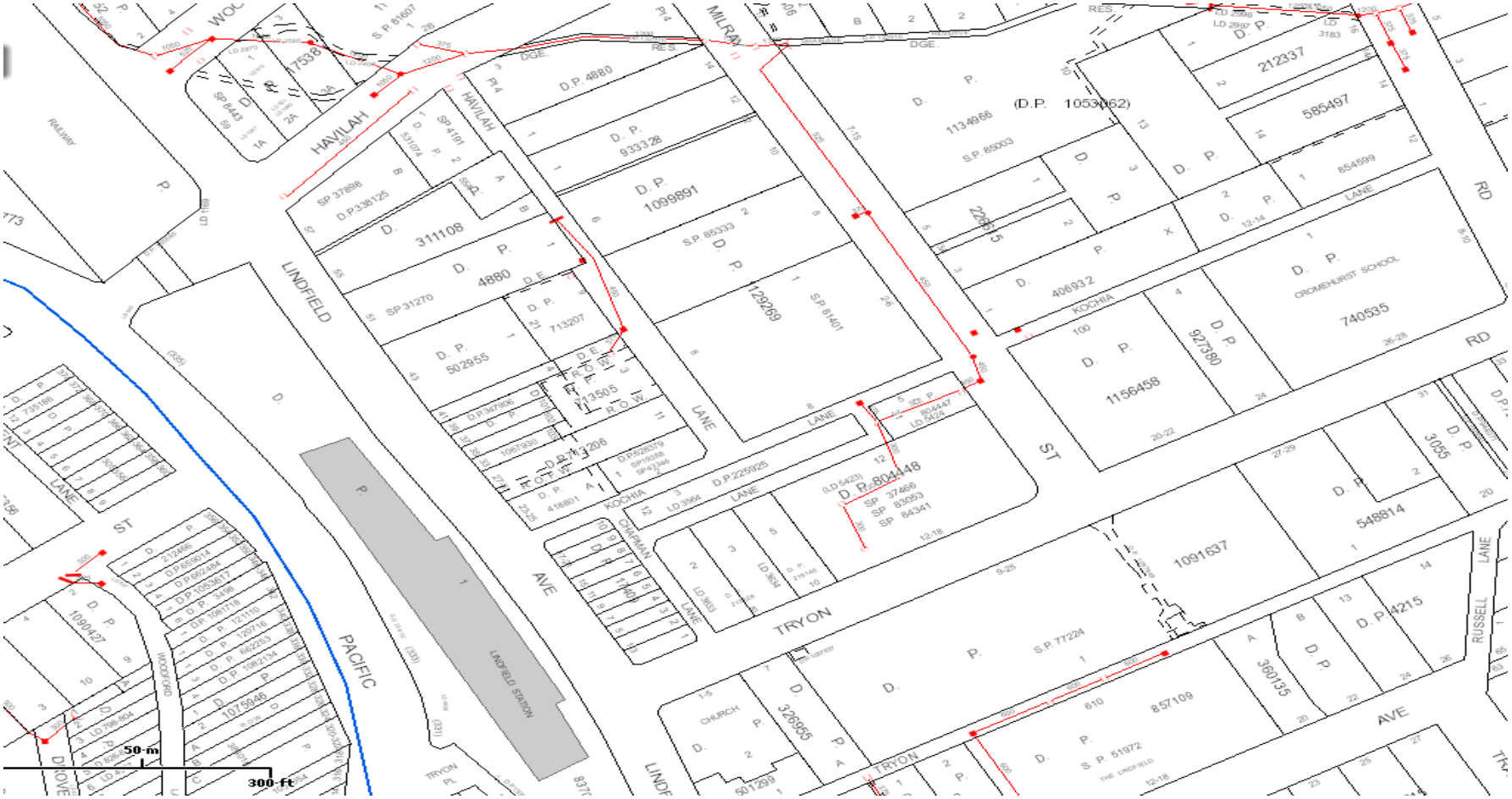
4 APPENDIX

4.1 Stormwater Main Diagram

4.2 OSD Catchment Plan

4.3 Detention Calculations

23-31 Lindfield Avenue, Lindfield



Appendix 1
Drainage Catchments for On-site Detention

17-03-2004

Project Name: Mixed Residential Development
Project Address: 23-37 Lindfield Avenue, Lindfield
Project Number: 20120033
Date: 21/08/2012
Engineer: Brett Lipscombe

OSD Parameters

Code	Catchment Area	Permitted Site Discharge (L/s/ha)	Minimum OSD Storage Volume (m^3/ha)
AC1	Avondale Creek	102	398
AC2	Avondale Creek	166	241
BB1	Blackbutt Creek	141	302
BB2	Blackbutt Creek	166	241
BC1	Cowan Creek	96	414
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RC2	Rocky Creek	166	241
SG1	Spring Gully Creek	134	320
SG2	Spring Gully Creek	166	241

Catchment Code **GC1**

Site Area (m) **3099.0**

Basic Catchment PSD	128	(A)
Basic Catchement SSR	336	(B)
60% of Site Area	1859.4	(C)
By-Pass Area	0.0	
Total Impervious Area	3099.0	(D)
Impervious By-Pass	0.0	(E)

Basic PSD	23.8	(C*A) (Flow 1)
PSD Correction Factor	0.0	(E/D) (must be <0.25) (F)
PSD Adjustment	0.0	(Flow 1*F) (Flow 2)
Final PSD (L/s)	**23.8**	(Flow 1-Flow 2)

Basic OSD Storage (m^3)	62.476	(C*B) (SSR 1)
Landscape Storage (m^3)	74.971	(SSR 1*1.2) (SSR 2)

Outlet Depth (m)	0.800
Outlet Diameter (mm)	112