
Sent: 7/09/2021 12:48:17 PM

Subject: Submission DA2021/1469 23 Loch St, Freshwater.

Attachments: JCL Report Issue No.2 2021-X-28.pdf; JCL Ref. Doc 1 - 23 Loch Street.pdf; JCL reference Doc 2.pdf; JCL Reference doc 3 Drawing 2020-W34-H01.pdf; JCL reference Doc 4.pdf; JCL reference documents No. 5- X-28 Loch St model input data.pdf; JCL reference document No.6 X-28 Loch St model results data^.pdf; NBC-WMDP extract doc 20-24.pdf;

Submission Attention Alex Keller,

This submission is for Mark and Megan Aubrey as owners of 2 Wyadra Ave Freshwater, and also 14 Ellen St Curl Curl.

We were approached prior to the applicant submitting DA2021/1469 in order for us to gauge the effectiveness of their proposed storm water runoff design.

JCL Development solutions were commissioned to do a report regarding the suitability for 2 Wyadra Ave which sits directly below the proposed runoff.

It should also be noted that 14 Ellen St adjoins both 2 Wyadra and 23 Loch St and given the fall of the land it would also be seriously affected by any increase in runoff from the proposed spreading design.

Attached is the report and supporting documents that point out the inadequacies of the proposed system.

Regards

Mark & Megan Aubrey
2 Wyadra Ave, Freshwater.
14 Ellen St, Curl Curl.

Ph: Mark 0413641735
doodskat@bigpond.net.au



No. 23 Loch Street & No. 2 Wyadra Avenue, Freshwater.

Report Prepared For:

Mr Mark Aubrey, No. 2 Wyadra Ave, Freshwater.

Report Subject: Proposed redevelopment of 23 Loch Street
Stormwater management Design.

Report No. 2021/X-28

Issue 2- 6th September 2021

Prepared by: James Olive, Hydraulic Systems Design Manager.

Signed:

A handwritten signature in black ink, appearing to be 'James Olive', is written over the 'Signed:' text.

JCL Development Solutions

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Desktop assessment of proposed No23 Loch Street development plans.

JCL have been requested to provide comment on the proposal to discharge storm runoff from No. 23 Loch Street, see attached ITM Design drawing H-DA-02, including JCL comments, marked as JCL Reference Document No.2.

JCL previously prepared a report on this proposal for Mr. Mark Aubrey, see attached JCL Reference Documents No. 5 & 6.

- JCL Ref. Doc. No. 5 is a DRAINS Model input data file based on assessment of the ITH Design planning strategy and listed design calculations.
- JCL Ref. Doc. No. 6 is a DRAINS Model results data file that confirms a developed overland discharge of storm runoff from the proposed soil infiltration system, 24.969 l/s overtopping 11m weir element. This overland flow discharges directly across No.2 Wyadra Avenues site development zone.

As shown on the JCL Reference Document No.2 ITM Design proposal confirms the direct disposal of storm runoff from the redevelopment of 23 Loch Street onto No. 2 Wyadra Avenue.

The other issue that requires confirmation is in relation to No. 25 Loch Streets reduction in land area due to boundary adjustment resulting in loss of storm water management area at rear of property to No. 23 Loch Streets increased land area.

JCL reference documents numbers 1, 3 & 4 question the impact of control of storm water discharge from No. 25 Loch Street due to loss of potential storm water infiltration area in the Eastern Zone of block.

As shown on JCL reference document No. 3 existing surface levels question whether the storm discharge from No. 25 Loch Street building roof catchment currently is discharged to Loch Street or to existing soil profile absorption trenches in the Eastern Zone, rear of block, which with the redevelopment of No. 23 Loch Street will be made redundant.

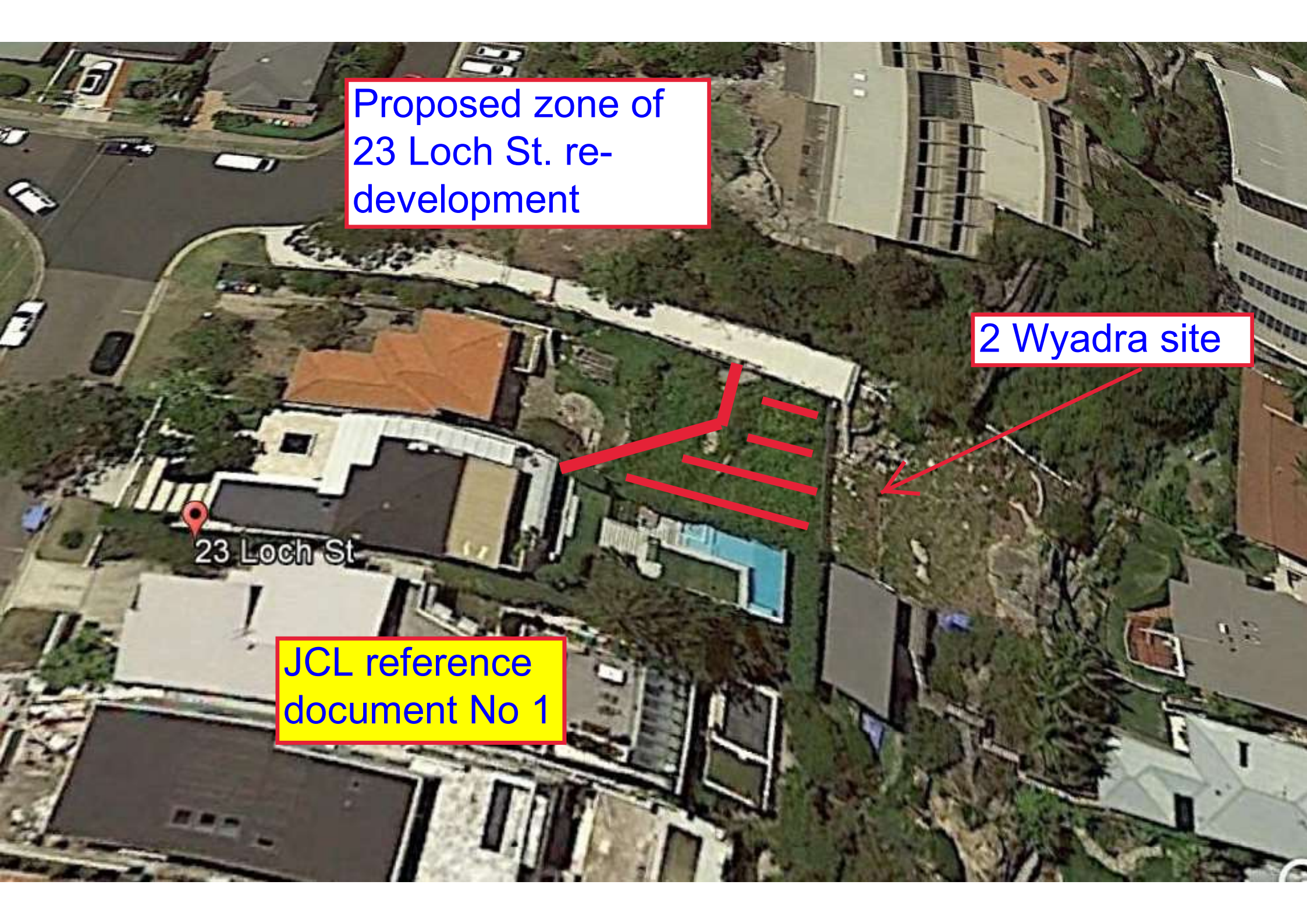
JCL recommend that the current method of storm water runoff from No. 25 Loch Street be confirmed by site investigation.

JCL are of the opinion that the proposal of On-Site Stormwater management as shown on ITM Design drawings is not compliant with the clear direction and expectations of the Northern Beaches Council Water Management for Development Policy as listed in section 5.0, see attached policy extract.

The NBC policy in clause 5.5 Stormwater drainage from Low Level Properties clearly states in 5.5.1.1.2 the performance requirements for Onsite Stormwater Absorption systems and 5.5.1.1.3 for disposal by Level Spreader, it is the JCL opinion that the proposed design is non-compliant with these design controls.

Signed 02/09/2021

James P. Olive.



Proposed zone of
23 Loch St. re-
development

This is an aerial photograph of a residential neighborhood. A red-outlined box in the upper left contains the text 'Proposed zone of 23 Loch St. re-development'. A red pin on the left side marks '23 Loch St'. A yellow box in the lower left is labeled 'JCL reference document No 1'. A red-outlined box on the right is labeled '2 Wyadra site', with a red arrow pointing to a wooded area. Several red lines, including a thick L-shaped line and several parallel diagonal lines, are drawn across the center of the image, likely indicating a specific area of interest or a boundary.

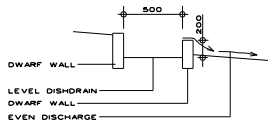
2 Wyadra site

23 Loch St

JCL reference
document No 1

- NOT FOR CONSTRUCTION
- FINAL LOCATION OF ALL DOWNPIPES, PITS, RAINWATER OUTLETS AND SUBSOIL PIPES TO BE CONFIRMED DURING CONSTRUCTION CERTIFICATE STAGE OF THE PROPOSED DEVELOPMENT

ALL LANDSCAPED AREAS LOCATED ABOVE CONCRETE SLABS
TO BE EQUIPPED WITH WATERPROOFING MEMBRANE,
DRAINAGE CELL AND GEOFABRIC



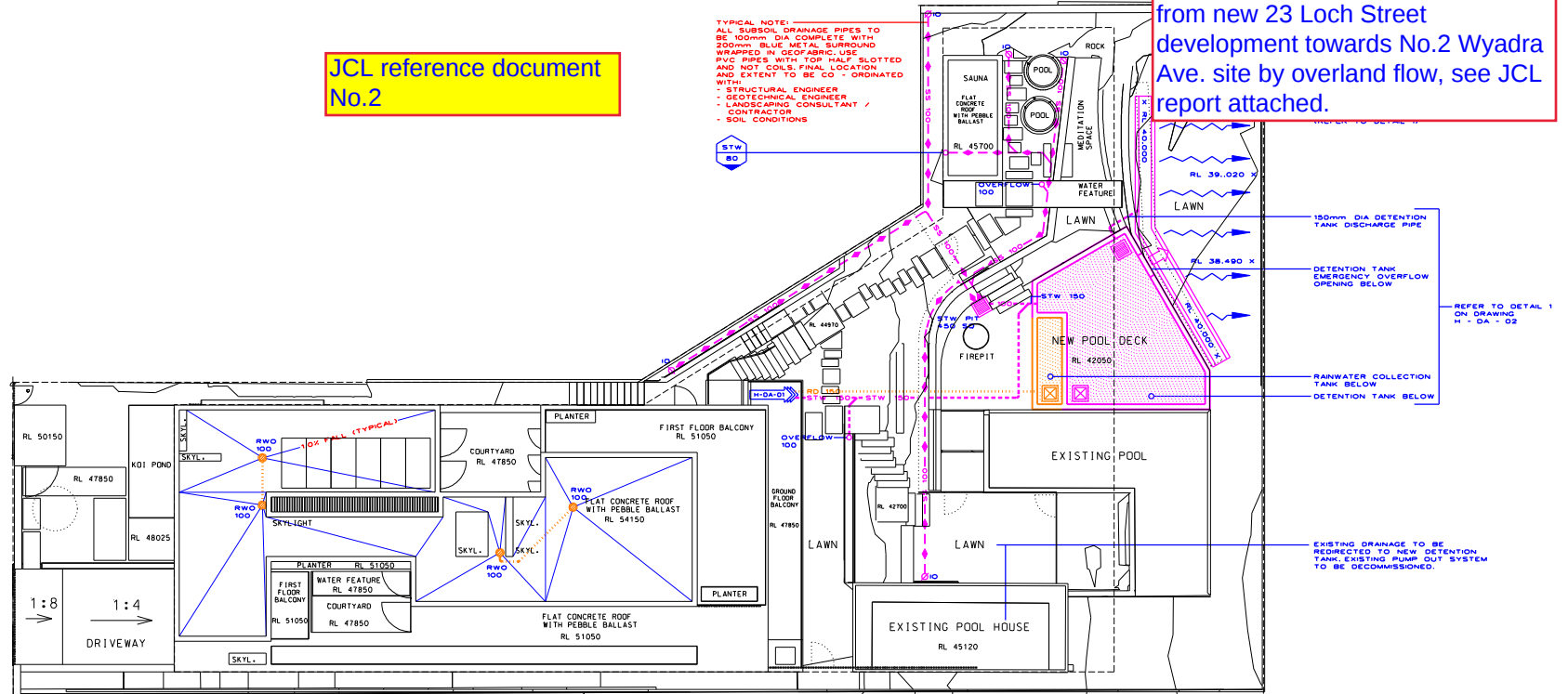
NTS

TYPICAL NOTE: ALL SUBSOIL DRAINAGE PIPES TO BE 100mm DIA COMPLETE WITH 200mm BLUE METAL SURROUND WRAPPED IN GEOTAFIBRE USE PVC PIPES WITH TOP HALF SLOTTED AND NOT COILS: FINAL LOCATION AND EXTENT TO BE CO - ORDINATED WITH:

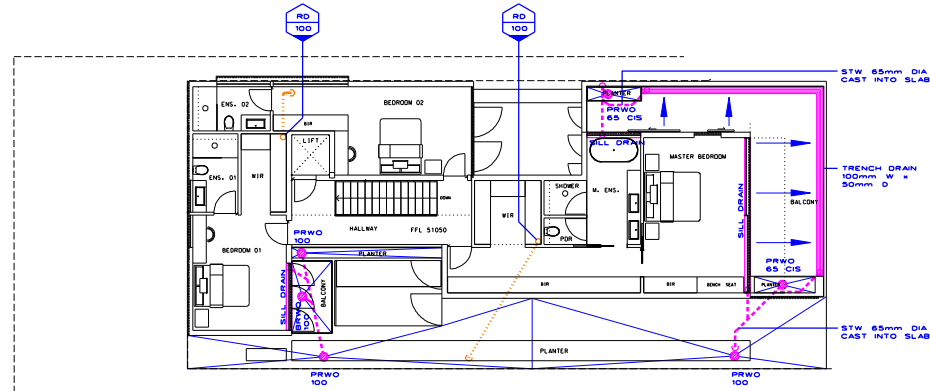
- STRUCTURAL ENGINEER
- GEOTECHNICAL ENGINEER
- LANDSCAPING CONSULTANT / CONTRACTOR
- SOIL CONDITIONS

NOTES
FOR GENERAL NOTES AND LEGEND
REFER TO DRAWING M - 04 - 00

Proposal is to direct storm flows from new 23 Loch Street development towards No.2 Wyadra Ave. site by overland flow, see JCL report attached.



ROOF / SITE



FIRST FLOOR

APPROVAL



C	RE - ISSUED FOR DA	13.07.21
B	RE - ISSUED FOR DA	08.07.21
A	ISSUED FOR DA	03.06.21
REV	DESCRIPTION	DATE

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PROJECT
23 LOCH STREET
FRESHWATER

DRAWING TITLE
FIRST FLOOR AND
ROOF / SITE
STORMWATER

SCALE		JOB No	
1:100 @ A1 / 1:200 @ A3		19/152	
DISCIPLINE	DRAWING No	REVISION	
HYD	H-DA-02	C	

WTDABRANIZG

JCL reference document No.3

? On existing disposal of Storm Water runoff from Existing building roof catchment, is there current disposal by infiltration into soil profile of roof and hard surface storm runoff.

Surface Fall ← Surface Fall

proposed new building development zone storm runoff disposal location

18 L/s STORM EVENT (1% EVENT) OVERFLOW ACCROSS SERVICES EASEMENT FROM EXISTING S.I.P. No1
TOTAL SHEET FLOW DEPTH 16mm
TOTAL SHEET FLOW WIDTH 1.63 mtr
TOTAL SHET FLOW VELOCITY 1.33 m/s

1. EXISTING ZONE UNABLE TO DRAIN BY OVERLAND FLOW TO NORTHERN SERVICES EASEMENT LOCATED ON No16 ELLEN ST
TOTAL AREA 30.2 m2

2. EXISTING ZONE ABLE TO BE DRAINED AS PRIMARY PIPE SYSTEM AND OVERLAND FLOW TO NORTHERN EASEMENT TOTAL AREA 655.80m2

3. HYDROLOGICAL MODEL INPUTS
- PAVEMENT AREA DEPRSSION STORAGE 1mm
- SUPPLEMENT DEPRESSION STORAGE 1mm
- GRASSED DEPRESSION STORAGE 5mm
- SOIL TYPE 3(A/MC)
- % OF No2 WYADRA AVE ASSESSED IMPERVIOUS 60%
- % OF No2 WYADRA AVE ASSESSED AS PERVIOUS 40%
- % UNABLE TO DRAIN TO SERVICES EASEMENT AS OVERLAND FLOW 4.4%

4. RAINFALL DATA FOR 33.7125 (S) - 151.2875(E)
1% 5 min STORM 261mm/hr
5% 5 min STORM 198 mm/hr

5. DRAINS MODEL RESULTS
- PEAK 1% STORM EVENT FLOW TO S.I.P. No1 43 l/s
- TOTAL FLOW ABLE TO BE COLLECTED INTO S.I.P. No1 AND DISCHARGE THROUGH EXISTING 150mm S.W. LINE 25 L/s @ 1.35 m/s
- TOTAL FLOW DIVERTED TO SERVICES EASEMENT VIA O/F ROUTE No1 - 18 L/s

6. SUMMARY
THE EXISTING SERVICES EASEMENTS PERFORMANCE FOR CONTROL OF THE 1% STORM EVENT DISCHARGE FROM THE INCREASED LOT AREA, TOTAL 686m2 OF No 2 WYADRA AVENUE HAS BEEN MODELED IN DRAINS COMPUTING SOFTWARE WITH THE FOLLOWING RESULTS
- THE EXISTING SERVICES EASEMENT CONTROLS THE 1% STORM EVENT DISCHARGE
SEE - DRAINS MODEL RESULTS, 5 ON THIS PLAN
- DRAINS MODEL INPUT AND RESULTS DATA SPREAD SHEETS
- O/F 1 DEPTH VS TIME GRAPH

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A PRELIMINARY
Issue: Description:

DATE
Date:

Project: No 2 Wyadra Ave Curl Curl
Drawing Title: Services Easement Analysis

Date: 16-06-20
Scale: 1:150
Plan No: 1/1
Drawing By: MB
Design By: JO
Checked By: JO

Drawing No: 2020-W34/H01
Issued For: DA

JCL DEVELOPMENT SOLUTIONS
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North Point.



Google Earth



JCL Project X-28 Wyadra – 23 Loch Street, Freshwater

DRAINS input data file + ITM design assessed parameters. 12/07/2021

SUB-CATCHMENT DETAILS

Name		Total	Paved	Grass	Supp	Paved	Grass	Supp
	Node	Area	Area	Area	Area	Tc	Tc	Tc
		(ha)	%	%	%	(min)	(min)	(min)
Cat1 Pre Dev	N1	0.0883	50.6	49.4	0.0	2	5	2
Cat1 Post Dev	N1	0.0883	59.0	41.0	0.0	2	5	2

IFD Data (33.7694 S) (151.292 E)

5% 5 min 20.00 mm/hr

5% 30 min 92.80 mm/hr

5% 60 min 58.00 mm/hr

1% 5 min 262.00 mm/hr

1% 30 min 122.00 mm/hr

Storm Runoff Infiltration Trench Detail

ITM Plan H-DA-02-Rev.A, 11m long x 0.5m wide Assumed grass swale/dish drain with 200mm ponding allowance, infiltration area 5.5m².

Assessed Ksat for Light Clay soil profile 0.5m/m²/day.

Soil erodibility factor (Critical Velocity) for grass surface over light clay HIGH for 6 hr period of inundation (@ 1.4m/s)

Modelled storm water runoff infiltration through proposed 5.5m² surface area 0.031 l/s (114 litres)

Design PSD 25 l/s via 107mm DIA OSD orifice plate discharging to infiltration swale/dish drain.

JCL Project X – 28 Wyadra – 23 Loch Street, Freshwater

DRAINS results prepared from Version 2020.061 + JCL Proposed SW Management System Assessment

SUB-CATCHMENT HYDROGRAPH DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Total Volume	Due to Storm	
Cat1 Pre Dev	0.043	0.030	0.013	5.00	5.00	2.00	12.4m3	X28 1%	5 min
	0.012	0.012	0.00	5.00	5.00	2.00	3.6m3	X28 1%	30 min
	0.004	0.004	0.00	5.00	5.00	2.00	1.3m3	X28 5%	60 min
	0.009	0.009	0.00	5.00	5.00	2.00	2.6m3	X28 5%	30 min
	0.028	0.022	0.06	5.00	5.00	2.00	7.9m3	X28 5%	5 min
Cat1 Post Dev	0.046	0.034	0.011	5.00	5.00	2.00	13.3m3	X28 1%	5 min
	0.014	0.014	0.00	5.00	5.00	2.00	4.3m3	X28 1%	30 min
	0.005	0.005	0.00	5.00	5.00	2.00	1.5m3	X28 5%	60 min
	0.010	0.010	0.00	5.00	5.00	2.00	3.0m3	X28 5%	30 min
	0.030	0.025	0.005	5.00	5.00	2.00	8.7m3	X28 5%	5 min

CONTINUITY CHECK for X28 1% 5 min storm

Node	Inflow	Outflow	Storage Change	Difference
	(cu.m)	(cu.m)	(cu.m)	%
N1	12.42	12.42	0.00	0.0
N2	13.28	13.28	0.00	0.0

Proposed 23 Loch Street Infiltration Swale/Dish Drain Assessed Performance.

Based on the nominated 25 l/s PSD and calculated disposal by infiltration of design storm runoff into site soil profile at 0.031 l/s the resultant weir overflow of the proposed system equates to 24.969 l/s across the 11m weir length at a velocity of V 0.29 m/s.

Note: This resultant velocity of weir overflow is not considered critical for potential erosion of grass surfaced soils.

The main concern will be with the total volume of storm water runoff from 23 Loch Streets proposed post development stormwater management system that includes disposal of Design Storm Runoff onto No. 2 Wyadra via both sub-surface infiltration and overland storm flows.

For the AS3500.3=2018 1 in 20 yr. (5%) Design Storm Event a total volume of 8.7m³ (8,700 litres) of collected storm runoff is required to be disposed of.

Based on the nominated PSD of 25 l/s less the assessed Ksat values of site soils (0.031 l/s) there is a resultant requirement to discharge 8.7 m³ (8700 litres) @ 24.9 l/s as overland sheet flow from the OSD over a 5.83 minute time step.

For the 1 in 100 yr. (1%) Design Storm Event the total volume increases to 13.3 m³ (13,300 litres) with a resultant time step for disposal of 8.9 minutes.

This overflow of collected storm runoff from 23 Loch Street will therefore be a sheet flow of water that leaves the proposed infiltration systems 11m long weir overflow and follows the natural ground surface contours that potentially can concentrate the flows into individual channels which will result in the requirement for No.2 Wyadra to include interception of these surface flows for controlled discharge.

The option of including the 23 Loch Street collected storm flows into No.2 Wyadras final storm water managements discharge system within the existing No.16 Ellen Streets northern stormwater easement would require replacement of the existing 150mm dia pipeline and creation of an easement benefiting No.23 Loch over No.2 Wyadra.

Current advice from the owners of No.16 Ellen Street is that this option to modify the existing stormwater drainage easement located on the northern boundary of No.16 Ellen Street will not be permitted.

There may be an opportunity to negotiate an easement for stormwater management, benefiting No.23 Loch Street, over No.12 Ellen Street.

The other effect of large volumes of storm runoff from 23 Loch discharging across the lower contours soil profile on No. 2 Wyadra will be the long term saturation of the soil profile. This will add to the time step required for the soil profile to dry noting that the soil profile will be intentionally saturated from the proposed infiltration trench on No. 23 Loch Street. As the soil profile transports the sub-soil water downslope there is also the risk of erosion of the soil profile layers (denude) with resultant further rock exposure.

5.0 Disposal of Stormwater

5.1 General

All works are to be designed, constructed and installed in accordance with the following:

- a) Stormwater drainage for all properties must be by gravity means. Mechanical methods of stormwater disposal (e.g. pump-out systems) will only be permitted for draining sub-surface flows from underground areas and basement car parks where a direct connection to a Council drainage system can be achieved. No pump-out or seepage flows are to be discharged to the kerb.
- b) Diverting flows from one catchment (or sub-catchment) to another catchment (or sub-catchment) will not be permitted. Properties must drain in the direction of their natural catchment.
- c) Private drainage easements obtained through downstream properties for piping flows to a public drainage system, at the applicant's expense, are strongly encouraged. Refer to Section 6.6 for further requirements regarding drainage easements.
- d) All drainage structures are to be designed to be visually unobtrusive and sympathetic with the proposed development and the surrounding environment i.e. water sensitive urban design.
- e) Disposal of stormwater must not unreasonably impact on the downstream environment.
- f) Piping the property drainage system across a public road is not permitted. Consideration will be given to extending Council's system across the public road to facilitate disposal of stormwater from the property at the applicant's expense.
- g) Stormwater drainage works must be approved by Council under the provisions of the Roads Act 1993 and Local Government Act 1993.

5.2 Street & Trunk Drainage

- a) Street and trunk drainage is to be designed and constructed so as to:
 - i) provide convenience and safety for pedestrians and traffic during storm events
 - ii) minimise damage to private and public buildings
 - iii) minimise risks to life and property by overland flow during major storm events.
- b) Street and trunk drainage must comply with the following specifications:
 - i) Auspec1 Design Manual
 - ii) Minor Work Specification

5.3 Discharge to Roads and Maritime Service Drainage Systems

Where stormwater is to be discharged to the street gutter or underground drainage system of a road that is under the control of the Roads & Maritime Services (RMS), Council will refer the development application to the RMS for review.

5.4 Properties Unable to Connect to a Council Stormwater Drainage System or Easement

- a) Any property that is unable to connect to a Council stormwater drainage system, such as land falling naturally away from a Council stormwater drainage system, is required to comply with Section 5.5 of this Policy.
- b) Developments proposing to discharge stormwater to a watercourse or open channel must comply with the requirements of Section 4.4 – Stormwater Discharge to Watercourse or Open Channel.
- c) Where an inter-allotment drainage easement is to be created, a letter of agreement to the creation of the easement from all the affected property owners shall accompany the development application. This is to demonstrate to Council that a suitable easement/s can be obtained. The letter/s shall be accompanied with a plan of the location of the proposed easement/s also signed by all the affected property owners. The letter/s is/are not to contain any conditions that may preclude the creation of the easement.

5.5 Stormwater Drainage from Low Level Properties

The purpose of this section is to:

- a) Manage overland flow, nuisance flooding and groundwater related damage caused by low level properties to adjacent downstream properties during storm events
- b) Manage the impact of stormwater runoff on Council's stormwater drainage infrastructure as a result of any development on a low level property and ensure low level properties drain to their natural downstream catchment
- c) Provide guidance for applicants with a property that naturally falls away from the street, for an appropriate drainage system and lawful point of discharge acceptable to Council.

5.5.1 Alternate Discharge Approach

This applies to all types of developments and land uses where these properties fall naturally away from the street and cannot connect directly to a Council drainage system. The requirement for stormwater disposal is dependent on the type of proposed development or proposed land use for the property.

Council is to be satisfied that all avenues of Stage 1 (Section 5.5.1.1 and 5.5.1.2) have been exhaustively investigated and these avenues considered impractical or unviable, prior to Council consenting to the property owner or developer progressing to the next stage. The same process must be followed as applicants proceed sequentially through the stages before finding an appropriate discharge solution.

OSD is to be provided in accordance with Section 9 of this policy.

5.5.1.1 New Single Dwelling House

For a development where a new single dwelling house (and any ancillary structures such as granny flats) is proposed, stormwater disposal from the site shall be in accordance with the following sections.

5.5.1.1.1 Stage 1 – Inter-Allotment Drainage Easements

Proponents of the development must exhaustively investigate the below options for stormwater drainage:

- a) Connection of stormwater to an existing Council stormwater drainage line located within the subject site, subject to the drainage line having sufficient capacity.

- b) Connection of stormwater to an existing inter-allotment drainage easement and pipeline subject to the property owner demonstrating the inter-allotment pipeline has sufficient capacity and the property owner having a formal drainage easement created over the inter-allotment pipeline within the downstream property. If the existing inter-allotment pipeline does not have sufficient capacity, the capacity of the pipeline will need to be increased to cater for the additional flow.
- c) Creation of a new easement to drain stormwater to Council's drainage infrastructure through the downstream property(s).

Noting there may be difficulties obtaining an easement through multiple properties, the property owner is to ascertain which adjoining downstream property(s) it may be feasible and practical to drain stormwater through, and then approach the owner(s) to request an easement be granted for the purpose of draining stormwater to Council's drainage system (Appendix 2- Sample Letter). If the property owner is unable to attain any written approval from the adjacent downstream property owner(s), the property owner is to then enclose a Statutory Declaration stating the above.

5.5.1.1.2 Stage 2 – Onsite Stormwater Absorption

Where the means of disposal in Stage 1 are not available, the use of an on-site absorption system will be permitted subject to the following:

- a) The on-site absorption system is designed by a suitably experienced and qualified civil engineer
- b) The on-site absorption system will not have an adverse impact upon adjoining and/or downstream properties by the direction or concentration of stormwater on those properties
- c) Soil absorption characteristics and other physical constraints indicate the on-site absorption system is appropriate for the property (refer Appendix 3 – On-site Absorption Design Guidelines).

The on-site absorption system shall require the creation of a Positive Covenant and Restriction on Use of Land over the system.

5.5.1.1.3 Stage 3 – Level Spreader

Where the means of disposal in Stage 1 and Stage 2 are not available, the use of a level spreader will be permitted subject to the following circumstances:

- a) The level spreader will have minimal impact on the upon adjoining property, including public reserves and parks, by the direction and flow of stormwater
- b) Soil absorption characteristics and other physical constraints indicate the on-site absorption system is not appropriate for the property (refer Appendix 3 – On-site Absorption Design Guidelines)
- c) Compliance with any requirements of the affected downstream property owners.

The level spreader shall require the creation of a Positive Covenant and Restriction on Use of Land over the system.

5.5.1.1.4 Stage 4 – Other Methods

Other methods of stormwater disposal may be considered, if all of the abovementioned methods have been exhaustively investigated and were considered not appropriate for this development.

5.5.1.2 Alterations and Additions to a Single Dwelling House and Granny Flats

5.5.1.2.1 Stage 1 – Discharge to an Existing Drainage System

Connection of stormwater to the existing stormwater disposal system will be permitted under the following circumstances:

- a) Connection into an existing inter-allotment stormwater pipeline or Council's stormwater pipeline subject to the drainage pipeline having sufficient capacity and the property owner having formal drainage easement(s) created over the above pipeline within the downstream property(s) or the existing drainage system was previously approved by Council
- b) There are no valid objections of overland flow and groundwater related damage and the associated inconvenience from downstream property owners.

5.5.1.2.2 Stage 2 – Inter-Allotment Drainage Easement

Where the means of disposal in Stage 1 is not available, the creation of a new drainage easement will be required subject to creation of a new easement to drain stormwater to Council's drainage infrastructure through the downstream property(s).

Noting there may be difficulties obtaining an easement through multiple properties, the property owner is to ascertain which adjoining downstream property(s) it may be feasible and practical to drain stormwater through, and then approach the owner(s) to request an easement be granted for the purpose of draining stormwater to Council's drainage system (refer Appendix 2 - Sample Letter). If the property owner is unable to attain any written approval from the adjacent downstream property owner(s), the property owner is to then enclose a Statutory Declaration stating the above.

5.5.1.2.3 Stage 3 – On-Site Stormwater Absorption

Where the means of disposal in Stage 1 and Stage 2 are not available, the use of an on-site absorption system will be permitted subject to the following:

- a) The on-site absorption system is designed by a suitably experienced and qualified civil engineer
- b) The on-site absorption system will not have an adverse impact upon adjoining and/or downstream properties by the direction or concentration of stormwater on those properties
- c) Soil absorption characteristics and other physical constraints indicate the on-site absorption system is appropriate for the property (refer Appendix 3 – On-site Absorption Design Guidelines).

The on-site absorption system shall require the creation of a Positive Covenant and Restriction on Use of Land over the system.

5.5.1.2.4 Stage 4 – Level Spreader

Where the means of disposal in Stages 1, 2 and 3 are not available, the use of level spreader will be permitted subject to the following circumstances:

- a) The level spreader will have minimal impact on the adjoining property, including public reserves and parks, by the direction and flow of stormwater
- b) Soil absorption characteristics and other physical constraints indicate the on-site absorption system is not appropriate for the property (refer Appendix 3 – On-site Absorption Design Guidelines)
- c) Compliance with any requirements of the affected downstream property owners
- d) The level spreader shall require the creation of a Positive Covenant and Restriction on Use of Land over the system to be registered with the New South Wales Land Registry Service.

5.5.1.2.5 Stage 5 – Other Methods

Other methods of stormwater disposal may be considered, if all of the abovementioned methods have been exhaustively investigated and were considered not appropriate for this development.

5.5.1.3 All Other Developments

For all other developments, except dwelling houses and secondary dwellings, that is subdivision developments, commercial developments, industrial development, boarding houses and mixed commercial/industrial/residential, etc. stormwater disposal via a gravity fed pipeline is required where these properties fall naturally away from the street. An easement(s) to drain stormwater to Council's drainage infrastructure through the downstream property(s) is required.

An application under Section 88K of the Conveyancing Act 1919 can be made to allow the Court to consider making an order to impose an easement over land if the easement is reasonably necessary for the effective use or development of other land that will have the benefit of the easement.

Where the above cannot be achieved, the development application will not be supported.

5.6 Stormwater Entering Properties from Upstream Lots

- a) Runoff currently entering the site from upstream properties should not be obstructed from flowing onto the site nor redirected so as to increase the quantity or concentration of surface runoff entering adjoining properties.
- b) When a retaining wall is to be constructed across an overland flow path, any intercepted flow must be contained within the property where the retaining wall is required and this flow connected to the site drainage system.
- c) Where the overland flow rates could pose a risk to life and property, the requirements of Section 11.0 – Overland Flow Flooding will need to be satisfied.