

MEMORANDUM

TO: Nicole William (IRT)	REF: J1406-CIV-MEM-003[A]
FROM: Billy Adzioski (Innovis)	REV: A
PROJECT: IRT Woonona Redevelopment	DATE: 10/03/2026
TITLE: SSDA – Stormwater, Flooding and Channel	PAGES: 04

1.0 Purpose

This statement has been prepared in response to Item 2 in Attachment A – Additional Information Requested by the Department of Planning, Housing and Infrastructure on 25 February 2026, concerning the diversion of stormwater flow to the north of Building E. This statement is limited to the area raised within Item 2 and should be read in coordination with the landscape sketches provided by Arcadia.

2.0 Basis of Response

This response is based on the proposed wording from the department outlined below.

- 2. Diversion of stormwater flow to the north of Building E.** While the Department notes that the proposed stormwater culvert is necessary to divert stormwater around Building E, the Department is concerned with the poor landscape quality, visual appearance and safety of the culvert dominating the northern part of the site which is highly visible from surrounding residences and the Princess Highway. The Department therefore requires design changes (which could take place via condition, if approved) for this culvert to be replaced with 1.2m pipe, with a slight swale feature above with gentle side batters (at 1:4 to facilitate mowing). The Department considers that this change will improve landscape quality, visual appearance and safety.

3.0 Calculations


Innovis compared the flow capacity of the two options. Option 1 being the option proposed by the department, and Option 2 being the culvert option outlined by Innovis and Arcadia.

Option 1 – 1.2m (1200mm) Pipe

PIPE FLOW BY COLEBROOK-WHITE EQUATION	
Pipe Diameter	= 1200 mm
Pipe Slope	= 1.000 %
Colebrook-White Roughness k	= 0.03 mm
Kinematic Viscosity	= 1.007E-06 m ² /s
Flow Area	= 1130973 mm ²
Wetted Perimeter	= 3770 mm
Hydraulic Radius	= 300 mm
Reynolds Number	= 5726855 (Turbulent flow if > 4000)
Velocity	= 4.806 m/s
Flow	= 5.435 m ³ /s = 5435.2 L/s

Calculation based on AS2200 Design Charts for Water Supply and Sewerage

Calculation assumes the pipe flows full but not under pressure




Option 2 – 3.4m (3400mm) x 3.0m (3400mm) Culvert

BOX CONDUIT FLOW BY COLEBROOK-WHITE EQUATION	
Conduit Depth	= 3500 mm
Conduit Width	= 3000 mm
Conduit Slope	= 1.000 %
Colebrook-White Roughness k	= 0.030 mm
Kinematic Viscosity	= 1.007E-06 m ² /s
Flow Area	= 10500000 mm ²
Wetted Perimeter	= 13000 mm
Hydraulic Radius	= 808 mm
Reynolds Number	= 30184901 (Turbulent flow if > 4000)
Velocity	= 8.685 m/s
Flow	= 91.189 m ³ /s = 91188.6 L/s (Single)

Calculation based on AS2200 Design Charts for Water Supply and Sewerage

Calculation assumes the conduit flows full but not under pressure



As can be seen from the calculation, the culvert has just over 18 times the flow capacity of the pipe. On this basis, we propose a culvert in lieu of the pipe.

4.0 Response

Based on calculations undertaken by Innovis, it is not agreed that the proposed culvert should be replaced by a 1.2m diameter pipe as this would not have sufficient flow capacity to convey the flows. We propose the condition be reworded as per the below:

2. **Diversion of stormwater flow to the north of Building E.** While the Department notes that the proposed stormwater culvert is necessary to divert stormwater around Building E, the Department is concerned with the poor landscape quality, visual appearance and safety of the culvert dominating the northern part of the site which is highly visible from surrounding residences and the Princess Highway. The Department therefore requires design changes (which could take place via condition, if approved) for this culvert to be ~~replaced with 1.2m pipe,~~ with a slight swale feature above with gentle side batters (at 1:4 to facilitate mowing). The Department considers that this change will improve landscape quality, visual appearance and safety.
fully enclosed

It is proposed that a culvert be provided. This culvert is to be capped/covered with a swale as outlined by the department. Innovis agree that this will provide a better visual appearance.

Please refer to sketch by Arcadia (Appendix A) for a visual representation of the proposed section.

Please contact the undersigned should further clarification be required.

Regards,



Billy Adzioski

Civil Associate Director

M +61 409 508 829

T 1300 466 043

E billy.adzioski@innovis.com.au

W www.innovis.com.au

Adelaide | Melbourne | Sydney | Auckland | London



Appendix A – Landscape Section & Visual Representation

