The HCAA has issued these documents for use by competent personnel deemed by the local and state/territory based engineering community & regulations. These templates are generic and pursuit to the requirements of the National Construction Code (NCC) require input by a suitably qualified personal. The templates are by no way are a complete guidance document, and are expected to be used by suitably qualified personal capable of understanding performance solutions as defined by the NCC. Some example guidance has been added for the State of NSW, this is to be suitably adjusted as required and verified. All data within this document is to be suitably verified by the suitably qualified person prior to use. The HCAA provides no warranty, no guarantee, or the like to the accuracy, validity or appropriateness of this data to your situation. Please be advised that you are using these documents at your own risk.

1. Find and replace (Ctrl + H) the following words to assist in completing the report:
    - InsertProjectName
    - InsertProjectAddress
    - InsertRevisionNumber
    - InsertRevisionName
    - InsertDate
    - InsertDesignerName
    - InsertCompanyName
    - InsertCompanyAddress
    - InsertCompanyPhoneNumber
    - InsertCompanyEmail
    - InsertClientName
    - InsertClientAddress
    - InsertClientPhoneNumber
    - InsertClientEmail
    - InsertDesignerTitle
    - InsertDesignerQualifications
    - Insert20YearAEP
    - Insert100YearAEP
    - InsertNumberOfDownpipesRequiredByFollowingTheDTSSolutions
    - InsertNumberOfDownpipesRequiredByUsingAPerformanceSolution
    - InsertLargestCatchmentSize
    - InsertLargestCatchmentSizeToIndividualDownpipe
    - InsertReviewerName
    - InsertReviewerCompanyName
    - InsertReviewerTitle
    - InsertReviewerQualifications
2. Insert all required Figures and Tables and reference them.
3. Add any sections you feel need to be added.
4. Yellow sections need you to insert information, green sections need your review + confirm
5. Send to the Private Certifier for their review and approval
6. Note in your design certificate that you have used a performance solution

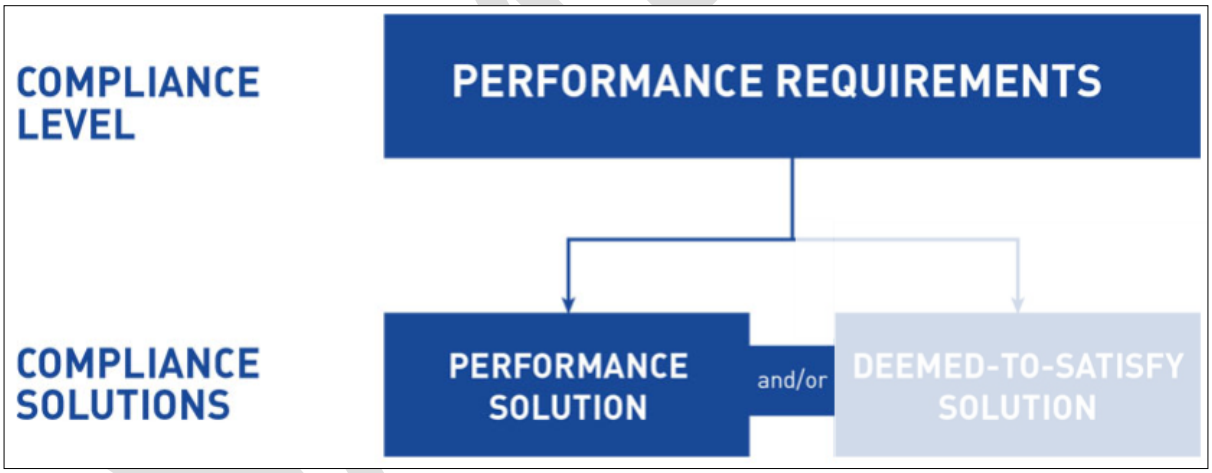
This page is a guide to the use of the performance solution template and does not form part of the performance solution, ensure this page is deleted prior to submitting the performance solution.

InsertCompanyLogo

InsertProjectName

InsertProjectAddress

Performance Solution – Box Gutters



Revision #	Revision Name	Date	Author
InsertRevisionNumber	InsertRevisionName	InsertDate	InsertDesignerName

Prepared By:

InsertCompanyName

InsertCompanyAddress

InsertCompanyPhoneNumber

InsertCompanyEmail

Prepared For:

InsertClientName

InsertClientAddress

InsertClientPhoneNumber

InsertClientEmail

Executive Summary

AS/NZS 3500.3:2018 Stormwater Drainage contains the deemed-to-satisfy (DTS) solutions on sizing box gutters to ensure compliance with the performance requirements of the National Construction Code (NCC) 2019. The performance requirement that specifically relates to the design of box gutters is FP1.1, FP1.2, and FP1.3 in the Building Code of Australia (BCA) 2019.

However, AS/NZS3500.3:2018 Stormwater Drainage is not fit for purpose when designing box gutters on anything other than a small roof as the limited information results in uneconomical outcomes. Therefore, to provide the best outcome possible on InsertProjectName, this project be utilising a performance solution.

We meet the performance requirements by using a combination of a performance solution and the DTS solutions as allowed under clause A2.1(3) of BCA 2019. We use the verification method of a calculation, using analytical methods or mathematical models as allowed under clause A2.2(2)(b) and A2.4 of BCA 2019.

This Performance Solution Pertains To:

This performance solution only pertains to the stormwater drainage design in relation to the size of box gutters and the size of their outlets on the roofs that are explicitly detailed in this report at InsertProjectAddress.

This Performance Solutions Has Been Prepared By:

Designer: InsertDesignerName

Company: InsertCompanyName

Title: InsertDesignerTitle

Qualifications: InsertDesignerQualifications

Contents

Update the contents and delete this text once the template has been completed

1. Introduction

InsertCompanyName are engaged by InsertClientName to design the box gutters for the roof stormwater drainage system on InsertProjectName which is located at InsertProjectAddress. Refer to the below site plan for an overview of the project location.

InsertSitePlan

AS/NZS 3500.3:2018 Stormwater Drainage contains the deemed-to-satisfy (DTS) solutions on box gutters to ensure compliance with the performance requirements of the National Construction Code (NCC) 2019. The performance requirement that specifically relates to the design of box gutters is FP1.1, FP1.2, and FP1.3 in the Building Code of Australia (BCA) 2019.

AS/NZS 3500.3:2018 Stormwater Drainage is not fit for purpose when designing box gutters on medium to large sized roofs as the limited information consequently produces uneconomical outcomes. Therefore, to provide the best outcome possible on InsertProjectName, we will be utilising a performance solution.

2. Reason for the Performance Solution

The design of a box gutter by following the DTS solutions of AS/NZS 3500.3:2018 Stormwater Drainage, most notably Figure 3.7.4, results in having an uneconomical number of downpipes. The reason for this is because the DTS solutions limits you to 16 L/s even though theoretical calculations shows that downpipes are capable of draining larger flow rates. On larger sized buildings, this results in having downpipes at intervals that are so minimal they impact on window and door layouts.

It is a common thought within the industry that the DTS solutions relate only to residential dwellings and other small buildings. A lack of study has so far prohibited the advancement of AS/NZS 3500.3:2018 Stormwater Drainage and in turn the performance solution option for complying with the performance requirements of the NCC is the process we need to follow in order to provide a fit for purpose outcome for the client.

3. Benefits of Using a Performance Solution

By using a performance solution on this project, we are able to reduce the number of downpipes required from InsertAmountOfDownpipesRequiredByFollowingTheDTSSolutions to InsertAmountOfDownpipesRequiredByUsingAPerformanceSolution.

AddOtherBenefitsIfThereAreAny:

- ??

4. Assumptions & Limitations

The following items have been assumed within our design:

- AddAssumptionsOrStateThereAreNone

The following items have been limitations so far within our design:

- AddLimitationsOrStateThereAreNone

5. Design Information

This performance solution pertains only to the box gutters on the roofs shown below.

InsertDrawing(s)ShowingRoofsThatThisPerformanceSolutionPertainsTo

The following information is specific to the box gutter design on the project and has been used within the calculations used to meet the performance requirements.

Rainfall Intensities:

20 Year AEP: Insert20YearAEP

100 Year AEP: Insert100YearAEP

InsertTableFromBoMShowingTheAEP

Roof Size:

Largest Catchment Size: InsertLargestCatchmentSize

Largest Catchment Size to Individual Downpipe: InsertLargestCatchmentSizeToIndividualDownpipe

6. Overview of the Calculations Used

The design of a box gutter needs to follow a combination of different calculations to ensure it is sized correctly. An overview of the different calculations that need to be undertaken to ensure a correct design are detailed below:

Design Component	Calculation Method
Catchment Area	The area of the catchment has been calculated by measuring and combining the following items: • The actual catchment • Façade runoff from wind blow rain • Overflows from above catchments Confirm this is correct, add the formula and edit as necessary
Catchment Flow Rate	The flow rate of the catchment has been calculated by using the rational method in conjunction with the AEP intensities. Confirm this is correct, add the formula and edit as necessary
Box Gutter Size	The box gutter channel has been sized using Manning's Formula for flow in an open channel. We are aware that this is not the most accurate calculation method for this application; however, it is conservative and results in a sufficient size. Confirm this is correct, add the formula and edit as necessary
Overflow Size	The overflow size has been sized using Manning's Formula for flow in an open channel. Confirm this is correct, add the formula and edit as necessary
Downpipe Size	The size of the downpipe has been based on a head over orifice calculation. Confirm this is correct, add the formula and edit as necessary
Sump Size	The size of the sump has been sized based on the results from the above calculations with additional allowances. Confirm this is correct, add the formula and edit as necessary

7. Overview of Compliance

The below table identifies the different levels of governance that needs to be complied with when undertaking and certifying a stormwater drainage design:

Generic Regulatory Requirement	Specific Regulatory Requirement
State & Territory Building Act	Environmental Planning & Assessment Act 1979

	Local Government Act 1993
State & Territory Building Regulation	Environmental Planning & Assessment Regulation 2000 Local Government Regulation 2005
Technical Standard	BCA 2019 (Volume One) Confirm this is correct and edit if you building classification is Class 1 or 10

To comply with the BCA 2019, we have followed the following process:

BCA Compliance Options	Specific BCA Compliance
Performance Solution and/or DTS	A combination of Performance Solution and DTS - A2.1(3)
Meeting the Performance Requirements	Other Verification Method - A2.2(2)(b)
Verification Method	A calculation, using analytical methods or mathematical models – A2.4 Explanatory Information

8. Verification Against the Performance Requirements

The below table identifies the performance requirements that need to be complied with when designing a box gutter. Also noted in the table is how verification has been achieved:

Clause	Requirement	Verification
FP1.1 Managing Rainwater Impact on Adjoining Properties	Surface water, resulting from a storm having an average recurrence interval of 20 years and which is collected or concentrated by a building or sitework, must be disposed of in a way that avoids the likelihood of damage or nuisance to any other property.	The box gutter has been designed with the use of recognised engineering formulas as accepted within the BCA's verification methods for undertaking a performance solution.
FP1.2 Preventing rainwater from entering buildings	Surface water, resulting from a storm having an average recurrence interval of 100 years must not enter the building.	The box gutter has been designed with the use of recognised engineering formulas as accepted within the BCA's verification methods for undertaking a performance solution.
FP1.3 Rainwater drainage systems	A drainage system for the disposal of surface water resulting from a storm having an average recurrence interval of— (a) 20 years must— (i) convey surface water to an appropriate outfall; and (ii) avoid surface water damaging the building; and	The box gutter has been designed with the use of recognised engineering formulas as accepted within the BCA's verification methods for undertaking a performance solution.

	(b) 100 years must avoid the entry of surface water into a building.	

9. Adopted DTS Solutions

The performance solution also uses some DTS solutions from AS/NZS 3500.3:2018 Stormwater Drainage to achieve compliance with the performance requirements as noted in the above sections. The adopted DTS solutions are noted in the table below:

Section	Clauses Adopted	Notes
Section 1 Scope and General	All	Followed but the section is not wholly applicable to the sizing of a box gutter
Section 2 Materials and Products	None	Not applicable to the sizing of a box gutter
Section 3 Roof Drainage Systems – Design	3.1, 3.2, 3.3, and 3.4	The clauses, tables and figures that relate to the sizing of a box gutter have not been followed due to their limitations. The design of valley gutters and eaves gutters is not applicable to the design of a box gutter.
Section 4 Roof Drainage Systems – installation	None	Not applicable to the sizing of a box gutter
Section 5 Surface Water Drainage Systems – Design	5.1, 5.2, 5.3 (5.3.1.1 only), 5.4 (5.4.1, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7 and 5.4.8 only)	The clauses, tables and figures that relate to the design and sizing of ground stormwater drainage systems are not applicable to the sizing of a box gutter
Section 6 Surface and Subsoil Drainage Systems - Installation	None	Not applicable to the sizing of a box gutter
Section 7 Surface Water and Subsoil Drainage Systems - Ancillaries	None	Not applicable to the sizing of a box gutter
Section 8 Pumped Systems	None	Not applicable to the sizing of a box gutter
Section 9 Site Testing	None	Not applicable to the sizing of a box gutter
Section 10	None	Not applicable to the sizing of a box gutter

Siphonic Drainage Systems		
Appendix A Normative References	All	Followed but the section is not wholly applicable to the sizing of a box gutter
Appendix B Site-Mixed Concrete for Minor Works	Informative	This section does not form part of the DTS solutions
APPENDIX C Stormwater Drainage Installation Plans	Informative	This section does not form part of the DTS solutions
Appendix D Guidelines for Determining Rainfall Intensities	Informative	This section does not form part of the DTS solutions
Appendix E Rainfall Intensities for Australia	Informative	This section does not form part of the DTS solutions
Appendix F Rainfall Intensities for New Zealand—10 Min Duration	Informative	This section does not form part of the DTS solutions
Appendix G Examples of Overflow Measures for Eaves Gutter	Informative	This section does not form part of the DTS solutions
Appendix H General Method for Design of Eaves Gutter Systems—Example	Informative	This section does not form part of the DTS solutions
Appendix I Box Gutter Systems—General Method, Design Graphs and Illustrations	Informative	This section does not form part of the DTS solutions
Appendix J Box Gutter Systems—General Method—Examples	Informative	This section does not form part of the DTS solutions
Appendix K Surface Water Drainage Systems—Nominal and General Methods—Examples	Informative	This section does not form part of the DTS solutions
Appendix L Example Calculation—Pumped System	Informative	This section does not form part of the DTS solutions
Appendix M Subsoil Drainage Systems—Design	Informative	This section does not form part of the DTS solutions
Appendix N General Information	Informative	This section does not form part of the DTS solutions
Appendix O	Informative	This section does not form part of the DTS solutions

Operation of Siphonic Roof Drainage Systems		

Note that there are other sections of AS/NZS 3500.3:2018 Stormwater Drainage that have been followed in the project that do not form part of this performance solution. Confirm these clauses are correct for your project and edit as necessary

10. Conclusion

To conclude, the performance requirements FP1.1, FP1.2 and FP1.3 have been met by using a combination of a performance solution and the DTS solutions as allowed under clause A2.1(3) of BCA 2019 and have been verified in accordance clause A2.2(2)(b) and A2.4 of BCA 2019.

Refer to the appendices for more information on the calculations/ results, acknowledgement of the performance solution from the client and further information on the designer and expert reviewer.

Appendix A – Calculations

InsertAllRelevantCalculationsIncludingTheResults

Appendix B – CV of Designer

InsertYourCV

Appendix C – Expert Assessment

InsertReviewerCompanyName have reviewed this performance solution and agree that the right process has been followed and the performance requirements have been met.

Reviewer: InsertReviewerName

Company: InsertReviewerCompanyName

Title: InsertReviewerTitle

Qualifications: InsertReviewerQualifications

Signature: InsertSignature

Appendix D – Roof Plans

InsertAllRelevantRoofPlans

Appendix E – Client Acknowledgement Letter

Dear InsertClientName,

InsertProjectName

InsertProjectAddress

Performance Solution – Box Gutter

By signing the below, you confirm that you have reviewed this performance solution, understand the reason why a performance solution is required and have no objections to the use of a performance solution.

Name: ClientToAddThis

Title: ClientToAddThis

Signature: ClientToAddThis