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Mixed Use Development

1-3 Hope Street, Penrith

WSUD Strategy Report Issue 01

Prepared For Dr. Al Khawaja C/- Morson
Group

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 +61 2 8883 4239

 P.O. Box 7855 Baulkham Hills NSW 2153

 Suite 5.03, L5, 156 Pacific Highway St Leonards NSW 2065

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1 Introduction

This document outlines the Water Sensitive Urban Design (WSUD) Strategy for the proposed residential development located at 1-3 Hope Street, Penrith. This strategy looks at the principles, objectives and targets for WSUD, the opportunities and constraints to the implementation of WSUD, as well as the proposed WSUD measures to be implemented as part of the proposed works.

The site is legally described as Lot 20&21 DP 31239. Morson Group is proposing a mixed use development. The proposed development is illustrated in Figure 1.1 below.

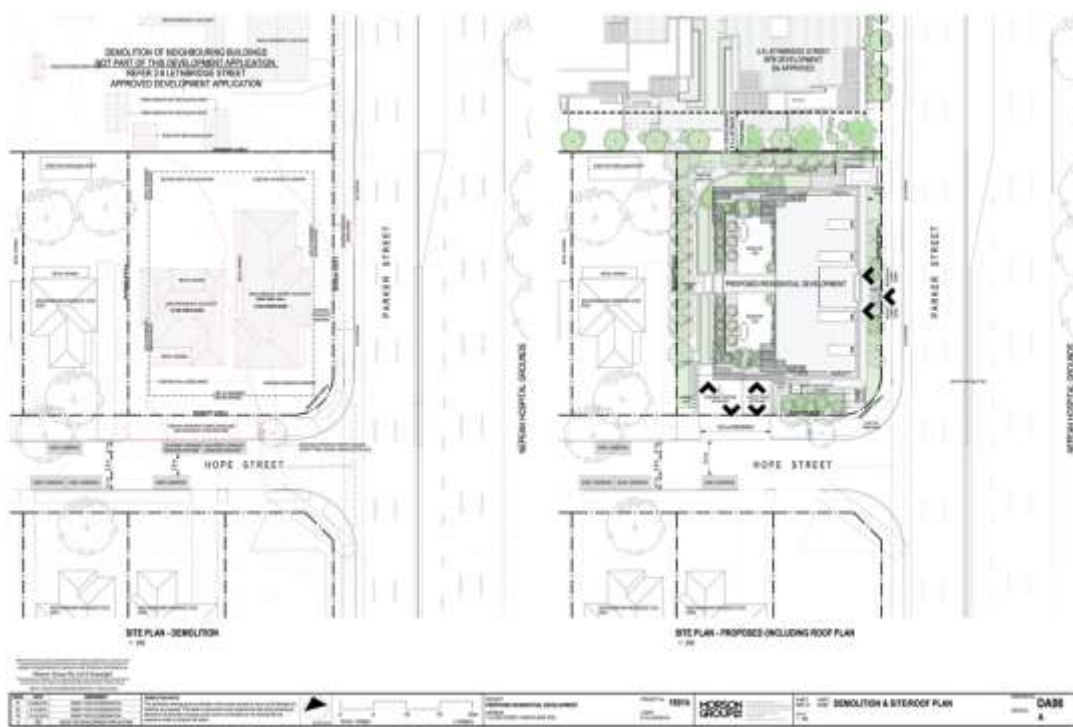


Figure 1.1 Site Plan

2 Water Sensitive Urban Design

2.1 Principles, Objectives and Targets

Penrith City Council has implemented a Water Sensitive Urban Design Policy in 2013. The aim of this policy is to respond to the growth of developable land within the Penrith Local Government Area (LGA) and improve the water conservation, and the quality and quantity of stormwater runoff from both new land development, and redevelopment of existing properties as they are developed.

The Policy is used to provide guidance for engineers and architects to ensure that developments mitigate their stormwater impacts on the natural environment.

Water Conservation aims to reduce the demand for potable water. This initiative was developed by the NSW State Government. The main tool for reducing demand for potable water is the BASIX scheme. The proposed development of this site will require the use of BASIX on a per lot basis as each of the proposed lots is developed.

Urban development increases the pollutant load of stormwater to the receiving water bodies. Stormwater Quality controls have been derived to reduce the impact of this increased loading on the environment. Penrith City Council has set targets for stormwater treatment trains to meet on a per site basis.

The targets that Council has set as part of the Water Sensitive Urban Design policy 2013 are as follows:

- 90% reduction of mean annual load of total gross pollutants
- 85% reduction of mean annual load of Total Suspended Solids (TSS)
- 60% reduction of mean annual load of Total Phosphorus (TP)
- 45% reduction of mean annual load of Total Nitrogen (TN)

Stormwater runoff modelling is carried out using the software called MUSIC (Model for Urban Stormwater Improvement Conceptualisation) using data from Council's WSUD Technical Guidelines.

2.2 Site Analysis

The development site falls towards Hope Street. It is proposed to drain the site in the natural direction of the runoff and make connection to a new kerb inlet pit.

As a result, the proposed stormwater treatment train will treat the runoff from most of the site area with the exception of the OSD detention area which is downstream of the treatment device.

2.3 Treatment Train

The site consists of one catchment only, which has various sub-catchments that collect detrimental pollutants at various rates. The MUSIC model adopts the pollutant parameters

from Council WSUD Technical Guidelines. The catchments are allocated as outlined in the following table.

Table 2.1 Catchment Area – 0.123ha

Type	Area (m ²)	Fraction Impervious
Roof	790	100%
Other Impervious (paved)	128	100%
Pervious	172	0%
Bypass	141	5%
Total	1231	

It is proposed to meet Council’s stormwater quality improvement targets outlined in part 2 of this strategy with a combination of proprietary devices. The proposed stormwater quality improvement devices are outlined in the following table.

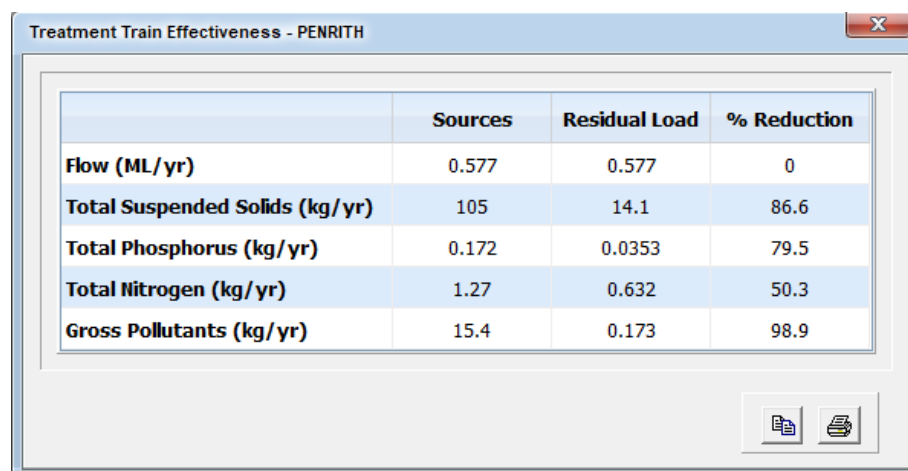
Table 2.2 Stormwater Quality Improvement Devices

Treatment Train	Description
Stormfilter	Stormfilter is a proprietary cartridge from Ocean Protect. The device has the capacity to remove suspended solids, fine particles and other nutrients such as TSS, TP & TN. The stormfilter is proposed under the driveway at the proposed entry into the development.

MUSIC was used to model the proposed site drainage stormwater treatment train. The proposed treatment train on the development application documentation meets the objectives and targets of Penrith City Council’s WSUD Policy 2013.

The following table summarises the results from the MUSIC model.

Table 2.3 MUSIC Summary Table



	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.577	0.577	0
Total Suspended Solids (kg/yr)	105	14.1	86.6
Total Phosphorus (kg/yr)	0.172	0.0353	79.5
Total Nitrogen (kg/yr)	1.27	0.632	50.3
Gross Pollutants (kg/yr)	15.4	0.173	98.9

The results indicate that the proposed stormwater treatment train meets the requirements of the Penrith City Council Water Sensitive Urban Design Policy 2013.

3 Draft Operations & Maintenance Schedule

3.1 General

The maintenance schedule covers all the stormwater quality measures adopted for the proposed development. The maintenance of some of these measures (proprietary products) is controlled by manufacturers’ requirements for mechanical devices and industry standards for environmental measures.

3.1.1 Stormfilter

The recommended maintenance frequency for the Stormfilter device is included in **Table 3.1** below.

Table 3.1 Stormfilter Maintenance Frequency

ITEM	PERIOD	RESPONSIBILITY	MAINTENANCE PROCEDURE
Inspection – Minor Maintenance	2 years and after major storms	Maintenance Contractor	Follow recommended procedure set out in Stormwater 360 “Operation and Maintenance Guidelines”
Inspection – Major Maintenance	1 year (except in case of spill)	Maintenance Contractor	Follow recommended procedure set out in Stormwater 360 “Operation and Maintenance Guidelines”

Reference should be made to manufacturer’s specifications for operation and maintenance.

4 Conclusions

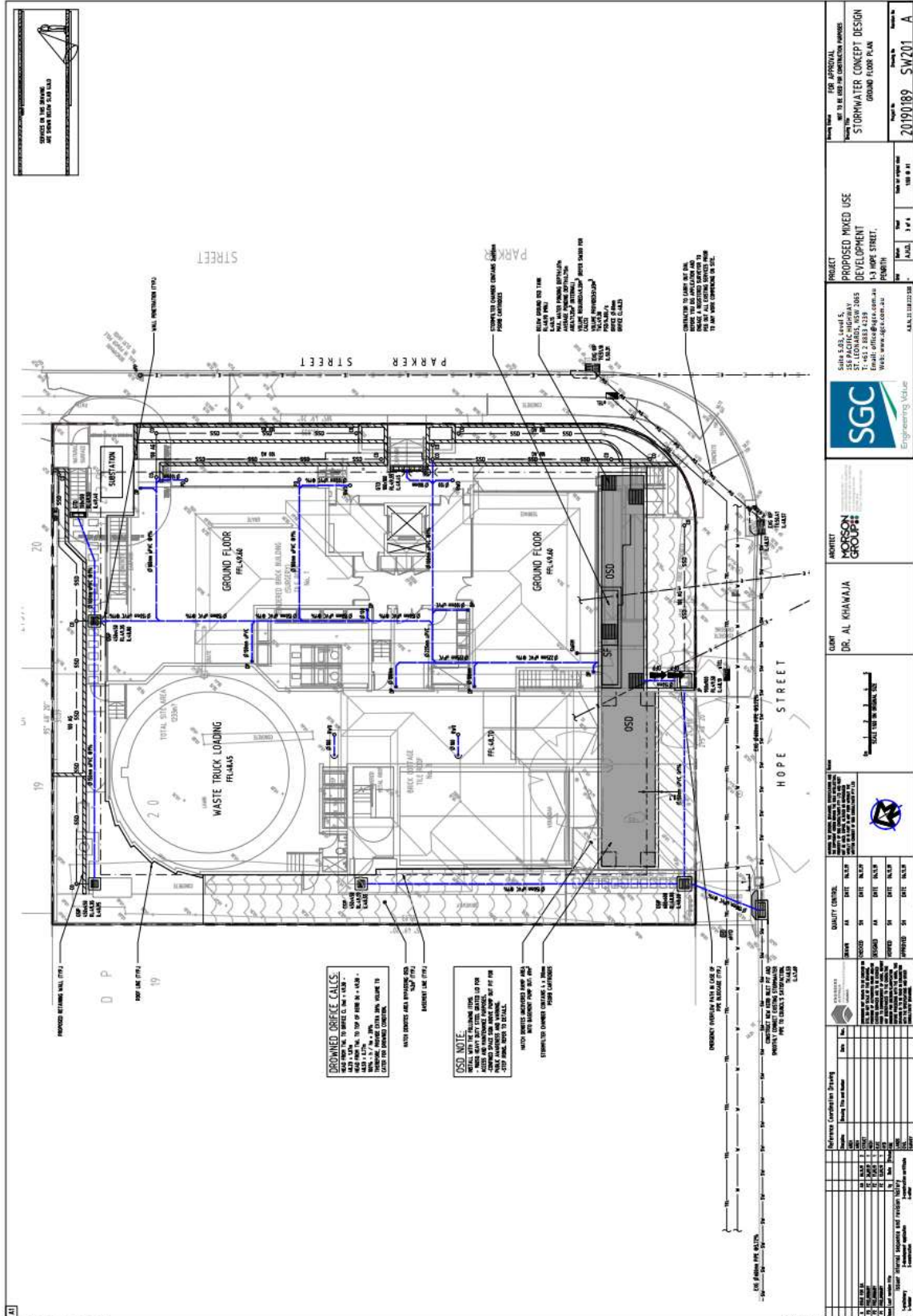
An investigation of the proposed site and stormwater treatment train has been undertaken for 1-3 Hope Street, Penrith.

A detailed MUSIC model was established for the site. The model was based on the parameters provided within the Penrith City Council WSUD Technical Guidelines. Using a combination of proprietary devices and bio-retention basins, the proposed stormwater treatment train will meet the WSUD Targets adopted by Penrith City Council.

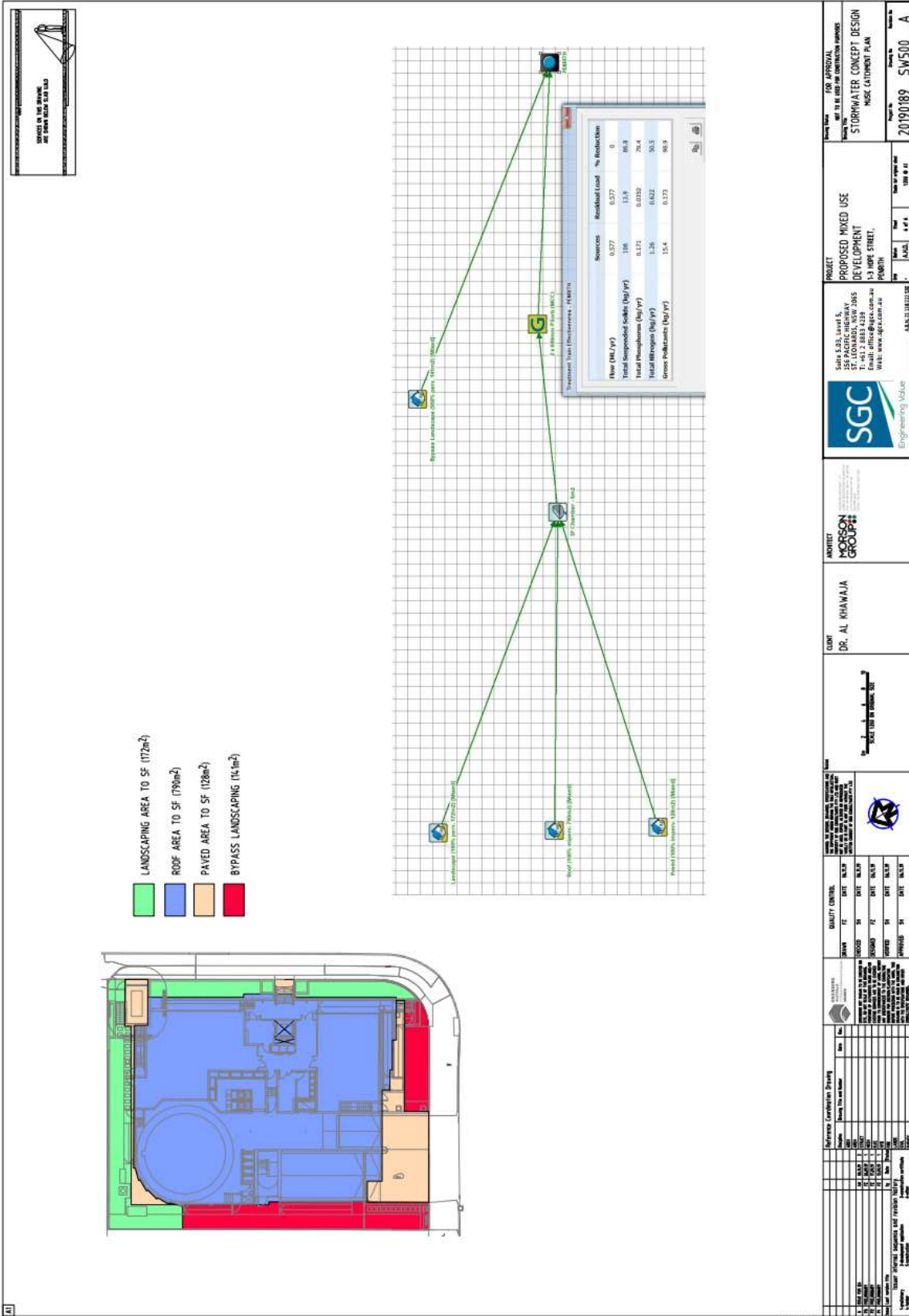
It is recommended that Council approves the proposed treatment train for the mixed use development.

Appendix 1


Stormwater Layout Plan



MUSIC Catchment Plan






 +61 2 8883 4239

 P.O. Box 7855 Baulkham Hills NSW 2153

 Suite 5.03, L5, 156 Pacific Highway St Leonards NSW 2065

7. CHECKLISTS

7.1. Development Application Checklist (lodged with DA)

		Water Sensitive Urban Design Development Application Checklist		
Site/ Project Name		1-3 Hope Street, Penrith		
Lot and DP Number:		Lot 20&21, DP 31239	DA Number:	
Information Required with DA Submission:			Y	N
1	Has a Water Sensitive Urban Design Strategy been submitted as part of the development application?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Is a BASIX Certificate required? If so, Yes - Attach certificate with DA		<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	<p>Has the digital version of MUSIC and report on the MUSIC model using data prescribed outlined in Council's Technical Guideline been attached?</p> <p>Have stormwater quality retention criteria (TSS 85%, TP 60%, and TN 45%) and water quantity / drainage requirements been met and documented in the WSUD Strategy?</p> <p>If relevant, have the Water Conservation, Quantity and quantity targets been achieved?</p>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	<p>Does WSUD Strategy contain the following information?</p> <ul style="list-style-type: none"> • Review of the WSUD principles and ensure that these are considered throughout development of the WSUD strategy. • Confirmation of the WSUD objectives that are relevant to the development application. • Confirmation of the WSUD targets for potable water conservation, stormwater quality management and stormwater quantity management that are relevant to the development application. • Complete a site analysis to evaluate the site characteristics that potentially will impact on the feasibility of WSUD for the site. • WSUD measures that would be appropriate for the development considering the development scale, site characteristics, stormwater quality management function and stormwater quantity management function. • A preliminary WSUD strategy that positions the selected WSUD measures in appropriate locations and arranges the measures in an appropriate series. • Numerical modelling utilising MUSIC software to evaluate appropriate sizes of the WSUD measures. • Concept designs of the WSUD measures. • WSUD strategy report that summarises the methodology and WSUD outcomes, and provide this with the development application for the site. 		<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Have the conceptual plans of the proposed stormwater treatment measures been included on the plans? (Detailed engineering plans will be required for the construction certificate)		<input checked="" type="checkbox"/>	<input type="checkbox"/>

6	<p>Has a Draft Operation and Maintenance Plan which includes details on the following been provided?</p> <ul style="list-style-type: none"> • Site description (area, imperviousness, land use, annual rainfall, topography etc) • Site access description • Likely pollutant types, sources and estimated loads • Locations, types and descriptions of measures proposed • Operation and maintenance responsibility (council, developer or owner) • Inspection methods • Maintenance methods (frequency, equipment and personnel requirements including Work Health and Safety requirements) • Landscape and weed control requirements • Operation and maintenance costs • Waste management and disposal options, and • Reporting. 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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