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1020 Melia Court, Castle Hill Civil Engineering Assessment & Feasibility Report

CIVIL REPORT

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FEASIBILITY REPORT

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1. INTRODUCTION

Northrop Consulting Engineers has been engaged by CASTLE HILL GLEN PTY. LTD to prepare a Civil Engineering Assessment and Feasibility Report. This is in support the Planning Proposal with Hills Shire Council for the proposed Glen Road development at 1020 Melia court, Castle Hill.

The investigations for this report primarily focused on the following objectives:

- · Identify site conditions and constraints; including topography
- Identify stormwater requirements for development under the proposed zonings within Hills Shire Local Government Area;
- · Provide preliminary advice on a stormwater strategy for the site;
- Provide preliminary advice on overland flow, OSD and Water Quality
- Identify existing Stormwater measures and connection into Council Systems
- Note the impact of Sydney Water Assets
- The views expressed herein are to assist in the preparation of a broad strategy for servicing the sites and to guide future design through the implementation of appropriate controls and best management practices.

The views expressed herein are to assist in the preparation of a broad strategy for servicing the site and to guide future design through the implementation of appropriate controls and best management practices.

1.1 Related Reports and Documents

This report is to be read in conjunction with the following reports and documents:

- Architectural Masterplan (DKO dated 7/12/23)
- Preliminary Landscape Drawings (LandForm dated 20/11/23)
- Preliminary Survey (Chadwick Cheng Consulting Surveyors 12/05/23)



2. EXISTING SITE CONDITIONS

2.1 Subject Site

The site is located in Castle Hill and is bounded by Glen Road to the west, Melia Court to the north and Bushland to the South and East. The area of the subject site is approximately 4.6 hectares. It is currently undeveloped, consisting of trees and landscaping.



Figure 1: Site Location, (Source: Nearmap)

2.2 Site Topography and Upstream Catchments.

Preliminary investigation suggests that there will be flow falling from the northern underdeveloped bushland and houses underneath Melia Court. Given the steepness of which the northern embankment sits, Northrop has proposed a swale running from east to west sitting at the northern boundary of the site, to service these upstream flows. The swale will run at a minimum of 1% and connect into existing stormwater pit at Glen Road, subject to approval and internal sizing calculations.



2.3 Site Constraints

Primary site Constrains are outlined as followed:

- Site Topography: Based upon the survey information provided by Chadwick Cheng, the following grading occurs:
 - The northern bushland portion of the site runs for a length of 49m from top to bottom towards the top edge of the site. There is a 21m level change from RL 193 – RL 172 resulting in a grade of 42.85%.
 - The main site area that runs from the edge of the northern trees to the top of the Sydney water easement runs at a length of approximately 115m. There is a 15m level change running directly north to south from RL171 – RL156 resulting in a grade of 13.04%
 - Further, to avoid conflict with Sydney water, levels around the existing Sydney Water Easement are to be matched with existing.
- The Sydney Water easement present at the south of the site constructs works around and on top of the asset. Limitations are present when proposing building works adjacent to the edge of the asset, as to avoid breaching the zone of influence.
- Diversion of stormwater: As mentioned in 2.2, stormwater will have to be diverted from the northern upstream catchment and enter councils existing system on Glen Road. As well as this, multiple OSD tanks and a new proposed pit and pipe system will be required to effectively maintain and regulate flow throughout the site. This proposed system is indicative and subject to Councils Approval.



2.4 Site Photos







3. PROPOSED DEVELOPMENT

The proposed development consists of multiple residential apartments, new internal link road and parkland.

3.1 Proposed Construction

The project involves the re-development of 1020 Melia Court in Castle Hill for Planning Proposal Application to the Hills Shire Council. The site is to be developed for a mix of low and medium density residential buildings including a new public park, series of open spaces and public domain upgrades.

The project includes:

- A Publicly Accessible Park "Rogans Hill Park" that is designed to provide a natural play area and outdoor fitness opportunities.
- Six (6) residential flat buildings, with heights ranging from three to six storeys, containing 147 apartment units.
- 38 terraces, each spanning between two and three stories.
- A series of connected biodiversity corridors connecting the existing Blue Gum High Forest and WSUD infrastructure that provide new opportunities for habitat for local flora and fauna.
- A central loop road to enhance accessibility and circulation to each public and communal space.

3.2 Masterplan

See below Image of Proposed Landscaping Masterplan



Figure 2: Site Masterplan, (Source: LandForm)

3.3 Overland Flow

The site is set to currently service overland flow from the north. Due to the steep grade of the site, a proposed retaining wall and swale has been implemented across the northern boundary to service these flows and prevent the water sheeting down in larger storm events (Figure 3). The swale is to be



design as such that it will run at a minimum of 1% grades towards Councils existing stormwater system to the west, and connect into the pit and pipe network running along Glen Road.



Figure 3: Retaining Wall Section (Source: DKO)

3.4 Staged Works

The site is proposed to be constructed in two (2) stages. The northern portion of works will be considered Stage 1, whilst works to the south inclusive of the loop road will be considered Stage 2. See below for further detail.



Figure 4: Staged Works, (Source: DKO)



4. EXISTING INFRASTRUCTURE

Northrop has undertaken a preliminary investigation of existing infrastructure in the vicinity of the proposed development site. Our assessment has been based on information provided by the relevant water and sewer Authorities, as well as local council.

4.1 Existing stormwater infrastructure

4.1.1 Council Drainage

There is one (1) Council-owned stormwater pipe adjacent to the site, as follows:

• West of the site there is a 375-450 diameter stormwater pipe running along the extents of Glen Road and through the end of road turning circle towards the south. The pipe currently services road drainage through a series of on grade lintels and pits, and will act as the primary point of discharge for the proposed site stormwater.

Figure 6 shows the Council-owned stormwater network adjacent to the site. The accuracy of this network cannot be guaranteed at the current stage and will confirmed during future design modelling.



Figure 5: Existing stormwater infrastructure adjacent to site





Figure 6: Stormwater Pits along end of Glen Road

4.2 Existing Water Infrastructure

The development runs adjacent to the following Sydney Water Asset:

• Approximately 6m Wide Sydney Water Easement running along the southern boundary of the site



Figure 7: Sydney Water Easement

Currently the southern lots run alongside the existing easement with proposed landscaping and fire trail positioned over the top of the asset. A specialist engineering assessment may be required to be submitted to Sydney Water due to proposed works being situated within the Zone of Influence.

The intention is to retain the existing levels over the Sydney Water easement.

4.3 Existing sewer infrastructure

Refer Northrop's Hydraulic report for full analysis on sewer diversion and relocation within the proposed development.



5. PROPOSED STORMWATER MANAGEMENT STRATEGY

Northrop has performed desktop investigations to determine a conceptual stormwater management strategy for the proposed development scenario, and the requirements for the development. This has relied on Council's current stormwater management requirements and preliminary calculations of catchment flows to ascertain the potential nature and size of stormwater management devices.

5.1 Stormwater Quantity Management

5.1.1 Proposed Drainage System

The major/minor approach to stormwater drainage is the recognised drainage concept for urban catchments within Hills Shire Council.

The minor drainage system is comprised of below ground pit and pipe network and is designed to control nuisance flooding and enable effective stormwater management for the site. Council requires the minor drainage system to be designed for the critical 10% Annual Exceedance Probability (AEP) with overland flow safely catering for the 1% AEP.

The major drainage system will be designed to control and convey flows from the critical 1% AEP event. This incorporates suitably designed overland flow paths and drainage to direct flows into the OSD, system for all events up to the critical 1% AEP storm event.

In accordance with Council's requirements, overland flow paths are to be designed to contain a 1% AEP storm flow are to be provided over all pipelines that are not designed to cater for this flow.

Further catchment and pipe network modelling will be required for the site to suitably size the major/minor drainage network during the design phase of the project.

5.1.2 On-site stormwater detention

The Upper Parramatta River Catchment Trust (UPRCT) outlines that OSD is required generally to all types of development and redevelopment on both flood liable and flood free sites.

The current site layout is to be split into 2 stages as outlined above. Based on the proposed construction plan, the design will require two (2) underground On-Site Detention Tanks situated/adjacent to the basement footprint. OSD 1 will service the northern stage 1 works, and be located under the western lots. OSD 2 will be located at the western end of the loop road, servicing stage 2 works. Northrop has proposed a third OSD in the southern end of Rogan's Hill Park to service nature play and park flows as well as reduce the size requirements of OSD 2. This OSD is subject to the park layouts and will require further investigation to determine feasibility and effectiveness. Based on SSR in UPRCT Version 4, the proposed third OSD would require approximately **113m**² in surface area at **1m** depth. If OSD 3 is implemented within site design, then OSD will have an SSR reduction of 113m³, dropping its value to 465m³. These locations and sizes are indicative and subject to change.

Council and UPRCT requirements outline permissible site discharge (PSD) and site storage parameters (SSR) that help design the size and location of the proposed OSD design. Northrop performed preliminary desktop investigations and calculated the following for the site:



	OSD 1	OSD 2	OSD 3
PSD (L/s)	88	80	20
SSR (m3)	517	465	113

These calculations are preliminary and are subject to change though further modelling and analysis.

5.1.3 Connection to Council's system

The outflow pipe from the proposed OSD system will connect directly to Council's stormwater line.

Detailed survey will be required to determine the exact location and size of existing infrastructure, and where the current stormwater system connects to the Council stormwater network. Based on preliminary investigation, the proposed stormwater design will be connecting to Councils system at 2 discharge points.

- The proposed swale to collect upstream overland flow will connect at the North-Eastern pit at RL 167.82 and IL 166.91
- The proposed site stormwater system will be discharged into Councils system at the southeastern pit at RL153.65.

Existing stormwater pipes may need to be decommissioned, replaced or extended, and/or rerouted to a suitable connection point with Council's network if the existing connection is not suitable. A CCTV investigation would be required to ascertain if the existing stormwater pipes are adequate to retain. Ultimately, connection points to Council infrastructure will be subject to Council approval.

5.2 Stormwater Quality Management

Section 4.25 from Councils Design Specifications states that all proposals are to incorporate WSUD measure into a new development and shall be submitted to Council for consideration with the Development Application.

According to Water Sensitive Urban Design Technical Guidelines for Western Sydney (NSW Government Stormwater Trust and UPRCT), <u>all</u> developments are required to achieve the following reduction in pollutants. The percent reduction is when compared to the same development if no stormwater treatment measures were implemented:

- Total Suspended Solids 85%
- Total Phosphorus 65%
- Total Nitrogen 45%
- Gross Pollutants 90%

This reduction in pollutant loads can be achieved via a variety (or 'train) of different treatment devices including pit filter baskets, gross-pollutant traps, proprietary filtration devices and/or bioretention areas/basins. Proprietary devices are generally more expensive but can be located underground, saving space in the development.

6. SEDIMENT AND EROSION CONTROL

The objectives of the erosion and sediment control for the development site are to ensure:

- Adequate erosion and sediment control measures are applied prior to the
 commencement of construction and are maintained throughout construction; and
- Construction site runoff is appropriately treated in accordance with Blacktown City Council requirements.

As part of the works, the erosion and sedimentation control will be constructed in accordance with Council requirements and the NSW Department of Housing Manual, "Managing Urban Stormwater Soil & Construction" 2004 (Blue Book) prior to any earthworks commencing on site.

6.1 Sediment and Erosion Control Measures

Prior to any earthworks commencing on site, sediment and erosion control measure shall be implemented generally in accordance with the Construction Certificate drawings and the "Blue Book". The measures shown on the drawings are intended to be a minimum treatment only as the contractor will be required to modify and stage the erosion and sedimentation control measures to suit the construction program, sequencing, and techniques. These measures will include:

- A temporary site security/safety fence is to be constructed around the site and the site office areas.
- Sediment fencing provided downstream of disturbed areas, including any topsoil stockpiles.
- Dust control measures including covering stockpiles, installing fence hessian and watering exposed areas.
- Placement of hay bales or mesh and gravel inlet filters around and along proposed catch drains and around stormwater inlets pits; and
- Stabilised site access at the construction vehicle entry/exits.

Any stockpiled material, including topsoil, shall be located as far away as possible from any associated natural watercourses or temporary overland flow paths. Sediment fences shall be installed to the downstream side of stockpiles and any embankment formation. All stockpiles and embankment formations shall be stabilised by hydroseeding or hydromulching on formation.





7. CONCLUSION

In summary, the requirements for the proposed development are as follows:

- Stormwater Infrastructure Both Onsite Stormwater Detention (OSD) and Water Quality measures will be required for the proposed development. OSD storage should be in the form of below ground tanks. Water quality treatment could be achieved using propriety filter cartridge devices or through bioretention treatment located in Rogans Hill park. The current design supports the implementation of three (3) OSD tanks with varying filter cartridges in each subject to detailed design.
- Sediment and Erosion Control measures would be implemented during the construction phase in accordance with the 'Blue Book'
- Northrop can determine through this initial feasibility investigation that the above information can support the development proposal from a civil perspective. Overland flow can be diverted and effectively treated whilst a proposed stormwater pit and pipe network can adequately guide flows through to existing systems.





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