
Annex 7

Sewerage Impact Assessment



Proposed Residential Development at Lot 182 S.B. in DD128, Lau Fu Shan

Sewerage Impact Assessment Report

Reference: P058/03 Issue 3

Date: January 2023

Confidential





Proposed Residential Development at Lot 182 S.B. in DD128, Lau Fu Shan

Sewage Impact Assessment

Checked and Approved by:

A handwritten signature in black ink, appearing to read 'Patrick Ip', is written over a light grey rectangular background.

Patrick Ip
Director

Reference: P058/03 Issue 3

Date: January 2023

Issue	Status	Prepared By	Date	Checked by	Date	Approved By	Date
1	For Comment	Cheryl Chan	Jul 22	Emily Tang	Jul 22	Patrick Ip	Jul 22
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1 Introduction

1.1 Background

The Applicant intends to develop a village house located at D.D. 128 Lot 182 S.B. Lau Fu Shan, New Territories (hereafter as “the Site”).

Due to the concerns of possible sewage impact arising from the change of uses, Urban Green Consultants Limited (UGC) has been commissioned by the Project Proponent to conduct a Sewage Impact Assessment (SIA) to assess the potential sewerage impacts arising from the change of sewage generation due to the Proposed Development.

1.2 Objectives of the SIA

The objectives of this SIA are to assess the potential sewerage impact arising from the proposed development and recommend the mitigation measures, if necessary, to alleviate the impacts.

1.3 Report Structure

The remaining chapters of this report are shown below:

Chapter 2 – Site Context

Chapter 3 – Evaluation of Sewerage Impact

Chapter 4 – Recommendations

Chapter 5 – Conclusion

2 Site Context

2.1 Site Location and Its Environs

The Site is located at D.D. 128 Lot 182 S.B. Lau Fu Shan. To the south are open storage yards for metals and a recyclable collection centre. To the west is an open storage yard for construction materials. To the north are vacant land, shrubland and a recyclables collection centre. The Site falls within an area zoned “Residential (D)”. The Site area is approximately 2,550 m².

[Figure 2.1](#) shows the Site location and its environs.

2.2 Proposed development

The proposed development is a Villa. The building height will be approximately 6 m (1 storey). The building comprises of swimming pool, 6 bedrooms, entertainment room, study room, kitchen, dining & living room. Operation year of the proposed development is expected to be Year 2024.

The general layout plans of the proposed development are presented in [Appendix A](#).

2.3 Existing Sewerage Condition

Based on the site survey conducted on 3 December 2021, it has revealed that the Site is not currently served by any form of DSD’s sewage facility.

3 Evaluation of Sewerage Impact

3.1 Evaluation of Sewage Generation

For the estimation of sewage generation from the proposed development, the planning unit flow factors as recommended in the “*Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning*” (hereafter as “GESF”) published by EPD in 2005 have been adopted in the assessment.

The sewage generation from the proposed development includes the flow contribution from residents and backwash of swimming pool. The population for the proposed development is shown in [Table 3.1](#).

Table 3.1 Estimated Population of the Proposed Development

Type of people	Minimum Number of People per Day	Unit Flow Factor (m ³ /day)	GESF
Residents	9	0.37	Domestic (housing type specific) R4
Backwash of swimming pool	-	4.63	-

Based on the estimated population, the estimated average daily flow for the proposed development will be 7.96 m³/day. The calculations have been provided in [Appendix B](#) for reference.

3.2 Proposed Septic Tank System

As the Site is not and will not be served by public sewer, it is required to provide their own sewage treatment or disposal facilities to ensure sewage can be discharged in a proper manner and hence to achieve the best protection to the public and the environment.

According to “*Guideline Notes on Discharges from Village Houses*” published by EPD, the use of Septic Tank System (STS) is recommended for small village houses in remote area where no communal sewer is available.

As the estimated average daily flow from the development will be approximately 7.96 m³/day, one septic tank system with a capacity of 9.74 m³/day is able to cater for the estimated daily flow volume. According to the design requirements as specified in “*Drainage Plans Subject to Comment by the Environmental Protection Department*” (ProPECC PN 5/93), the recommended dimensions of the septic tank should be

about (L) 6.1 m x (W) 1.9 m x (D) 2.2 m with a concrete wall thickness of 0.25 m to fulfil the specified dimension requirement.

The recommended dimensions of soakaway pit should be with the stone layer thickness of 0.15 m to fulfil the specified dimension requirement. Soakaway pit with a capacity of 8.7 m³/day is able to cater the sewage retained in the septic tank. The dimension of the soakaway pit should be about (W) 2.9 m x (D) 2.9 m. Detail calculation of the volume of septic tank and soakaway pit are shown in [Appendix C](#). The minimum clearance requirements for a soakaway system are shown in [Table 3.2](#).

Table 3.2 Minimum Clearance Requirements for Soakaway Systems

Type	Distance from Soakaway System (m)	Remarks
Building	3	-
Retaining Walls	6	-
Wells	50	-
Stream where the bed is lower than invert of soakaway system	15 (30)	Should the water from the stream or pool is used or likely to be used for drinking or domestic purposes, the distance (30) will be adopted.
Pools	7.5 (30)	
Cuts of Embankments	30	-
Paths	1.5	-
Beaches	100	From boundaries of gazette beaches or bathing beach subzones of water control zone
	30	From H.W.M. and from nearest watercourses for other cases
Ground Water Table	0.6	Below invert

According to the site layout plan and site observation on 3 Dec 2021, no sensitive receivers including retaining walls, wells, stream courses, pools, cut of embankments and beaches were identified. As the building block and the existing access road will be included in the proposed development, the location of the soakaway pit should be fulfilled the minimum clearance requirements. [Figure 3.1](#) shows the proposed location of the septic tank system.

3.3 Emergency Measures

An operation and maintenance manual will be prepared by the contractor and then the future operator should appoint competent technician(s) to operate the septic tank. The operator should be fully conversant with the recommended operating procedures as stipulated in the operation and maintenance manual.

In case of emergency, tanker away service will be arranged immediately to draw away the sewage from septic tank. The collected incoming sewage will be disposed to government treatment plant to avoid sewerage impact.

4 Recommendations

The Septic Tank System (STS) should be properly sited, designed, constructed, operated and maintained in accordance with the “*Guidance Notes on Discharges from Village Houses*” and “*Drainage Plans subject to Comment by the Environmental Protection Department (ProPECC PN 5/93)*” published by the EPD. To minimize the adverse impact on the public and the environment, the following precaution should be considered during planning a new STS:

- Locate the STS away from the beach, stream, well, retaining wall and your building etc. to prevent water contamination and leakage;
- Carry out a soil percolation test before the STS construction to ensure the permeability of soil; and
- Locate the STS in an open space with easy access for desludging.

The operator should implement good house keeping practices to ensure that the continuous operation of the STS. These should include:

- Avoid deposit any oil, chemical and solid waste into the STS;
- Inspect and measure of the sludge depth of treatment components at least once every 6 months;
- Remove the STS sludge properly when exceed 1/4 of overall water depth;
- Inspect the STS immediately when flooding, overflow, odour become noticeable or not flush well; and
- Clean and flush of screens and other sewage handling equipment regularly.

Refer to the “*Guideline Notes on Discharges from Village Houses*”, the STS should be inspected and desludged regularly. Desludging should be done by specialist contractor. A tanker lorry equipped with a pump is often used for pumping out the content of the septic tank and transport to sludge treatment facility for future treatment.

5 Conclusion

A Sewerage Impact Assessment (SIA) has been conducted to evaluate the potential impacts upon the sewerage system due to the sewage generated from the proposed development.

The assessment findings demonstrated that the estimated average daily flow from the proposed development will be 7.96 m³/day. The proposed septic tank is capable to cater for the sewage generated from the development, and the soakaway system has fulfilled the specified requirements for minimum clearance distance. As there is no existing public sewer in the vicinity of the Site, the use of Septic Tank System (STS) is recommended.

To ensure the sewage generated from the proposed building can be soak into surrounding soil effectively and the solid wastes including sludge and scum can be screened off and collected by specialist contractor for future treatment. The designed, constructed, operated and maintained of the STS will be follow the “*Guidance Notes on Discharges from Village Houses*” and “*Drainage Plans subject to Comment by the Environmental Protection Department (ProPECC PN 5/93)*” published by the EPD.

Accordingly, it is concluded that sewerage impact arising from the proposed development will be acceptable.

Figures



LEGEND

 Site Boundary

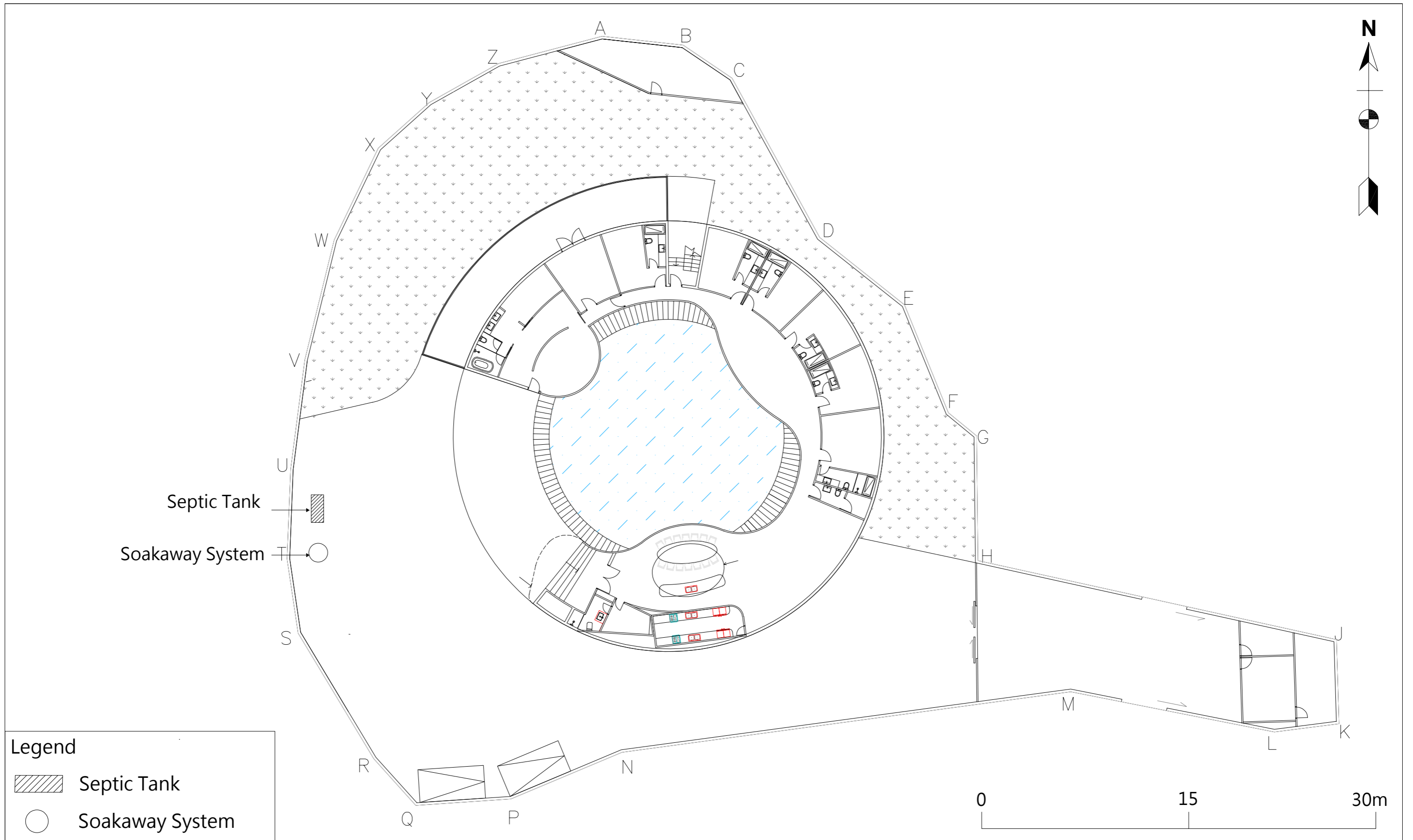


Proposed Residential Development at Lot 182 S.B. in DD128

Site Location and its Environ

Figure 2.1

Rev. 0



Legend
 [Hatched Rectangle] Septic Tank
 [Circle] Soakaway System



Proposed Residential Development at Lot 182 S.B. in DD128
 Proposed Location of Septic Tank System

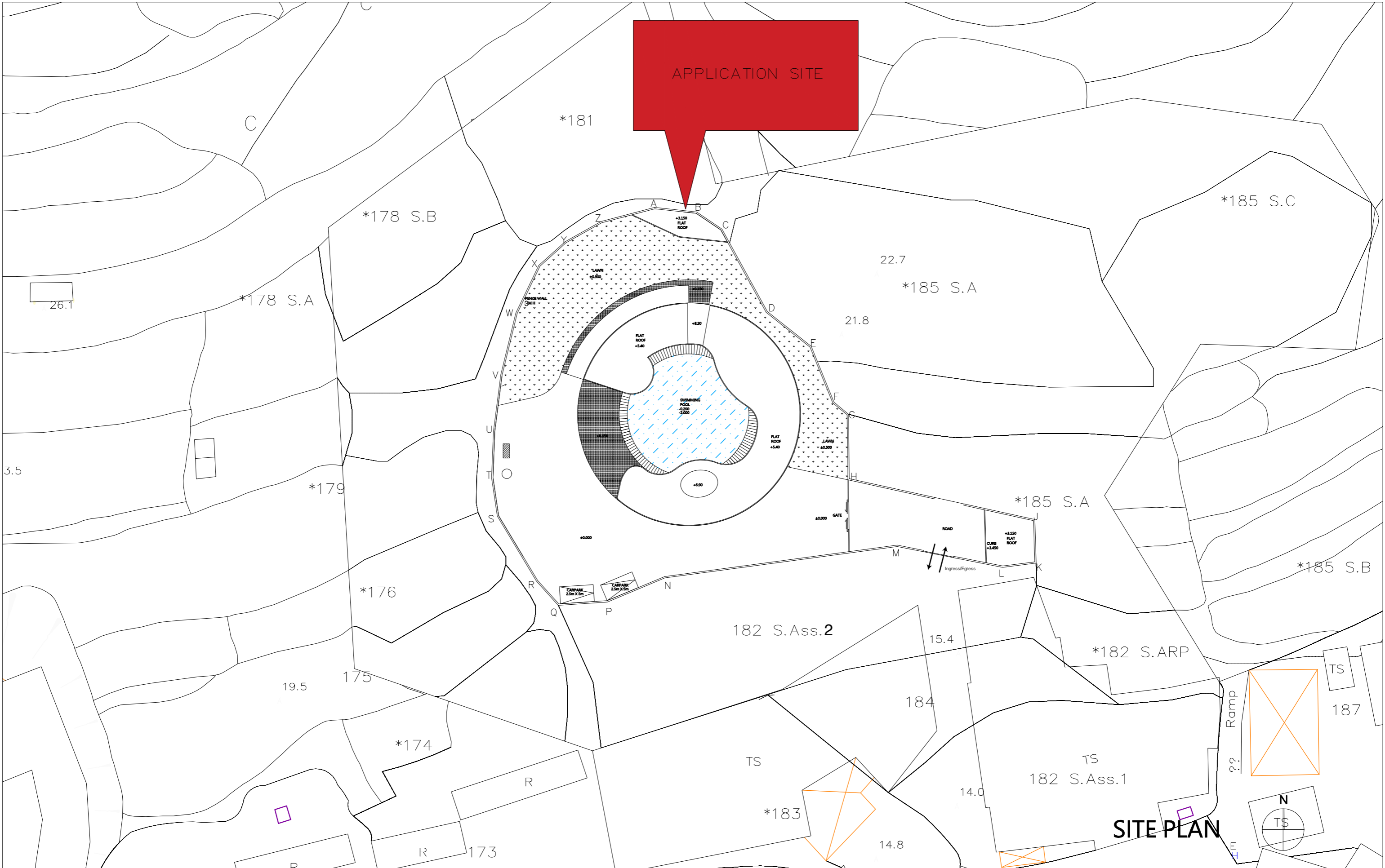
Figure 3.1
 Rev. 0

Appendix A

Development Plan



APPLICATION SITE



SITE PLAN

DESIGN DRAWING

Rev	Date	Description
-	-	-

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Project:
**PROPOSED HOUSE DEVELOPMENT
 AT LOT NO. 182 S.B. IN D.D. 128**

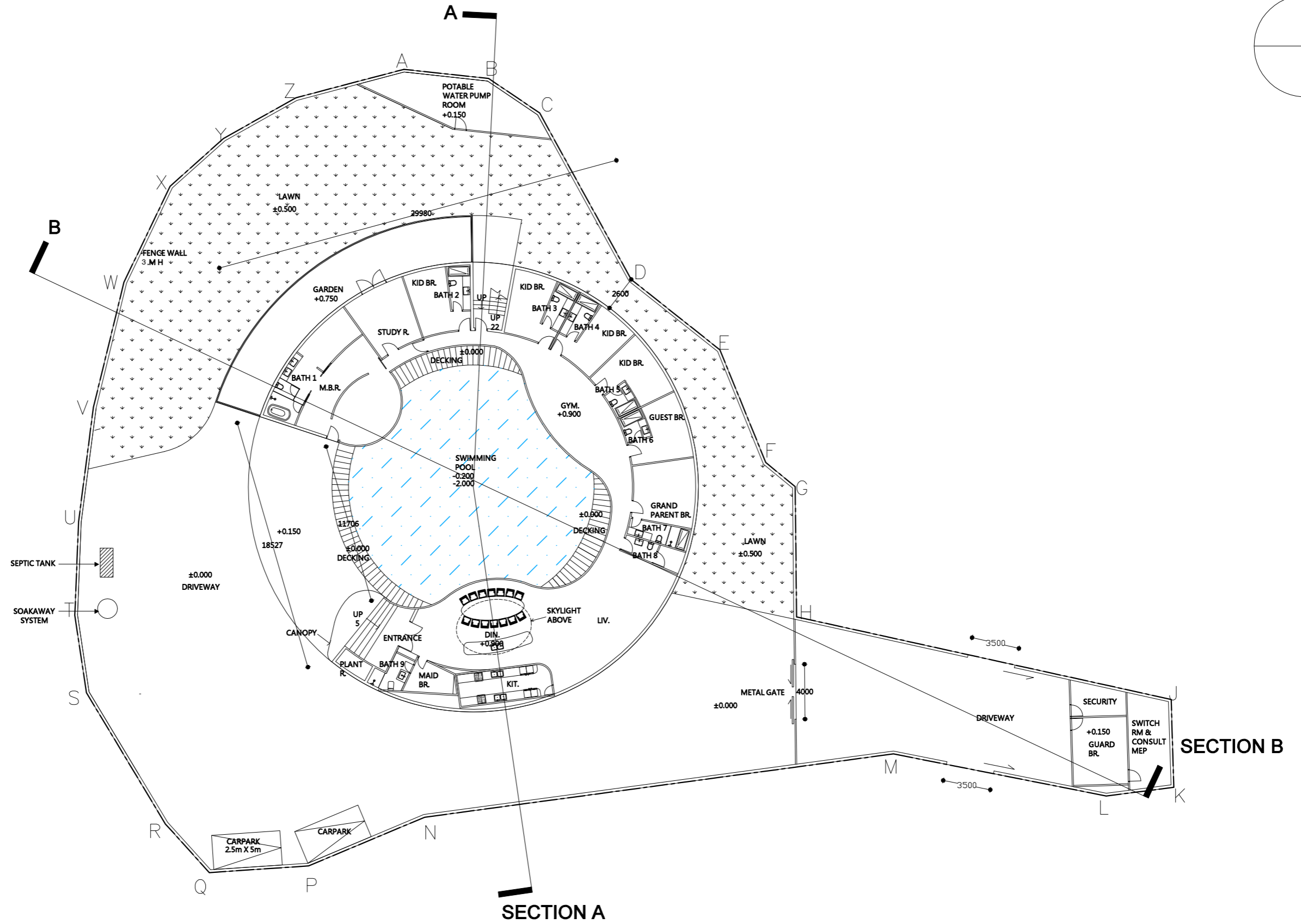
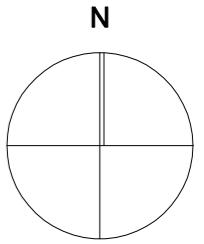
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SITE PLAN



Project reference		Scale	Drawn	Checked	Approved
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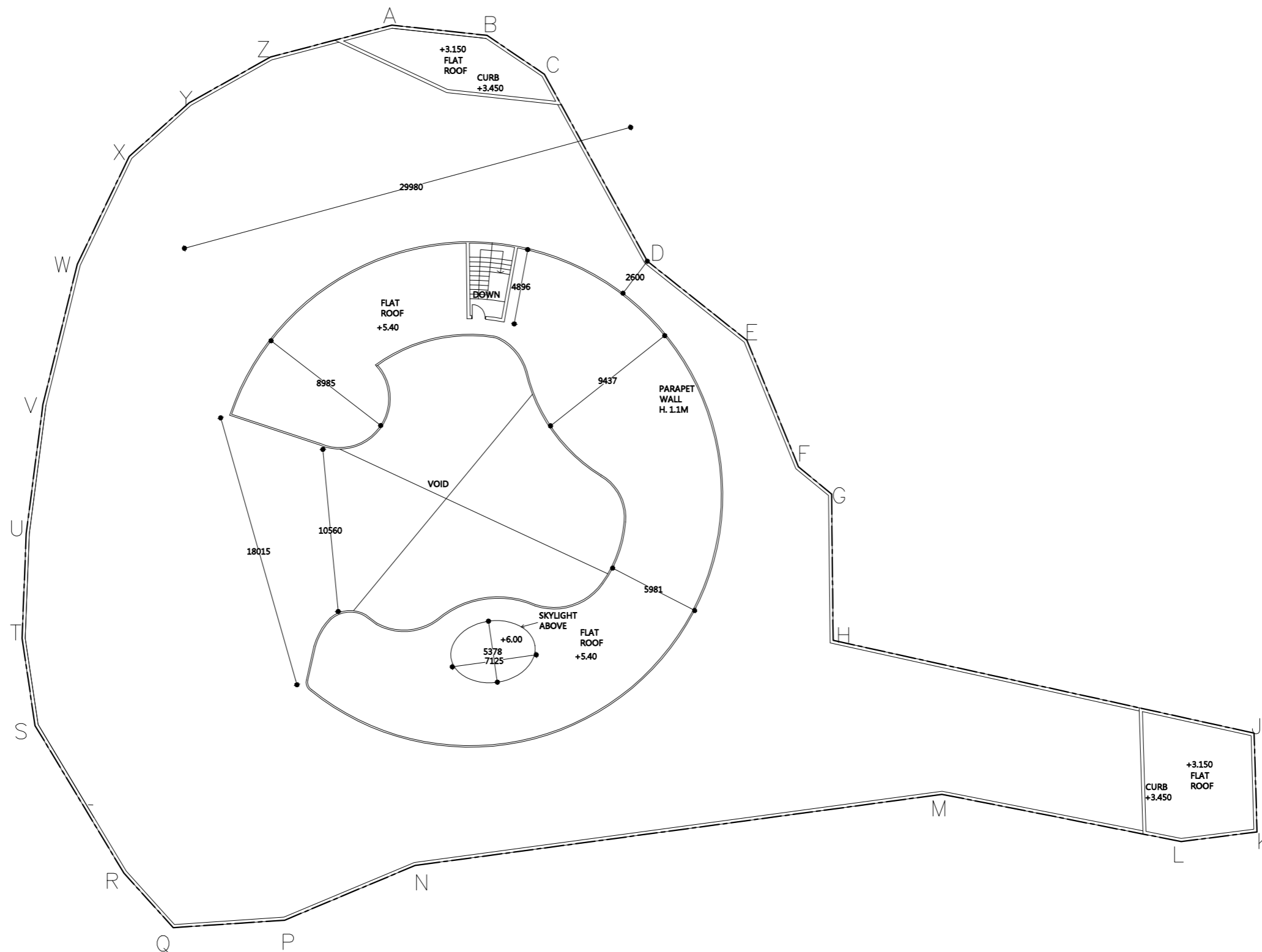
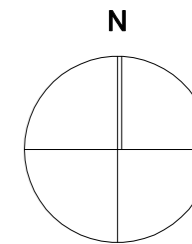


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Drawing Title:
GROUND FLOOR LAYOUT PLAN

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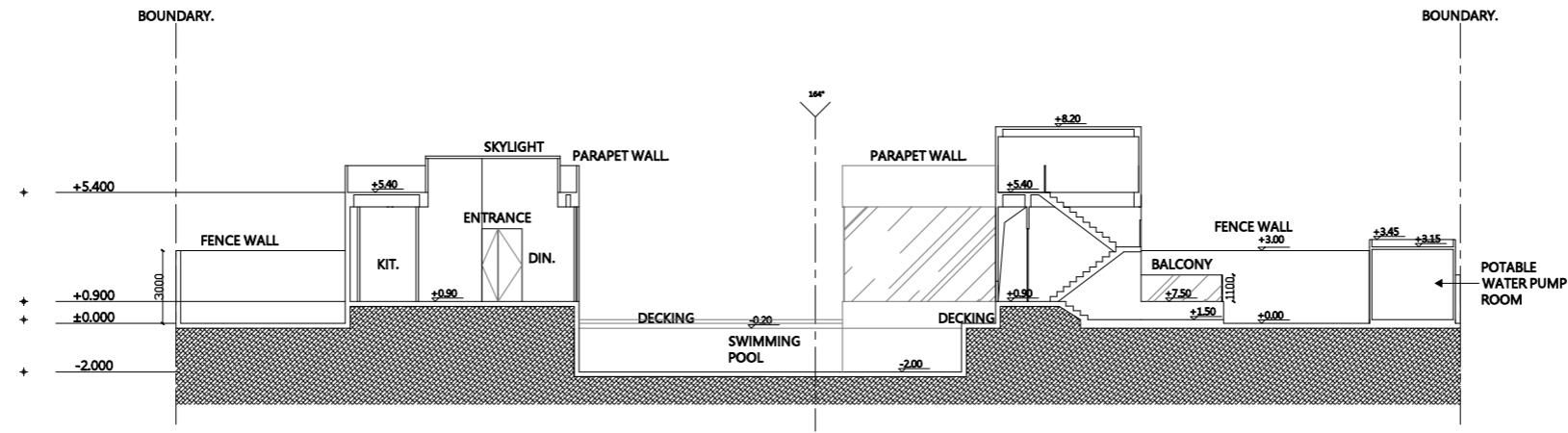
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AT LOT NO. 182 S.B. IN D.D. 128**

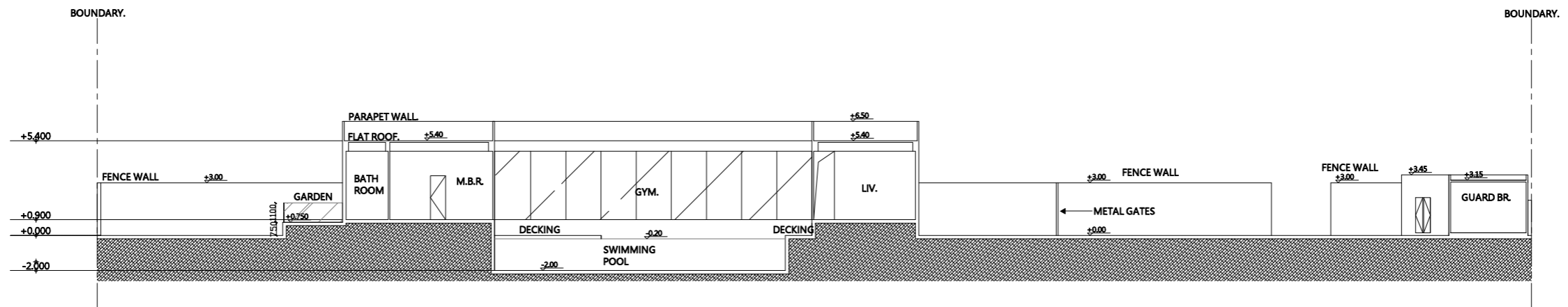
Drawing Title:
ROOF FLOOR LAYOUT PLAN



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CAD reference	Date	Revision No./Date	Read in conj. with Drawing No.
	2021-2-16		



SECTION A - A



SECTION B - B

DESIGN DRAWING

Rev	Date	Description
-	-	-

Project:
**PROPOSED HOUSE DEVELOPMENT
 AT LOT NO. 182 S.B. IN D.D. 128**



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Drawing Title:
SECTION A - A & B - B

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Appendix B

Calculation of Peak Flow

HSK Villa
Sewage Impact Assessment
Sewage Generation Calculation

<u>Estimation of Daily Flow from the Proposed Development</u>		<u>Remark</u>
<u>Generation from Residents</u>		
Total number of persons	9 persons	Provided by Project Architect
Unit flow	0.37 m ³ /person/day	Referred to the planning for future unit flow for Domestic Flows - Domestic (housing type specific) Private (R4) in Table T-1 of GESF(a).
<u>Generation from Swimming pool (outdoor)</u>		
Minimum Capacity of Septic Tank	220 m ²	Provided by Project Architect
Pool depth	1.8 m	Provided by Project Architect
Pool volume	397 m ³	
Turnover rate	6 hr	General Specification for Swimming Pool Water Treatment Installation in Government Buildings of The Hong Kong Special Administrative Region.
Surface loading rate of filter	50 m ³ /m ² /hr	Swimming Pools: Design and Construction, Fourth Edition By Philip H. Perkins (50 m ³ /m ² /hr adopted).
Filter areas required	1.32 m ²	
Backwash duration	7 mins	With reference to Section B8.5.5 of General Specification for Swimming Pool Water Treatment Installation in Government Buildings of the HKSAR published by the ArchSD, "the water velocity chosen shall be effective in cleaning the filter in duration of 7 minutes for sand filter".
Backwash flow rate	30 m ³ /m ² /hr	Technical Paper - Domestic Swimming Pool Filtration by European Union of Swimmingpool and Spa Associations.
Design flow for swimming pool backwashing	4.63 m ³ /day	
Total Average Dry Weather Flow from the Proposed Development		
Total estimated daily flow	<u>7.96</u> m ³ /day	As the contributing population of the segment is < 10,000, peaking factor of 8 is adopted based on Table T-5 (including stormwater allowance).
Total estimated peak flow	<u>0.0007</u> m ³ /s	

Note:

(a) GESF - "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning" published by Environmental Protection Department (EPD) in 2005

Appendix C

Estimation of Minimum Capacity of Septic Tank and Soakaway pit

HSK Villa

Sewage Impact Assessment

Determination of Minimum Capacity of Septic Tank

Determination of Minimum Capacity of Septic Tank		
a) Total number of person served (N)	9 persons	Provided by Project Architect
Estimated per capita daily water consumption (Q)	0.37 m ³	Referred to the planning for future unit flow for Domestic Flows - Domestic (housing type specific) Private (R4) in Table T-1 of GESF(a).
b) Design flow for swimming pool backwashing	4.63 m ³ /day	
Minimum Capacity of Septic Tank	<u>7.96</u> m³	Referred to the requirements of septic tank design in ProPECC PN 5/93 (b). Septic Tank not less than QN, where N is the number of persons served and Q is the estimated ultimate per capita daily water consumption

Note:

(a) GESF - "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning" published by Environmental Protection Department (EPD) in 2005

(b) ProPECC PN 5/93 - "Drainage Plans Subject to Comment by the Environmental Protection Department".

Ref: WSD7.11B

Soakaway pit requirement		
Top soil	300	mm
Surrounded by layer of 75 stone	150	mm
Above ground water	600	mm
Depth (from bottom to inlet)	B/3	mm

Remark: for each drain of the soakaway pit, and 3 drains from top to bottom (Ref:App D)

Total population 6 persons

Required volume= 7.96 m³

Circular pit volume= $(B/2)^2 \times \pi \times D$

*Depth= $B+0.1-0.15-0.15$

*0.1 : distance between the cement and the drain

*0.15: the tank thickness / the stone layer

Assume B 2.3 m

Depth 2.1 m

Volume 8.7 m³

Actual size of the pit (including the concrete wall)

Width 2.6 m

Depth 2.9 m

Actual size (including the concrete wall and the surrounding stone layer)

Width 2.9 m

Depth 2.9 m