TENT ENGINEERING

Ms Pamela Hughes

Planning Department and Environment,

South Dublin County Council

Ref. Planning Register Reference SD22A/0150

Date. 4th of October 2022

Dear Ms Hughes,

Tent Engineering have been commissioned by Bradawl Limited to prepare a technical submission in relation to the proposed truck wash on lands located at Kingswood, Old Naas Road, Kingswood Cross, Dublin 22.

This report is intended to be a response to the further information requested items 6, 7, 8, and 10 dated 21/07/2022 received from South Dublin County Council in relation to Planning Register Reference SD22A/0150.

Item 6 - Green Infrastructure

The applicant is requested to submit green infrastructure proposals to help mitigate and compensate for the impact of the proposed development on existing boundary vegetation. These proposals shall include additional landscape details, SUDS measures (such as permeable paving, green roofs, filtration planting, above ground attenuation ponds etc) and planting for carbon sequestration and pollination. Response shall include drawings.

- Please refer landscape architect,s drawing„ PP381-01-01, and landscape architect,s report„ PP366, prepared, which details the above.

In more detail, to compensate for impact on existing boundary vegetation (approx 98m² found to potentially be impacted at the northern boundary of our site) we propose the following solutions.

- New landscaped area of approx. 450m²
- New trees to be planted on site. following. SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide 2022, for acceptable tree pit details. Our tree pits proposal is 15 no. ø1200mm.

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Item 7 - Sustainable Drainage

The applicant has not proposed any SuDS (Sustainable Drainage Systems) features for the proposed development. The applicant is requested to submit plans and cross-sectional views clearly showing proposed Sustainable Drainage Systems (SuDS) features for the development.

- We propose the following Sustainable Drainage Systems.
  - New landscaped area of approx. 450m^2.
  - New trees to be planted on site, following, SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide 2022, for acceptable tree pit details. TOur tree pits proposal is 15 no. ø1200mm (providing additional 6.8m^3 storage volume for our site).
- Please refer landscape architect,s drawing,, PP381-01-01, and landscape architect,s report,, PP366, prepared, which details the above.

Item 7a

A drawing to show how surface water shall be attenuated to greenfield run off rates. It is unclear how much attenuation in total is provided for the development. Submit a report and drawing showing how much surface water attenuation in m3 is provided for the development. Also submit a drawing showing where the surface water attenuation will be provided for the development.

- Please refer to our drawing, 22077-TNT-XX-XX-DR-C-92001, prepared which presents the existing drainage infrastructure and existing Stormtech Attenuation System, a total of 260m^3 attenuation volume currently provided on-site.
- Please refer to our drawing, 22077-TNT-XX-XX-DR-C-92002, prepared which details our proposed drainage infrastructure and details the above.
- A total of 266.8 m^3 of surface water is provided on our site (including SUDS). A hydrobrake is provided to limit our discharge to 2L/s, in accordance with the higher value of Qbar and 2L/s.
- Please refer to Appendix A which shows calculation of the necessary storage attenuation for our site (with proposed SUDS being implemented) and Appendix B of this report which contains the calculations of the proposed SUDS and the attenuation capacity provided by those.

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Item 7b

The applicant shall show natural SUDS features for the development such as Green roofs, swales, tree pits, permeable paving, and other such SuDS and show what attenuation capacity is provided by such SuDS.

- Please refer to Appendix B of this report which contains the calculations of the proposed SUDS and the attenuation capacity provided by those.
- Refer to response on item 7a

Items 7c

The applicant is requested to submit a comprehensive SUDS Management Plan to demonstrate that the proposed SUDS features have reduced the rate of run off into the existing surface water drainage network. A maintenance plan should also be included as a demonstration of how the system will function following implementation.

- Several Sustainable Urban Drainage Systems have been incorporated in our designs. This includes an optimised area of cultivated landscaped, area with tree pits (in accordance with, SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide 2022,), providing 450m^2 self-draining open space with 15no. tree pits attenuating up to 6.8m^3.Hardstanding site area is actively drained via road gullies, towards an underground soak away (Stormtech) with an attenuation volume of 260m^3.
  In case of rare storm event, an overflow outfall connects into a SWMH which then ties into the existing public storm water network. The flow rate is limited via hydrobrake to 2L/s, which is the greater of Qbar and 2L/s/ha.
- A maintenance programme is contained within landscape architect,s report clearly specifying the ongoing requirements for the proposed trees and landscape areas.
- The SUDS effectively reduce the required site storage amount from approximately 240m^3 (with no SUDS) to 223m^3 (refer to appendix A for the calculation of site storage requirements with no SUDS). The provided SUDS are low maintenance and self-sustaining. The soak away will have an inspection chamber and an access junction for rodding and CCTV.

Item 7d

Demonstrate how the proposed natural SUDS features will be incorporated and work within the drainage design for the proposed development.

- Refer to our drawing, 22077-TNT-XX-XX-DR-C-92002, for full details on the proposed Surface Water drainage system and to Appendix B of this report which shows full justification for the use of this proposed strategy.

Item 7e

Tree pits incorporating SUDS features should include a deep cellular water storage/ attenuation area below the surface which acts as a soak away allowing surface water to infiltrate into the ground.

- Refer to our drawing, 22077-TNT-XX-XX-DR-C-92002, showing the detail of the tree pits.

Item 7f

The applicant is requested to refer to the recently published, SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide 2022, for acceptable SUDS tree pit details.

- , SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide 2022, has been referred and closely followed for SUDS tree pit details.

Item 7g

The applicant is requested to submit a report showing surface water attenuation calculations for proposed development.

Please refer to Appendix A of this report which contains the calculations of the proposed sustainable attenuation system.

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Item 8 - Roads

The applicant is requested to provide a revised set of drawings which shows.

(a) Existing yard layout

(b) Proposed islands with dimensions

(c) Proposed parking arrangements (bike/car/truck)

(d) Proposed lining arrangement

(e) AutoTRAK path and analysis for

(i) Fuelling area approach/exit (each of the paths)

(ii) Truck wash approach/exit

- Please refer to our drawings, 22077-TNT-XX-XX-DR-C-92000,,, 22077-TNT-XX-XX-DR-C-92003, and, 22077-TNT-XX-XX-DR-C-92004, which provide further details to support all the above points raised on Item 8.

Item 10 - Flood Risk

The applicant is requested to submit a flood risk report to show what if any flood risk there is for proposed and existing development.

- Please refer to report, 22077-TNT-XX-XX-RP-C-00001_Flood Risk Assessment, which consist in a comprehensive Flood Risk Assessment for the proposed development.

We trust this robustly address each of your queries and we remain on hand to address any further queries you or your team may have.

Kind Regards,

Diarmuid Healy Co-founder | Director
BEng Hons CEng MIEI FIStructE

Cristina Peslari
Engineer

Tent Engineering Ltd
32 Francis Street
Dublin, D08NN96

Appendix A - Calculations of Attenuation System

TENT ENGINEERING Tent Engineering Ltd 32 Francis Street D08NN96, Dublin, Ireland	Project 22077 Kingswood truckwash				Job no. 22077	
	Calcs for Soakaway design using SUDS				Start page no./Revision 1	
	Calcs by C.P.	Calcs date 10/4/2022	Checked by E.H.	Checked date 03/10/2022	Approved by	Approved date

SOAKAWAY DESIGN

In accordance with CIRIA C753 SUDS

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **5970.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.271**
5-year return period rainfall of 60 minutes duration	M5_60min = **16.9** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Width of pit	w = **13620** mm
Length of pit	l = **13620** mm
Percentage free volume	V_{free} = **100** %
Soil infiltration rate	f = **44.0×10^{-6}** m/s
Base area	A_b = w × l = **185504400** mm^2
Perimeter	P = 2 × (w + l) = **54480** mm
Coefficient b	b = P × f / (A_b × V_{free}) = **0.05** hr^{-1}

Table equations (Eq. 25.4)

Rainfall intensity	i = M100 / D
Coefficient a	a = A_b / P - (A × i / (P × f))
Minimum depth required	H = a × ($e^{(-bD)}$ - 1)

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Intensity, i (mm/hr)	a (mm)	Min depth req (mm)
5	0.33;	6.7;	1.90;	12.7;	152.61;	-102170;	395
10	0.48;	9.7;	1.96;	19.1;	114.85;	-76048;	587
15	0.58;	11.8;	1.97;	23.2;	92.93;	-60886;	704
30	0.76;	15.4;	1.98;	30.5;	60.94;	-38756;	891
60	1.00;	20.3;	1.93;	39.1;	39.09;	-23641;	1075
120	1.27;	25.7;	1.88;	48.5;	24.24;	-13367;	1188
240	1.64;	33.2;	1.82;	60.6;	15.14;	-7068;	1200
360	1.88;	38.0;	1.79;	67.9;	11.32;	-4425;	1078
600	2.23;	45.3;	1.74;	79.0;	7.90;	-2060;	766
1440	3.09;	62.6;	1.67;	104.5;	4.36;	392;	0

Minimum depth of soakaway H_{max} = **1200** mm

Time to empty soakaway to half vol. - Eq.24.6(2) t_{s50} = V_{free} × A_b / (f × P) × Ln((H_{max} + A_b / P) / (H_{max} / 2 + A_b / P)) = 3hr 3s

PASS - Soakaway discharge time less than or equal to 24 hours

SOAKAWAY DESIGN

In accordance with CIRIA C753 SUDS

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **6420.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.271**
5-year return period rainfall of 60 minutes duration	M5_60min = **16.9** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Width of pit	w = **14140** mm
Length of pit	l = **14140** mm
Percentage free volume	V_{free} = **100** %
Soil infiltration rate	f = **44.0×10^{-6}** m/s
Base area	A_b = w × l = **199939600** mm^2
Perimeter	P = 2 × (w + l) = **56560** mm
Coefficient b	b = P × f / (A_b × V_{free}) = **0.04** hr^{-1}

Table equations (Eq. 25.4)

Rainfall intensity	i = M100 / D
Coefficient a	a = A_b / P - (A × i / (P × f))
Minimum depth required	H = a × ($e^{(-bD)}$ - 1)

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Intensity, i (mm/hr)	a (mm)	Min depth req (mm)
5	0.33;	6.7;	1.90;	12.7;	152.61;	-105823;	394
10	0.48;	9.7;	1.96;	19.1;	114.85;	-78765;	586
15	0.58;	11.8;	1.97;	23.2;	92.93;	-63060;	702
30	0.76;	15.4;	1.98;	30.5;	60.94;	-40137;	889
60	1.00;	20.3;	1.93;	39.1;	39.09;	-24480;	1073
120	1.27;	25.7;	1.88;	48.5;	24.24;	-13838;	1186
240	1.64;	33.2;	1.82;	60.6;	15.14;	-7313;	1200
360	1.88;	38.0;	1.79;	67.9;	11.32;	-4575;	1079
600	2.23;	45.3;	1.74;	79.0;	7.90;	-2126;	768
1440	3.09;	62.6;	1.67;	104.5;	4.36;	414;	0

Minimum depth of soakaway — H_{max} = **1200** mm

Time to empty soakaway to half vol. - Eq.24.6(2) — t_{s50} = V_{free} × A_b / (f × P) × Ln((H_{max} + A_b / P) / (H_{max} / 2 + A_b / P)) = 3hr 1min 26s

PASS - Soakaway discharge time less than or equal to 24 hours

Appendix B - Proposed SUDS

Site areas	Area [m^2]
Hardstanding	5970
Landscape	450
Tree pits	17

Hardstanding area.

Rain water on the hardstanding area of our site will find it,s way into the existing soakaway, currently existing on site 260 m^3 Stormtech attenuation system.

Tree pits.

According to, SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide 2022, 1m^2 of permeable paving is providing 0.4m^3 of attenuation storage, therefore a total volume of 6.8m^3 it is provided by tree pits. Our tree pits proposal is 15 no. ø1200mm.

Landscape area.

We propose green area on our site to be 450m^2, reducing the strain on the attenuation tank as less area is to be catched and site run-off is reduced, the landscaped area will provide natural soil infiltration/soakaway properties for surface water.

As shown above, the total volume of attenuation necessary for our site is 223m^3 (using SUDS). This will supply the total area necessary to be attenuated of 5970m^2

Total hardstanding area = 5970m^2

5970m^2 to be discharged into the attenuation storage

260m^3 + 6.8m^3 = 266.8m^3 total storage provided on site

223m^3 / 266.8m^3 = 0.84% utilisation of our provided storage (including SUDS)