

# Infrastructure documentation for smart urban drainage system in Zadar implemented

Final Version of June/2023

Deliverable number 5.8.4.



Project Acronym STREAM
Project ID Number 10249186

Project Title Strategic Development of Flood Management

Priority Axis 2 - Safety and Resilience

**Specific objective** 2.2 - Increase the safety of the Programme

area from natural and man-made disaster

Work Package Number 5

Work Package Title Pilot projects

Activity Number 5.8.

Activity Title Smart urban drainage system

Partner in Charge LP

Partners involved LP, PP3, PP13

StatusFinalDistributionPublic



# Summary

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# 1. Introduction

As part of A.5.8. Smart urban drainage system, infrastructure documentation for smart urban drainage system in Zadar was implemented. Rain gardens slow down the penetration of water, their benefits are multiple in protection against floods and climate change. As the existing drainage system shows more and more deficiencies as a result of increasingly intense stormy rain periods, we looked for new effective solutions, and the benefits of rain gardens proved to be multiple. Their drainage systems slow down the penetration of water, and surpluses are "sanitized" by well-chosen plants with an absorbent character.



# 2. Infrastructure documentation for smart urban drainage system

Zadar County Development Agency ZADRA NOVA implemented infrastructure for smart urban drainage systems as one of the solutions for reducing water runoff that is causing floods in Zadar. Smart urban drainage systems will recreate the land's natural function, including capturing rainwater filtering out pollutants and recharging groundwater. The system can be designed as simple as digging a shell or depression and filling it with native plants and soil amended with sand. At the same time, it can store large amounts of rainwater that can be used in the irrigation process. Also, the system protects natural water sources and creates cleaner and greener areas for the citizens.

# 2.1. Conceptual solution

The project of building rain gardens at four locations in Zadar County is one of the strategic projects of Zadar County, more precisely, it refers to the development of the conceptual solution of the concept of storm water drainage according to the principles of WSUD (water sensitive urban design) for adaptation to climate changes, harmonization with sanitary sewerage (agglomeration) and the creation of a hydrotechnical model that will be used for all future operations in the watershed. Spatial planning as an interactive, publicly visible, technically simple and beautiful ecological infrastructure is the basis of the conceptual solution of storm drainage according to WSUD principles. For growing challenges climate change water and greenery are used together to reduce flood zones, reduce temperature islands, pollution, social and economic challenges, as well as the sustainability of the spaces themselves. Solutions should combine function, aesthetics and usability in harmony with the natural space. This solution also improves the quality of rainwater, not only in the water bodies into which it is discharged, but also creates an opportunity for rainwater to be used to increase drinking water supplies. Solutions should be planned in multidisciplinary cooperation of spatial planning, urbanism, landscape architecture and hydrotechnical profession.

The decision was made in accordance with the Spatial Planning Act, the Spatial Planning Plan of the City of Zadar, positive legal regulations and rules of the profession. In the wider zones of the localities in question, the existing rainwater drainage system has been built to a greater extent, and with these conceptual solutions, the relief of the existing drainage system is seen in such a way that shorter sections that make up functional units are observed, and it is possible to redirect them towards the rain gardens in question. An exception to the above is the solution of rain gardens, which accept rainwater from the internal parking areas provided within individual parcels in question. Since there are several types of rain gardens (insufficiently drained and independent, as well as several different subtypes), considering the existing condition of the terrain and the design concept, the most optimal solutions were selected. The form-functional technical solution is determined by the configuration of the terrain and the height difference. When laying the collector



routes and positioning the rain gardens, the existing construction was taken into account while respecting the planned condition. Underground and/or surface retentions are planned, mostly inhabited by autochthonous non-invasive varieties which are equally tolerant to conditions of occasional flooding and drought.

With this approach to dealing with stormwater, green areas are an indispensable part of the drainage system, and three important roles are addressed:

- 1. Reduction of stormwater runoff by increasing infiltration into the underground at the very place of origin,
- 2. Slowing down the flow of rainwater into the sewage system or other recipient by retention
- 3. Creation of water supplies for watering in the dry period of the year.

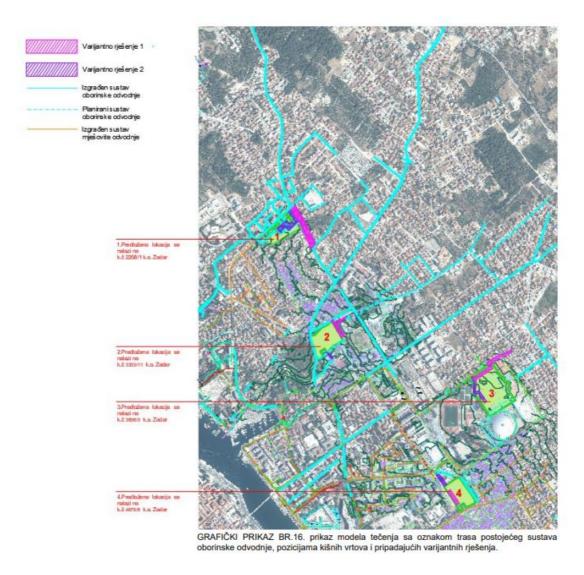


Figure 1. Display of the flow model with route markings of the existing system rainwater drainage, the positions of rain gardens and associated variant solutions



## 2.2. Rainfall drainage

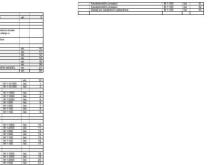
When creating the project documentation - conceptual solution, it was necessary to adhere to: Valid spatial planning documents, positive legal regulations, existing norms and regulations for the system public drainage and environmental protection. Dimensioning buildings of the storm drainage system on the basis of hydraulic - hydrological calculation. Create a hydraulic hydrological model of the basin and sub-basins that gravitate to the zone. Harmonize the routes of sanitary and possible future rain collectors. The design solution for stormwater drainage is in accordance with the chosen method of stormwater drainage - "slow the flow" in contrast to the method of sanitary - waste water drainage - "as soon as possible". It is not allowed to direct rainwater and surface water to the collector before slowing down and retaining them as much as possible in the catchment, and all according to special technical regulations for the drainage of rainwater and surface water. Special technical conditions refer to the measures applied to the newly designed drainage system. In this case, emphasis is placed on WSUD measures (24-hour retention, infiltration, recipient), while the rational method is used for classical elements of shorter sections and smaller sub-basins. The retention time is distributed within the basin, and by sub-basins to reduce the peak flow downstream, in the main collector, open channel and natural watercourse. This time is not less than 15 minutes with a tendency to increase upstream in accordance with the possibilities of green areas, i.e. selected retention methods. Everything is proven by hydraulic calculations. The type of material for the construction of collectors, other buildings and bioretentions was also chosen, which will enable simple and economical management of the new system.





MJESTO I DATUM Zadar, Lipani, 2023.



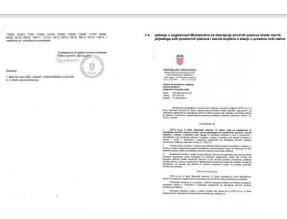














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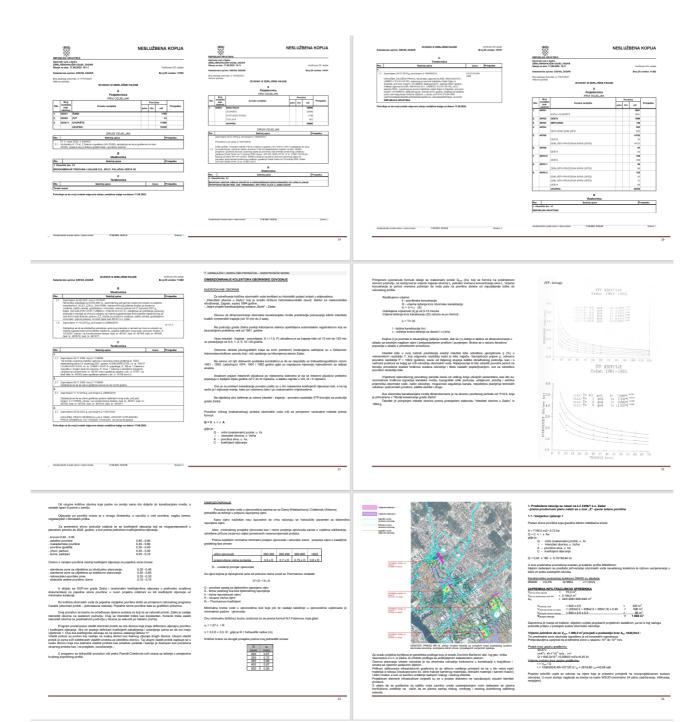
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**PAPREMINIA INFLITACIJSKOO SPREMNIKA**

V<sub>pot 20 kilomorpo colo 20n.</sub> = 40,00 m²

V<sub>pot 20 kilomorpo colo 20n.</sub> = 2 819,71 m²

Alia. = 2834-986-1988-201-2778 m²

Alia. = 191+366-113-112-512 m²
   Karakteristike postojećeg kolektora DN400 su sljedeće:
DN400 i=0,3% Q=95l/s v=1,0m/s
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V<sub>pot 20 10thin pipeak</sub> = 1562,95 m<sup>3</sup>

A<sub>6</sub> = 485+67+75=627 m<sup>2</sup>

A<sub>6</sub> = 233 m<sup>2</sup>

        Vulneration varie
        = 40 x 0,5
        = 20,00 m²

        Vesteratio armini na markija
        = 153 x 2,5 x 0,40
        = 153,00 m²

        Valentalis tramen rimeria
        = 153 x 0,5 x 0,3
        = 22,95 m²

        Vulnapara remoria
        = 156,96 m²
        = 156,96 m²

                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    emina je veća od tražene, slijedom uvijeta propisanih projektnim zadatkom, pa se
viđa njeno korištenje kao rezenmi preljev Varijantnog rješenja 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Zapremina je manja od tražene, slijedom uvijeta propisanih projektnim zad 
predviđa preljev u postojeći sustav oborinske odvodnije.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Vrijeme potrebno da se V<sub>juin</sub> 1 700,20 m² procjedi u podzenije kroz A<sub>sk</sub> =778,0+4*120=1258,0m2.
Tio predmetne zone obshivala izgrađeno je od eocenskih vaprenaca.
Pretpostavljena upojnost tia predmetne zone u rasponu 10° do 10° m/s.
       Zapremina je manja od tražene, slijedom uvijeta propisanih projektnim zada
   Vrijeme potrebno da se V<sub>pm</sub> 1 373,6 m² procjedi u podzemlje kroz A<sub>in</sub> =880,0+4x100
Tio prodmetne zone obuhvala izgrađeno je od eocenskih vaprenaca.
Pretpostavljena upojnost tia predmetne zone u raspenu 10° do 10° m/s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Protok kraz upojnu građevinu:

Q=A^V

V=K^1; K=1*10<sup>4</sup> m/s ; i=1

Q = 1258,0x10<sup>5</sup> =0,01258 m3/s=12,58 l/s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Wijerns mriside lores amples producinc:

1 ≤ V<sub>M</sub> ( 2)

1 ≤ V<sub>M</sub> ( 3)

1 ≤ V<sub>M</sub> ( 4)

1 ≤ V<sub>M</sub> ( 3)

1 ≤ V<sub>M</sub> ( 4)

1 ≤ V<sub>M</sub> 
                                           k kroz upojnu građevinu:
Q=A*v
v=K*7 ; K=1*10<sup>-6</sup> m/s ; /=1
Q = 12800x10<sup>-6</sup> =0,0128 m3/s=12,8 l/s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       \frac{\text{Vierne protoka kroz upojnu građevinu:}}{t = \text{V}_{pd} / \text{Q}} \\
t = 1709200/12,58=135866,45 / ss = 2264,4
   Vyšems szonka krosi upodni problemiu.

[ = 1373600712-81070123 ]. = 7786.54 [.e. 278.65 ose

Ponkal kritikili upod sa odnose sa ospisa koja je protince prinjesti na nonomještanom sustavu odnostje. U som skudaju neglasak sa starija na injene Vyšuľo (mirmatro 24 satro zadržavenja, hilfitracija, recipijers).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Posební tehníčkí uvjetí se odnose na mjere koje je potrebno privrjenití na novoprojektranom sustavu
odnodnje. U ovom slučeju naglasak se stavlja na mjere WSUD (minimalno 24 satno zadržavenje, infitracija,
recipijenti.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Posební tehnički uvjetí se odnose na mjere koje je potrebno primjenití na novoprojektiranom sustavu odvodnje. U ovom slučaju naglasak se stavlja na mjere WSUD (minimalno 24 satno zadržavanje, infitracija, nedojeni).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              4. Prediožena lokacija se nalazi na k.č 4676/5 k.o. Zadar
- prema prostornom planu nalazi se u zoni "D" – prostor javne i društvene nam
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             4.2/ Varijantno rješenje 2

Podaci slivne povetirne koja gravitra linijskoj rešetki iznosi:
A = 1 132 m2 = 0,1132ha=0,11 ha
g = C x i x Ae
gije je ;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          - prema prostomom panu natazi sa u zoni "br – pros

4.1/ Varijantno rješenje 1

Podaci silme pomine koja gravitra linijskoj rešetki iznosi

A = 14465 m2 ≈ 0,1465 = 0,15 ha

Q = C x i x Ae

gilej le :
3.2 / Varijantno rješenje 2

Podaci slivne povrtine koja gravitira linijskoj retetki iznosi: A=1902\,m2 \pm 0.1902\,\pm 0.2 ha Q=C\times 1\times A Q=C\times 1\times A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Proceedings of any partners upon in the copie hashborshown objurings, a business deprives a total of a greatery of the copie and the copie and
               Q = 0,45 × 185 × 0,2=1,665=16,65 l/s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ldejnim rješenjem se predlaže prihvaćanje oborinskih voda navedene zone obuhvata na način da se ista 
prepušta kruz procijepe u rubnjacima te se površinski ujeva u zonu klišnog vrta.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      V<sub>pris</sub> a rest a v. 1,121-1,241 to the final fi
   klejnim (elenjem se prediaže prihvaćanje oborinskih voda navedene zone obu 
propušta kroz procjepe u rubnjacima te se površinski uljeva u zonu kližnog vrta. 
ZAPREMINA INFLTRACIJSKOG SPREMNIKA
   V<sub>per no litrice planak</sub> = 19,98 m<sup>3</sup>
V<sub>per no litrice planak</sub> = 1 438,56m<sup>3</sup>
A<sub>to</sub> = 81,22+85,60 =166,82 m<sup>2</sup>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Veneroja zente = 430 x 0,3 = 129,00 m² 

Veneroja zente za sadaju = 430 x 2,5 x0,40 = 430,00 m² 

Veneroja zente za sadaju = 430 x 0,50 x 0,3 = 54,50 m² 

Veneroja zente zenteja = 430 x 0,50 x 0,3 = 623,50 m²
   V<sub>pot to 20000 pipea </sub> = 21,98 m<sup>3</sup>

V<sub>pot to 20000 pipea vode job.</sub> = 1,582,85 m<sup>3</sup>

= 263+213+576 m<sup>2</sup>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   as agreement places deferme dearers as policioses et agreement in terminal practice log reconsists a 
production of the control of the contro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    *** Table *** Ta
                                   V<sub>amonip a color</sub> = 576 x 0,5 = 288,00 m<sup>3</sup> 

V<sub>amonip a color</sub> = 576 x 2,5 x 0,40 = 576,00 m<sup>3</sup> 

v<sub>amonip a color</sub> = 4,8 x 2,6 x 0,48 x 0,95 = 179,30 m<sup>3</sup> 

V<sub>amonip a color</sub> = 576 x 0,5 x 0,3 = 56,40 m<sup>3</sup> 

V<sub>amonip a color</sub> = 576 x 0,5 x 0,3 = 56,40 m<sup>3</sup> 

V<sub>amonip a color</sub> = 1123,70 m<sup>3</sup>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Pretok kras upojnu građevinu:
Q+A*V
v+A**; K+3*10.6* m/s.; i+1
Q = 777,0x10.6 =0.00777 m3/s=7,77 i/s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Protok kraz upojnu gradevinu:
QnA'v
vnK'i; Kn1'10' m/s ; in1
Q = 430,0x10' =0,0043 m3/s=4,3 i/s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Visione portion from apply a professor.

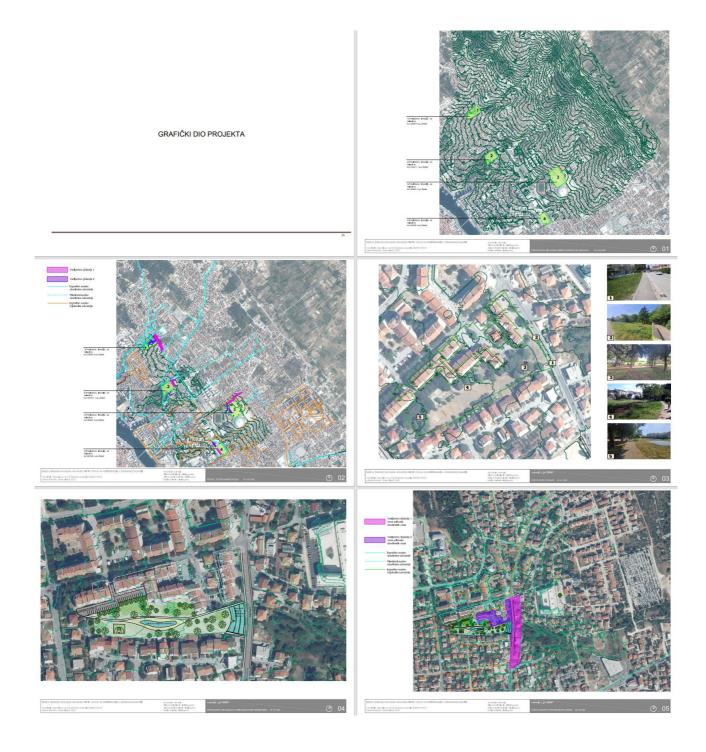
1 = 100-0007/7-193221 in = 2273.88 (n = 32.78 asi

Product shrinks upde so odnoce so onigne kelp is protector principal so noncoprojetismom sustano control and making registeral to entire professor in the Commission 24 series and control professor.
       Protok kraz upojnu građevinu:
QsA*y
vsK*1; K=1*10<sup>6</sup> mis ; i=1
Q = 1176,0x10<sup>8</sup> =0,01176 m3/s=11,76 l/s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          \label{eq:control_problem} \begin{array}{l} \text{Vylume problems} \\ \text{If $V_{M}$ (2)$} & \text{Vylumin} \\ \text{If $V_{M}$ (2)$} & \text{Set} (2006)_{m} = 2418.6 \, l_{m}\!\!=\!\!0.27 \, \text{sail} \\ \text{If $v_{M}$ (2)$} & \text{Set} (2006)_{m} = 2418.6 \, l_{m}\!\!=\!\!0.27 \, \text{sail} \\ \text{Possibit in Whitelli uppl as odnose na rejene hige je potrebno prinjenit na novogovjekiranom sustanu okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom sulkije naglapske sa teslova na rejene VPXIDO (mirmalsto 28 atmo sadžavanje, irrittracja, okologije. Usom su sadžavanje na rejene venika na rejene VPXIDO (mirmalsto 28 atmo sa teslova na rejene VPXIDO (mirmalsto 28 atmo sa teslova na rejene VPXIDO (mirmalsto 28 atmo sa teslova na rejene VPXIDO (mirmalsto 
   Posební tehníčkí uvjelí se odnose na mjere koje je potrebno primjentil na novoprojektranom sustanu odvodnje. U ovom slučaju naglasak se stavlja na mjere WSUD (minimalno 24 satno zadržavanje, infiltracija, poseciolotik).
   U smislu ostalih odredbi Zakona o gradnji kolektori kanalizacije i priključci sigurni su od požara, ne djeluju
   Svi radovi moraju se izvesti prema ovoj projektnoj dokumentaciji. Ukoliko se tijel na nepredviđene poteškoće obvezatno se mora konzultirati nadzomi inženjer.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Potrebno je naglasili kako jedirične cijene mogu značajno odstupati, čak i umutar istih ili sličnih lokaliteta.
Resilan prikaz troškova izgradnje moguće je dobiti vrednovanjem ponuća na natječaju, pri čemu se u sklogu
ponuće prijuvjenih na istom nadječaju slupna vijednost može bitno razlikovati medu sračične pomutačnima.

    Prediožena lokacija se nalazi na k.č 3333/11 k.o. Zedar
2. U Varjantro rjeđenje 1. 2339/1 EUR
2.2/ Varjantro rjeđenje 2. 64.993 EUR

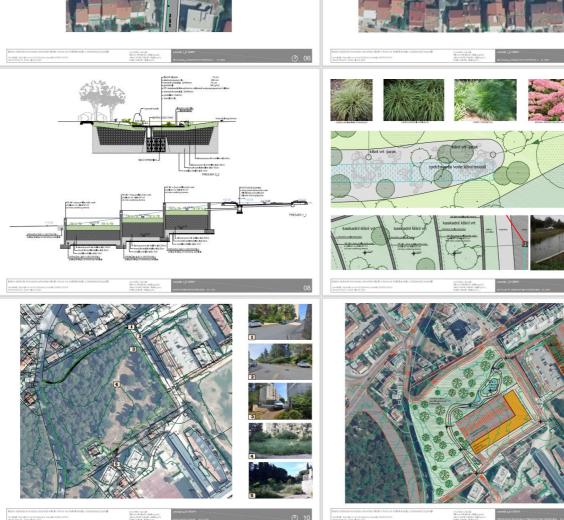
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Vodevodne instalacija:
U skužuji razlasta na vodocpskrbne cijevi prilikom gradnije na svakom križanju vodovodnog cijevovoda i kanalizacijskog kolektora monigu se cijevi kolektora obložiti zabitivim slojem betona u duljini od 3,0 m s obije staran križanju, kado bi se mogožnost loma cijevi u području križanju svela na minimiran.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Na kraju se napominje da sve radove treba izvesti prema ovoj projektnoj dokumentaciji jer u protivnom 
projektant ne možne garantizati funkcionalnosti projektrannog devovoda. Ulkoliko se tijekom izvođenja radove 
nade na nepredvidene potektiokor, treba se koncustrata s nadzomim izdnejenom i projektantom iz projektantom.
   Elektroenergetske instalacije (EE):
Način polagorja vodovochh Instalacija u bilziri elektroenergetskih kabela bit će u skladu s "Tehniškim uvjetima za Libru i polaganje riestvinenergetskih kabela nazivnog napona 1 kV do 35 kV" – Prve izmjene i dopune (HEP Vjeznik – Bilten tz. 130, od 31. prosince 2003. godine).
                                   troniške komunikacijake instalacije (EK);
Kritarja sa EK instalacijama moraju bili uskladena s Pravirikom o načinu i uvjetima određivanja
ekoničnok komunikacijake infrastukture i cluge povezine opreme, zaštitne zone i radjskog koridera
vezama investora radova ili gradivne (NN 73113); Člarnak T. (Vodovod i kanalizacija).
       Mjesto kritanja ovisi o visinskom položaju elektroričkog komunikacijskog kabela te se u pravilu 
izvodi na način da vedovodna opjer prelazi spod elektroričkog komunikacijskog kabela, pri čeru o komita 
izvodi na način da vedovodna opjer prelazionoda kroni najnanje 0,0 n. a bod tražlega kabela s kolizion 
prikljačiona osimani razamski p. 0.3 m.;
   Alo mismasus udajemosi trataksa 2. ovoga člaska nije moguće postići, potrebno je u svrhu zabite 
elektroničkog komunikacijskog katela od mehaničkh odiočenja isti postaviti u posebnu zabitatu cijev odio-
najmanja ir na svose frame mjesta kortaja. U stra stakla, najmanja udajamente e sveja bit manjamaja od na 
mismasi prava svoja odiovanika odiova 
mismasi svrbanja elektroničkog komunikacijskog katela is glavnim cjevovodom, odnosno 0,15 m kod kritanja 
elektroničkog komunikacijskog katela is sucirian prilipičenim.
                                           početka radova potrebno je na terenu izvršti lociranje i označavanje trase podzemnih instalacija,
rod, kanalizacija, <u>elektroerengetici i TK kabeli). U svakom slučaju u zoni očekivarog istžanja potrebno
gep vršti pažijivo uvožni iskop), čia se instalacije ne bi oštetile. Postojeće instalacije potrebno je iskolčti
u mjesta, te snimih njihovu dubimu.</u>
```







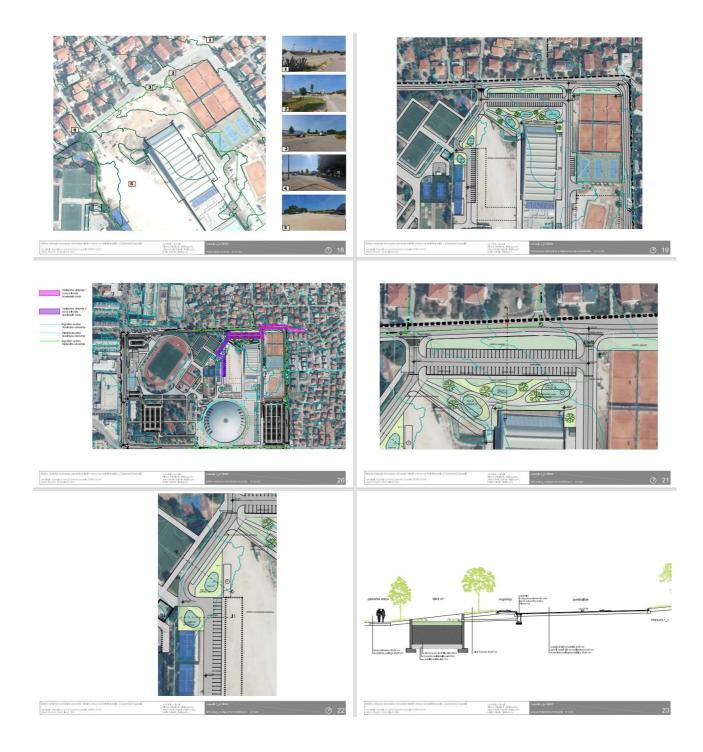










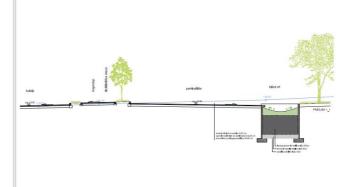


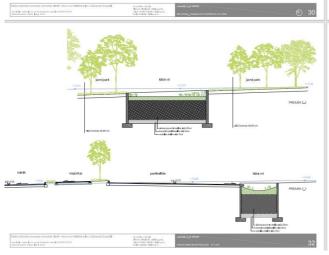


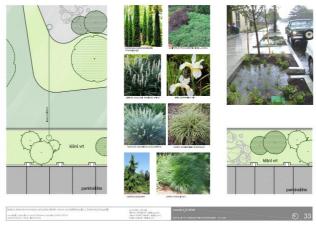














# 3. Conclusion

The creation of a conceptual design for the drainage of rain gardens at four locations in Zadar County will be used for future projects for the construction of new rain gardens in Zadar. Smart urban drainage systems reduce the possibility of flooding due to sewage overflows. In addition, they reduce pollution and improve the quality of surface and underground waters. They also improve greenery and increase biodiversity. Systems will affect the reduction of harmful effects on human health and the environment, but will also raise citizens' awareness of flood risks.