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Department of Civil Engineering

Climate Change and Water Management Impacts on Land and Water Resources

Syed Mahtab Ali

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.
This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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ABSTRACT

This study evaluated the impacts of shallow and deep open drains on groundwater levels and drain performance under varying climate scenarios and irrigation application rates. The MIKE SHE model used for this study is an advanced and fully spatially distributed hydrological model. Three drain depths, climates and irrigation application rates were considered. The drains depths included 0, 1 and 2 m deep drains. The annual rainfall and meteorological data were collected from study area from 1976 to 2004 and analysed to identify the typical wet, average and dry years within the record. Similarly three irrigation application rates included 0, 10 and 16 ML/ha-annum. All together twenty seven scenarios (3 drains depths, 3 climates and 3 irrigation application rates) were simulated.

The observed soil physical and hydrological data were used to calibrate and validate the model. Mean square error (R^2) of the simulated and observed water table data varied from 0.7 to 0.87. Once validated the MIKE SHE model was used to evaluate the effectiveness of 1 and 2 metre deep drains. The simulated water table depth, unsaturated zone deficit, exchange between unsaturated and saturated zones, drain outflow and overland flow were used to analyse their performance.

The modeling results showed that the waterlogging was extensive and prolonged during winter months under the no drainage and no irrigation scenario. In the wet climate scenario, the duration of water logging was longer than in the average climate scenario during the winter months. In the dry climate scenario no waterlogging occurred during the high rainfall period. The water table reached soil surface during the winter season in the case of wet and average climate. For the dry climate, the water table was about 0.9 metres below soil surface during winter. One and 2 metre deep drains lowered the water table up to 0.9 and 1.8 metres in winter for the wet climate when there was no irrigation application.

One metre deep drains proved effective in controlling water table during wet and average climate without application of irrigation water. One metre deep drains were more effective in controlling waterlogging a in wet, average and dry years when the irrigation application rate was 10 ML/ha-annum. With 16 ML/ha-annum irrigation

application, 1 metre deep drains did not perform as efficiently as 2 metre deep drains in controlling the water table and waterlogging. In the dry climate scenario, without irrigation application, 1 metre deep drains were not required as there was not enough flux from rainfall and irrigation to raise the water table and create waterlogging risks.

Two metre deep drains lowered the water table to greater depths in the wet, average and dry climate scenarios respectively when no irrigation was applied. They managed water table better in wet and average climate with 10 and 16 ML/ha-annum irrigation application rate. Again in the dry climate, without irrigation application 2 metre deep drains were not required as there was a minimal risk of waterlogging.

The recharge to the groundwater table in the no drainage case was far greater than for the 1 and 2 metre deep drainage scenarios. The recharge was higher in case of 1 metre deep drains than 2 metre deep drains in wet and average climate during winter season. There was no recharge to ground water with 1 and 2 metre deep drains under the dry climate scenarios and summer season without irrigation application as there was not enough water to move from the ground surface to the unsaturated and saturated zones.

When 10 ML/ha-annum irrigation rate was applied during wet, average and dry climate respectively, 1 metre deep drains proved enough drainage to manage the recharge into the groundwater table with a dry climate. For the wet and average climate scenarios, given a 10 ML/ha-annum irrigation application rate, 2 metre deep drains managed recharge better than 1 metre deep drains. Two metres deep drains with a 10 ML/ha-annum irrigation application rate led to excessive drainage of water from the saturated zone in the dry climate scenario.

Two metres deep drains managed recharge better with a 16 ML/ha-annum irrigation application rate in the wet and average climate scenarios than the 1 metre deep drains. Two metres deep drains again led to excessive drainage of water from the saturated zone in dry climate.

In brief, 1 metre deep drains performed efficiently in the wet and average climate scenarios with and without a 10 ML/ha-annum irrigation application rate. One metre deep drains are not required for the dry climate scenario. Two metre deep drains performed efficiently in the wet and average climate scenarios with 16 ML/ha-annum irrigation application rate. Two metre deep drains are not required for the dry climate scenario.

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k	Time constant
K_{inf}	Infiltration rate (mm/h)
∂h	Partial derivative of hydraulic head
∂z	Partial derivative of gravitational head
Δh	Change in hydraulic head (m)
AROOT	Parameter that describes the root mass distribution
C1	Empirical parameters
C2	Empirical parameters
C3	Empirical parameters
Cint	Defines the interception storage capacity of the vegetation (mm)
Cm	Iteration coefficient
Cn	Iteration coefficient
D0	Zero metre drain depth (No drain scenario)
D1	One metre drain depth
D2	Two metres drain depth
Eat	Actual Evapotranspiration (mm/d)
Ecan	Canopy evaporation (mm/d)
Ep	Potential Evapotranspiration by crops (mm/d)
f1(LAI)	Function based on the leaf area index
f2(θ)	Function based on the soil moisture content in the root zone
H	Hydraulic head (m)
H_c	ET Surface Elevation (m)
I	Inflow rate to the reservoir
Iact	Actual Interception

I0	Zero Mega Litres per annum per hectare irrigation
I10	Ten Mega Litres per annum per hectare irrigation
I16	Sixteen Mega Litres per annum per hectare irrigation
Imax	Canopy storage (mm)
Inf_k	Maximum amount of infiltration (mm/h)
K	Hydraulic conductivity (m/s)
Kh	Horizontal hydraulic conductivity (m/s)
Km	Iteration coefficient
Kn	Iteration coefficient
K_o	Time constant for the overflow outlet
k_p	Time constant for the percolation outlet
LAI	Leaf Area Index
MAE	Mean Absolute error
ME	Mean error
$Obs_{i.t}$	observed measurement
P	Precipitation (mm)
Q	Volumetric flux in m^2 per second
Q	Source/sink term
Q	Outflow rate from the reservoir
Q_o	Outflow from the overflow outlet and
Q_p	Percolation of water
R	Correlation constant
RDF	Root Distribution Function
RMES	Root mean square error
Ro	Root extraction at the soil surface

S	Storage in the reservoir
SA	Average climate scenario
SD	Dry climate scenario
SW	Wet climate scenario
$Sim_{i,t}$	Simulated measurement
STDres	Standard residual error
SZ	Saturated zone
t	Time
Thd	Threshold value for the overflow outlet
UZ	Unsaturated Zone
Z	Gravitational head component (m)
Z	Depth below ground surface [m]
z_d	Equal to the root depth (m)
z_{ext}	Extinction depth(m)
Δt	Change in time (t)
Θ	Volumetric water content
θ_{FC}	Volumetric moisture content at field capacity
Θmax	Maximum water content
Θmin	Minimum water content
Θsat	Saturated water content
θ_W	Volumetric moisture content at the wilting point
Ψ	Pressure component (m)

CHAPTER 1

INTRODUCTION

The change in global climate is impacting on every aspect of our life. Our limited agricultural land and water resources are under severe pressure. In the Southwest of Western Australia the average annual rainfall is decreasing and extreme rainfall events and flooding are becoming more frequent. This changing environment is one of the major challenges in the irrigated and non-irrigated agricultural catchments of Southwest of Western Australia. It has major implications for our current water resources and engineering water management strategies. It demands a deep understanding of these changes for a sustainable use of our land and water resources.

Excessive clearing of native vegetation in the Southwest of Western Australia for agricultural production has had a number of environmental consequences including salinity, waterlogging, flooding, declining water quality and increased emission of green house gases. In addition to this, engineering strategies aimed at boosting agricultural production, like irrigation and drainage are, in general, poorly planned and engineered leading to further environmental degradation and inefficient water use. Before clearing most of the rainfall was being accounted for by interception and transpiration by vegetation with relatively small amounts recharging groundwater systems. Removal of much of the native vegetation has had major impacts on the carbon and water balances. In the absence of the native deep-rooted perennial vegetation more water now enters the soil and evapotranspiration has been reduced. Water that is not used by annual crops and pastures recharges the groundwater system and mobilises salts stored in the profile. Rising groundwater can then lead to seepage, waterlogging during winter and salt deposition at the surface when water is evaporated during summer.

One of the major causes of localised waterlogging and salinity in Western Australia is texture contrast or “duplex” soils. Two thirds of the agricultural land in the Southwest region has a duplex soil profile with sandy loam surface soils overlying sandy clay subsoils. A common morphological feature of these soils is a strong texture-contrast between the A and B horizons; however, chemical, mineralogical and physical properties can vary. A lack of vertical flow capacity in the B horizon causes ponding above the boundary between the A and B horizons and as a result waterlogging develops in the topsoil.

Second most important cause of waterlogging and salinity in the agricultural catchments is the role of topography specifically in upper and middle part of the catchemnts. On sloping duplex soils, lateral saturated flow occurs above the B-horizon. The amount of flow and its duration depends on the slope angles and length, soil depth, and the hydraulic conductivity of the topsoil and subsoil. Interflow may contribute to waterlogging further down the slope and create a watertable at or near the ground surface. In the Southwest of Western Australia some form of artificial drainage network (engineering earthwork) especially interceptor drains are increasingly being used to manage waterlogging and salinity. The change in natural drainage pattern with one developed by man's activities, mostly through open shallow and deep drainage is a subject of much debate in WA. The artificial drainage network may take many forms e.g., graded banks, contour banks, interceptor and reverse interceptor banks, w-drains and simple open and closed ditches.

To deal with waterlogging and salinity in the southwest of Western Australia, understanding the rainfall-runoff (surface and subsurface) process is a fundamental requirement and is the basis of this study. It is important to investigate what happens to the rain when it falls on drained or undrained agricultural areas as well as what impact drains have on surface and subsurface flow. We will investigate these issues with the use of physical based modelling and compare the hydrological processes involved, in terms of surface and subsurface runoff, in drained and undrained agricultural areas.

1.1 STUDY AREA

The Harvey Water Irrigation Areas (HWIA) is an important irrigated dairying and horticulture area situated in Southwest of Western Australia. The area supplys Perth and surrounding areas with more than 40 per cent of its milk demand. The history of irrigated agriculture in HWIA started with the establishment of a weir in 1916. Since that time, pastures and horticultural crops have been irrigated through surface (flood) irrigation. Irrigated agriculture is the community's major source of income. HWIA consists of three Irrigation Districts (IDs); Waroona, Harvey and Collie. The northern edge of the HWIA is approximately 100 kilometres south of Perth. The clearing of native vegetation with the replacement of shallow rooted crops and pastures, construction of dams, irrigation by flooding and the construction of a drainage network, has modified the water balance of Harvey, Collie and Waroona Irrigation Districts of the Southwest of Western Australia. More water is recharging the groundwater system and discharge has decreased. As a consequence improving irrigation efficiency, managing seasonal waterlogging and salinity are key issues which are being faced by the farming communities in HWIA.

Prolonged waterlogging has reduced the number of cropping days per year and, as a result, farm profit has declined in recent years. The fluctuation of the water table during summer, winter and irrigation times has led to surface and sub-surface salinity and which in turn reduces crop production per unit area. Once severely affected, areas may be out of production permanently. To manage excessive water and to reclaim the salt affected areas, a number of drains have been constructed throughout the IDs with little success.

We hypothesise that appropriate application of irrigation and drainage to waterlogged and salt affected soil can reclaim agricultural land in short period of time. This study employed a physical based hydrological model (MIKE SHE) to assess the effectiveness of irrigation and drainage in reclaiming the affected land. For this purpose, MIKE SHE was calibrated and validated by using actual field observations from selected catchments in IDs. The validated model was then used to run scenarios with varying drains depths, irrigation applications and climate scenarios to analyse the role of drainage in managing waterlogging and salinity in IDs.

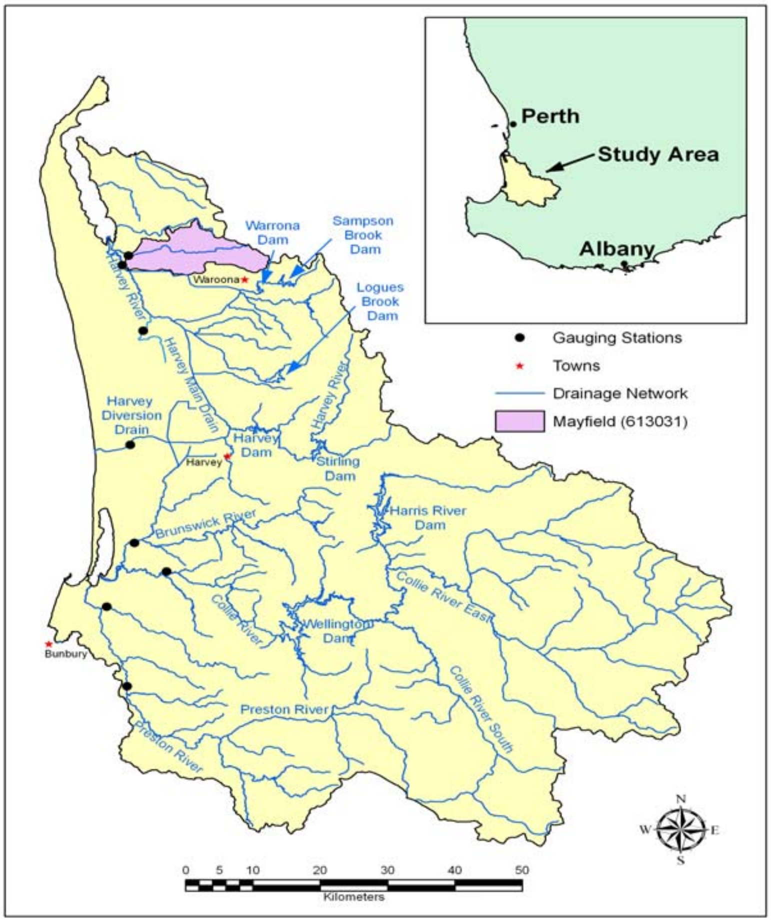

Figure 1.1: Location of the Study area.

1.2 OBJECTIVES

Although reforestation and drainage are two major tools to tackle the problem of waterlogging and salinity, in this study the impact and role of drainage was evaluated for managing water table depth and water balance of IDs agricultural catchments. It aimed to provide a deeper understanding of how different fluxes (e.g. recharge, discharge, overland flow and subsurface runoff) are exchanged and modified after the installation of drainage. The study also provides a better understanding of the role of irrigation and drainage in modifying the saturated zone and unsaturated zone moisture contents under drained and un-drained scenarios in wet average and dry climates. The objectives of study were:

1. To calibrate and validate MIKE SHE model with actual rainfall, meteorological, land use, water table depth and stream flow data from HWIA agricultural catchment in the Southwest of Western Australia.

2. To use the calibrated model to assess the impact of drainage on overland flow, drain outflow, saturated and unsaturated zones moisture content in wet average and dry climates.

3. The impact of a wet, average or dry climate on the water table depth with and without irrigation and drainage. The performance of drains with different depths to manage the water table were compared to understand the role of drain depth under wet, average and dry climates

4. To gain understanding of the effect of climate on un-drains and drained, irrigated and non- irrigated areas. MIKE SHE a fully distributed hydrological model will be used to gain the understanding of the soil, vegetation, topographic and land use factors that control the water balance of typical irrigated agricultural catchments in the Southwest region of Western Australia. The implementation of various drainage schemes in the model will provide a thorough understanding of its impact on the overall water balance, specifically, the volume of recharge, discharge from the unsaturated and saturated zones, rate of exchange in unsaturated and saturated zones and volumes drains and overland flows.

5. To evaluate the role of drainage to cope the waterlogging and salinity problem in the irrigated and non-irrigated area. The extent of waterlogging and rate of recharge during irrigation will be estimated and the drains performance will be compared with non-irrigated and undrained areas.

6. To quantify different fluxes in saturated and unsaturated zones with different drainage designs and their role in managing waterlogging and salinity. The calibrated MIKE SHE will be used to run different scenarios with different irrigation application rates to understand the change in moisture contents in saturated and unsaturated zones.

7. To understand the interaction between the generation of overland flow and flooding risk with and without drainage and irrigation. For this purpose, the impact of overland flow would be estimated in term of depth of flow with and without irrigation under wet, average and dry climate scenarios.

CHAPTER 2

THEORY AND LITERATURE REVIEW

The main objective of this chapter was to review the literature for getting a comprehensive knowledge of past work done locally and internationally to address the problem and causes of water logging and salinity. The strategies adopted to tackle this problem and the hydrological models used to understand and evaluate the impact of these strategies were also reviewed. Application of GIS based hydrological models has also been explored as these models have made a great progress in the field of hydrology in recent history.

There is wealth of knowledge available in the literature about causes of waterlogging, salinity, hydrological models, strategies adopted to reclaim the affected soil locally and internationally. It is not possible to cover all of that only the material related to this research is being repeated here form the literature. This chapter is divided in to following sub heading:

- Causes of waterlogging and salinity
- Impact of drainage to reclaim the affected land
- Hydrological models used to assess the problem
- Application of GIS in Hydrological Modelling

2.1 CAUSES OF WATERLOGGING AND SALINITY

Farming community of Western Australia is facing the worst environmental problem of waterlogging and salinity in the recent history. Approximately 1.8 million hectares of productive land is already affected by waterlogging and salinity (Ferdowsian *et al.*, 1996; George *et al.*, 1997) and further 3-6 millions of hectares may be affected by 2020-2050 respectively (George *et al.*, 2001; Short, R. and McConnell, C., 2001).

The clearing of native vegetation in southwest of Western Australia has altered the water balance of agricultural catchments (Peck and Williamson, 1987). More water now enters the soil and evapotranspiration has been reduced. Water that is not used by cereal crops and pastures contributes to loss of crop yield (McFarlane and Cox, 1992;

McFarlane *et al*., 1992). Also, this water may recharge saline groundwater causing them to rise and seep out at the land surface (dryland salinity; Nulsen and Henschke, 1981). Figure 2.1 shows the impact of overland flow, irrigation and land use on groundwater recharge.

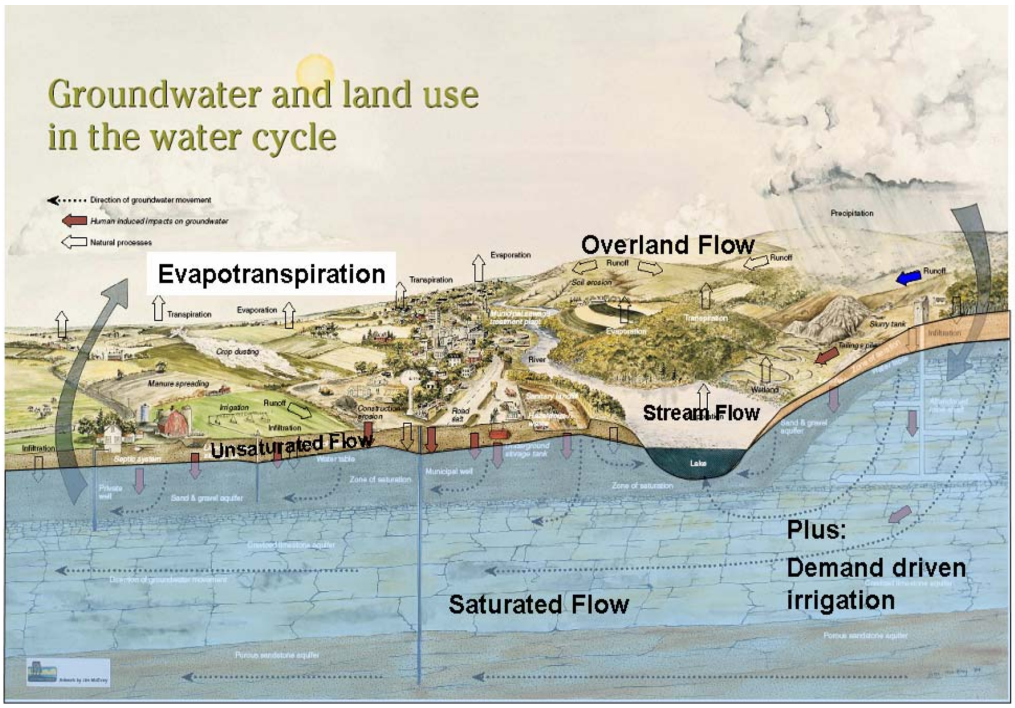

Figure 2.1: Impact of overland flow, Irrigation and Land use on Groundwater Recharge.

Almost two thirds of the agricultural land in this region has a duplex soil profile with sandy loam surface soils overlying sandy clay subsoils (Northcote, 1979). A common morphological feature of these soils is strong texture-contrast between the A and B horizons; however, chemical, mineralogical and physical properties can vary (McFarlane and Cox, 1987). Texture-contrast soils are also common in other parts of the world (Chittleborough, 1992). A lack of vertical flow capacity in the B horizon causes pounding above the boundary between the A and B horizons and waterlogging develops (McFarlane and Cox, 1987). Field observations, aerial photography and remote sensing confirm that waterlogging is common throughout year in the areas of low relief in southwest of Western Australia (McFarlane *et al*., 1992). Figure 2.2 shows the different soil horizons which are major factor in the soil water movement.

Figure 2.2: Textural Contrast Soils with Sand over Clay.

Before European settlement, the whole South West agricultural area in Western Australia was covered with very thick native forests. Theses native forest had many stories of large and long trees undercover by medium large trees and small bushes as well as a thick layer of dead leaves, broken branches and trunks. These native forests were playing a very important role in the hydrology and water balance of the agricultural catchments of Western Australia (Ali and Coles, 1999). Almost 20-30% of the rainfall was being intercepted by trees and thick floor of leaves, and was being evaporated without touching the soil surface. Deep-rooted trees could use the rest of the 70-80% after rainfall events (Ali and Coles, 1999). The increase in runoff and recharge is a direct consequence of the clearing of native vegetation in southwest of Western Australia, and it has altered the water balance of agricultural catchments (Peck and Williamson, 1987).

More water now enters the soil as interception and evapotranspiration has been reduced. Water that is not used by cereal crops and pastures contributes to loss of crop yield (McFarlane and Cox, 1992; McFarlane *et al.*, 1992) in addition to waterlogging and salinity. Also, this water may recharge saline groundwater causing them to rise and seep out (discharge) at the land surface (Nulsen and Henschke, 1981).

On sloping duplex soils, lateral saturated flow occurs above the subsoil (Chow, 1964; Whipkey and Kirkby, 1978). The amount of flow and its duration depends on the slope angles and length, soil depth, and the hydraulic conductivity of the topsoil and subsoil (Hammermeister *et al*., 1982; Lehman and Ahuja, 1985). Ahuja and Ross (1982, 1983) have shown that even a relatively low leakage rate through the subsoil greatly reduces the length of contributing slope (i.e. the soil volume traversed by the interflow). Interflow may contribute to waterlogging further down the slope and create a watertable at or near the ground surface (Lowery *et al*., 1982).

2.2 IMPACT OF DRAINAGE

Literature review indicates that when drains are installed, they modify the hydrological regime and as consequence, the surface and sub-surface flows leaving the drained area are also modified. However, the nature of these changes has not always followed a consistent pattern. In a recent study completed by Dunne *et al*. (1996), a simple hill slope model has been used to analyse how a network of open drainage affects the hydrology of an area. The results from the model simulation showed that the most significant effect of the drains is to increase the sub-surface runoff. This occurs because of the large active area for sub-surface exchange flow into the channel network, and the head difference that is generated by the forced lowering of the water level in the drains.

In many cases, drains have increased the level of peak flow (e.g. Robinson, 1986; Nicholson *et al*., 1989), but in other instances the level of the peak flow has been seen to reduce (e.g. Iritz *et al*., 1994, Dunn *et al* 1996). Different mechanisms have been proposed to account for the observed changes. In case of increased peak flows, the theory is that the increased canalization creates a smoother and faster flow path which acts to increase the rate of surface and sub-surface runoff. In case of reduced peak flows, it is assumed that the drainage has lowered the water table and hence reduced the surface and sub-surface runoff.

Perhaps because of the lack of clear explanation of the hydrological processes involved, the presence of artificial drainage is frequently neglected in hydrological analysis. A recent attempt to understand the hydrological process has been made by Iritz (1994). In this study, three techniques were applied to different catchment in Sweden to try to establish whether or not forest drainage increased peak flows. The techniques involved using a paired catchment approach, a conceptual modelling approach and a distributed modelling approach. The results not only showed slightly different effects for different catchments, but also highlighted the difficulties of prediction by showing slightly different results from the different techniques used. One of the problems here was in having a sufficient understanding of the complex heterogeneous catchment to allow the effects of the drainage to be interpreted. However, the results did allow an important observation to be made, which was that the effect of the drains on lowering the groundwater level had a greater influence on the formation of the peak flows than the increased channel conveyance capacity.

Drainage systems are generally installed to improve crop yields. Although most studies related to crop yields have simply focused on removing water by finding the proper depth-spacing of drains, some early researchers also realized that drainage is potentially a general water management tool. For example, King (1931) envisioned a time "in the not distant future when systems of ditches will be designed and installed as a part of a system for controlling soil water supply, not simply as a means of removing excess water....". Although this vision has yet to be successfully implemented on more than a demonstration scale, it continues to be actively pursued in controlled drainage research projects around the world. These projects have shown promise in not only improving crop yields but also in reducing the nitrogen losses through drainage systems (Zucker and Brown, 1998).

2.3 DRAINAGE EXPERIENCE IN WESTERN AUSTRALIA

There have been reviews of the role of the drains by George and Nulsen 1985, and reports on specific drainage case studies (e.g. Ferdowsian *et al*. 1997, Speed and Simon 1993, Green 1990, Silberstien 1989). Nulsen (1982), concluded that the design of earthwork or engineered drainage solution to ameliorate salinity and/or waterlogging be subtle different depending on whether areas are suffering from saline encroachment resulting from rising water tables (or capillary action); affected by waterlogging; or affected by both.

In areas where soils are affected by saline groundwater, drainage is principally designed to manage the depth of the water table. In the wheat belt area of southwestern Australia, critical depth to water table to avoid salinisation of the soil profile is considered to be around 1.5 to 2.0 metres (Talsma 1963, Peck 1978, Nulsen 1982, George and Nulsen 1985). The critical depth varies with soil type; water table salinity; and plants cover. For example, in coarse to medium sands and some heavy clays the critical depth may be <1.0 to 1.2 metres but for some loamy soils it can be 3.0 to 4.0 metres (George and Nulsen 1985). Figure 2.3 shows typical open drain in Wheatbelt area of Western Australia.

Figure 2.3: Typical open Drain in Wheatbelt area of Western Australia.

The Department of Agriculture of Western Australia was involved in implementing a series of trial in the Moora and Narrogin districts in the early eighties (Coles *et al.*, 1999). The contention at the time was that through monitoring the impact of drains on groundwater levels, soil salinity and ground cover, data will be collected to develop more accurate and inclusive measure of drain effectiveness in different landscapes; and that these measures will thereby be more cost effective and transferable to other areas. Four sites near Watheroo and two near Wubin were chosen for the initial drainage studies and five sites near Yealering were developed. The Department of Agriculture concluded that deep drains will not be effective in the Yearling district owing to the clayey nature of the subsoils.

2.4 HYDROLOGICAL MODELS

The impact of any engineering earth work to mange surface, subsurface and ground water requires the understanding of physical process of water movement within and on land surface. The most important parameters which control water flow within and over the land surface are topography, soil texture, soil structure, soil roughness, and soil conductivities in x, y and z directions, infiltration rate, storage capacity, specific yield, crop roots and their rate of water use in saturated and unsaturated soil zones.

There are many physically based models available in literature which describes surface, subsurface and ground water flow. The aim of this section is to identify the main components of soil water models, compare differences in approaches to their modelling, and assess which approaches were best suited for the modelling of soil water dynamics in Irrigation Districts of Southwest of Western Australia.

2.4.1 Physically Based Hydrological Models

Physical hydrology has produced sophisticated models of water flow through variable soil structures providing accurate methods of simulating infiltration and redistribution. There is a claim that these approaches do not lend themselves to ecological modelling as processes work at different scales, necessitating considerable abstraction before contrarieties may be nullified. Even if this claim could not be supported, the knowledge about rooting patterns is insufficient to resolve water uptake with delivery at the scale hydrological models. The association between competition and rooting depth has effected a stratification of the soil profiles into layers that are equivalent to rooting zones. The need to estimate rates of transpiration have necessitated estimation of water loss to processes other than percolation, such as runoff, soil surface evaporation, crack flow and deep drainage.

MODFLOW and HYDRUS-2D is most widely used hydrological model throughout the world. They are not fully distributed and can not model irrigation and drainage management strategies along with overland flow. MODFLOW is good to simulate the saturated zone. HYDRUS-2D is best to simulate unsaturated and saturated zones. MIKE SHE can be used to simulate unsaturated, saturated, and overland flows as well as irrigation and drainage management strategies. HYDRUS-2D and MIKE SHE use similar routines and numerical techniques to simulate saturated zone as used in MODFLOW.

A complete overview of MIKE SHE is given in next chapter. HYDRUS-2D will be reviewed in this chapter in detail. MODFLOW is not discussed here as the saturated zone modelling in HYDRUS-2D and MIKE SHE is similar to the MODFLOW modelling and discussed in detail in this dissertation. Only important difference in case of MODFLOW and HYDRUS-2D are being written here. For details readers are referred to Technical Manuals and User Guides (Harbough, A.W 2005 and Genuchten, V. 1987).

HYDRUS-2D is a software package for simulating water, heat and solute movement in two-dimensional variably saturated media and was developed by the George E. Brown Jr., Salinity Laboratory, USDA, ARS, Riverside, California (Van Genuchten and M.Th., 1987). HYDRUS-2D may be used to simulate two-dimensional water flow, heat transport, and the movement of solutes involved in consecutive first-order decay reactions in variably saturated soils. HYDRUS-2D uses the Richards' equation for simulating variably-saturated flow and Fickian-based convection-dispersion equations for heat and solute transport. The water flow equation incorporates a sink term to account for water uptake by plant roots. The heat transport equations consider transport due to conduction and convection with flowing water. The solute transport equations consider convective-dispersive transport in the liquid phase, as well as diffusion in the gaseous phase. The transport equations also include provisions for nonlinear non equilibrium reactions between the solid and liquid phases, linear equilibrium reactions between the liquid and gaseous phases, zero-order production, and two-first-order degradation reactions, one which is independent of other solutes, and one which provides coupling between solutes involved in the sequential first-order decay reactions. Data pre-processing involves specification of a flow region of arbitrary continuous shape by means of lines, arcs and splines, discretization of domain boundaries, and subsequent automatic generation of an unstructured finite element mesh. An alternative structured mesh for relatively simple transport domains defined by four boundary lines can also be considered. Graphical presentation of the output results consists of simple two-dimensional x-y graphs, contour and spectral maps, velocity vectors, as well as animation of both contour and spectral maps. Graphs along any cross-sections or boundaries can be readily obtained. A small catalogue of soil hydraulic properties was made part of the interface. HYDRUS-2D does not handle preferential flow. HYDRUS-2D may fail for extremely nonlinear flow and transport problems. Numerical instabilities may develop for convection-dominated transport problems when no stabilizing options are used. The effect of air phase on water flow is neglected.

The boundary of the flow region may consist of different curves such as lines, circles, arcs and splines. Internal boundaries, as well as internal curves can be specified. The program also discretizes the two-dimensional flow region into an unstructured triangular mesh. The MESHGEN2D module is part of the extended version of the HYDRUS-2D interface. The GEOMETRY and MESHGEN modules of version 1.0 of the HYDRUS-2D were combined into one module for the current version of HYDRUS-2D.There is an option for automatic mesh generation, or for a user-defined sequence of mesh generation steps. The user using a smoothing factor, which influences the permitted changes in size between two adjacent triangles, controls the smoothness of the finite element mesh.

The Domain and Boundary Parameters command calls the external BOUNDARY module which helps a user to (1) specify boundary and initial conditions for both water flow and solute transport, and (2) define the spatial distribution of other parameters characterizing the flow domain (e.g., spatial distribution of soil materials, hydraulic scaling factors, root-water uptake parameters, and possible hydraulic anisotropy) and/or observation nodes. The program controls the logical correspondence between the water flow and solute transport boundary conditions. Other parameters characterizing the flow domain (initial condition, material distribution) are defined in a similar way. The user must first select that part of the transport domain to which user wants to assign a particular value of the selected variable. It is possible to select the entire transport domain, part of it, or only individual nodes or elements. When specifying the initial condition, users have the option of assigning either a constant value to a selected domain, or a unit-gradient distribution for the pressure head and associated water content. All variables are assigned to nodal points, except for those defining anisotropy angles, first and second components of the anisotropy, and sub region numbers, which are all assigned to elements.

Effective surface and subsurface water management leading towards sustainable agriculture production in arid and semi-arid regions will stem from effective soil water management (Snyman, 1998) and comprehension of the hydrological properties of the soil (Sharma, 1998). However, in such areas, there is great complexity of interaction between the soil, climate and vegetation. Highly variable climates can give rise to extended dry periods in which the majority of rain that does fall is lost to surface evaporation (*e.g.*, Opperman *et al.*, 1977 cited in Bate *et al.*, 1982; Walker & Langridge, 1996).

Soil water dynamics are a function of soil physical processes and the competition between plant species and individuals for soil water and space (*e.g.*, Knoop & Walker, 1985). Spatial distribution of canopy and rooting patterns dictate the outcome of this competition, and the subsequent stability of the vegetation structure (Skarpe, 1992). However, rainfall infiltration and the spatial redistribution of runoff water are the predominant factors determining patterns in semi-arid vegetation (Friedel, 1990; Maestre *et al.*, 2003), with grazing impacts and fire also contributing to the generation and maintenance of spatial heterogeneity (*e.g.*, Higgins *et al.*, 2000; Adler *et al.* 2001).

Physically based hydrological models assist us in identifying the gaps in our knowledge by integrating mathematical representations of processes operating at local scales in order to simulate larger scale natural phenomena. However, because of the differences between scientific disciplines, and the bias on investigation that different interests support, true fusion of knowledge is hard to achieve. It is difficult to make comparisons between the approaches taken by hydrologists to predict the water content of the soil profile. Hydrologists consider the physical laws that determine water flow between locations in the soil body available for plant use during transpiration. Hydrologists imagine a net throughput that ends with accumulation in an aquifer, the rate of which is dictated by soil morphology. Hence, plants are considered to bridge the water-potential gradient between soil and air (Larcher, 1995), with resistance to this movement of water present in the soil body and in the atmosphere. Consequently, some models describe the same processes, but in very different ways, with emphasis being placed on the subject of interest. The relationship between climate and primary productivity in precipitation-driven systems is well established (*e.g.*, Kelly & Walker, 1976), along with the system level amelioration of water uptake by soil texture (Dye & Spear, 1982).

2.4.2 Classical Models

Micro pore volume is assumed to be a continuous function in space. A series of differential and partial differential equations based on mass, momentum and energy conservation, are used to describe water flow. A widely used formulation is Richards' equation (Richards, 1931).

Clemente *et al*. (1994) compared three unsaturated soil water flow models (Soil Water and Actual Transpiration Rate, Extended (SWATRE), Belmans *et al*., (1993); Leaching Estimation and Chemistry Model (LEACHM), Hutson & Wagenet (1992) and Soil Water Simulation (SWASIM), Hayhoe & de Jong (1982)), each using a form of Richards' equation. Differences between model predictions were found to arise from differing approaches to modelling soil evaporation and plant transpiration.

Classical approaches fail to adequately describe infiltration via macropores (Feyen *et al*., 1998). Microscopic heterogeneity in soil structure concerns the inclusion of a macropore network, contrasted with exclusively a micropore network. Macroscopic heterogeneity refers to the effect of differential soil structure on flow throughout the soil body. Macropore flow can account for three-fold increases in water content, as measured by time-domain reflectometry (TDR) probes, spaced a few centimeters apart, but at an equal depth. Various techniques have been introduced to model water flow through heterogeneous porous media. Dual-porosity models apply the classical approach to a second macropore network. Micropore and macropore networks are considered continuous, and solutions are found that best describe flow within and between these two regions. Typically, bimodal functions are employed to describe differential water retention characteristics and hydraulic conductivities of pore networks (e.g., Zhang & van Genuchten, 1994). Expedited water flow via macropores leads to deeper infiltration and a different spatial redistribution of water than found in macropore-deficient soil. Other microscopic heterogeneous approaches include explicit description of channeling and gravitational flow through macropores.

2.4.3 Deterministic and Stochastic Models

Modelling of macroscopic heterogeneity has been tackled in two ways, deterministically and stochastically. Deterministic models may use an exact representation of an observed heterogeneity at a given study site. Alternatively, a homogeneous model is parameterized using the scaled-up averages of local site data. Stochastic forms introduce elasticity into soil properties to generate the levels of variability expected for local heterogeneity in a porous medium (i.e., the variance in pore size). For example, stream tube models (e.g., Mallants *et al*., 1996), typically use a probability density function to determine the variance and covariance of the model parameters for the pore series that constitute flow tubes at a given location, but ignore spatial heterogeneity between locations by ignoring flow between tubes. Random space functions extend stochastic forms to account for spatial heterogeneity between locations by generating a covariance between the hydraulic properties of soil at different locations. The remaining 'Stochastic continuum' models are largely distinct by the mathematical techniques used to provide input values and to analyze their output. These techniques include bootstrapping (resampling) of soil properties within a Monte-Carlo framework, and Perturbation-Spectrum Analysis. The latter uses a random space form of Richards' equation to apply stochastic water flow.

The main effect of 'channelling flow' is to accelerate infiltration, redistributing water to lower in the soil profile. There is no automatic increase in gravitational through-flow unless the macropore structure is specified to extend uninterrupted to the zone of saturation (groundwater). At the working scale of population (i.e., not individual) plant models, microscopic heterogeneity has no bearing on the calculation of evapotranspiration. Macroscopic heterogeneity will influence estimates of evaporation and transpiration by models that treat the soil profile in terms of layers, and allocate roots to these soil layers. The consequence for plant growth models that do not use layers or rooting depth, therefore, is negligible.

2.4.4 Analytical Models

Hatton *et al*., (1997) proposed use of Eagleson's statistical-dynamic model of equilibrium water balance. This analytical formulation assumes equilibrial dynamics between the hydrological and biological components of an ecosystem. Vegetation growth is modelled in terms of water alone. The equilibrium state would not be possible without the dampening influence of steady-state water flow on the effects of a stochastic climate. Thus unsaturated flow, which includes [upward] capillarity, suppresses variability in rainfall. Water flow is modeled by an adaptation of Richards' equation and uptake is an externally defined proportion of the bare-soil potential evaporation rate.

The optimal solution for the model is assumed to equate to the maximal value for soil water balance, under a stochastic climate. Optimality in this relationship will eventuate via short-term shifts in vegetation composition to maximize transpiration efficiency, and therefore net soil water. These compositional changes seek to equilibrate canopy density with climate and soil. Over a longer time scale, the vegetation will generate changes in soil hydrological properties connected with saturated flow, to maximize biomass growth, whilst maintaining the equilibrium. Essentially, macropores become populated and divided by root systems, giving an increase in micropore density. Growth is assumed proportional to canopy density and canopy rain use efficiency.

Eagleson's statistical-dynamic model provides an estimate of soil water without the use of hydrological relevant parameters such as, soil depth, field capacity and rooting pattern, which are difficult to quantify. Therefore, the model requires only a minimal set of field parameters, which is an advantage, but at the cost of an estimate for evapotranspiration. A complementary algorithm needed to compute the species- and climate-dependent evapotranspiration rate, particularly in the case of patchy savanna, probably would be complex.

Soil Water Infiltration & Movement (SWIM, Ross, 1990) Hydrological model is an extension of the Richards' equation, by simple addition of a vegetation component. A rare example is which exhibits reasonable performance (Singleton *et al*., 1998), but only after parameterization with generally unavailable specialized hydrological data (Walker & Langridge, 1996). Some hydrological models restate soil water flow in terms of the entire flow path between soil and plant.

The theory of water movement in soils and plant in the analytical models (and their modern adaptations) that have attempted to represent soil hydrology is widely available in literature. The attitude that plants are an interface between soil and the atmosphere leads to a more process-oriented interpretation in place of the general analytical forms like the Richard's equation. Processes combine to define components of the system; delivery of water (precipitation) to the soil surface, redistribution according to topography (runoff), loss to evaporation, infiltration through the soil profile, uptake and transport, photosynthesis and transpiration, growth and assimilation.

2.5 ADVANCED COMPUTER BASED MODELS

With the invent of personal computer in early 1980's, it become much easier to convert classical and physical based models into more comprehensive and fast processing advanced hydrological model to model complex processes such as flow in macro pores. Soil Water, Energy and Transpiration (SWEAT), Daamen & Simmonds, (1994) contains a set of rules defining the conditions for infiltration via cracks. These are; rainfall must be greater than 10 mm, infiltration via cracks is limited to 10 mm of rainfall, the upper profile must be at less than 50% of field capacity, cracks can extend throughout regions which are at less than 50% of field capacity, cracks are filled from the bottom up, and any crack flow can only introduce water up to 50% of field capacity. Simulation of Daily Water Dynamics (WATDYN, Walker & Langridge, 1996) adopts the same crack flow routine.

Evaporation is a two stage process. Immediate evaporation of infiltration is followed by long-term evaporation at a rate proportional to the square root of time, constrained by soil water deficit in the topsoil. Transpiration is the minimum of potential extraction rate and potential transpiration rate, which is derived from Leaf Area Index (LAI, a measure of cover expressed as m^2 total leaf area per m^2 of ground). LAI has been widely adopted as a measure of the mean attenuation of incident solar radiation by interception by leaf surfaces. This depends largely on structural aspects of the canopy such as the density of foliage and, the arrangement and inclination of the leaves (Larcher, 1995).

In the modelling of LAI, leaf area is often assumed directly related to green leaf biomass (e.g., WATDYN and Savanna - Landscape and Regional Ecosystem Model (SAVANNA, Coughenour, 1993), or is a user-measured input (e.g., *Productivity, Erosion and Runoff Functions to Evaluate Conservation Techniques* (PERFECT) and Soil Water, Energy and Transpiration (SWEAT), Daamen & Simmonds, (1994)). LAI measurements vary according to the choice of criteria used in estimation. Assuming LAI to be maximal when further increases in LAI have an insignificant effect on evapotranspiration is notionally distinct from LAI is maximal when evaporation is nullified as a contributor to evapotranspiration. Other treatments of LAI relate fluctuation in leaf area to ambient temperature and light interception (e.g., Acock *et al*., 1979 cited in Johnson & Thornley, 1983). However, as Johnson & Thornley (1983) state, such dependencies of LAI on environmental conditions and biomass are limited because two canopies concurrent in their LAIs do not necessarily have identical structures. Additionally, environmental variation often exceeds that observed in associated vegetation growth. Johnson and Thornley's (1983) solution was to treat LAI as an independent state variable in their model. Vegetation structure was generated independent of biomass by allocation of predicted daily growth to a carbon storage pool, and fluxes from there to other compartments representing differential turnover of leaf, sheath and stem material. The result was an independent estimate for LAI buffered from environmental variation, and provision of a mechanism that may be extended by inclusion of known species phonology and plant part allometry (Illius *et al*., 1996).

The Penman-Monteith equation (Monteith, 1965) is a modified expression for soil surface evaporation that assumed the soil and canopy to be a single damp surface separated from a reference height by aerodynamic resistances. Inclusion of the canopy and boundary layer conductance allowed transpiration to be determined as a function of solar radiation (net reflection), vapour pressure and several temperature-dependent physical quantities (Thornley & Johnson, 1990). Models such as WATDYN use the Penman-Monteith equation to their advantage in separately estimating transpiration and evaporation.

Soil Water, Energy and Transpiration, SWEAT is a two source, crop-based model specializing in the calculation of transpiration for sparse canopies furnishing low aerial cover, a condition associated with droughts in particular. LAI is used to estimate canopy condition, and thus canopy photosynthetic activity. Flux of water and heat are evaluated for soil surface, leaf surface, in air canopy and air at a reference height, each a node within the network of resistances.

Transpiration is often converted into plant growth by use of a coefficient of efficiency, (e.g., Dye, 1983; PERFECT; Stroosnijder, 1996). PERFECT, (Productivity, Erosion and Runoff Functions to Evaluate Conservation Techniques), constrains crop growth for saturated soils, by scaling plant biomass down by a wetness factor. WATDYN adds the proviso that soil water should exceed 15% of field capacity before growth can commence at 10 kg ha-1 per mm of transpiration. WATDYN additionally modifies growth with respect to soil fertility, temperature, vapour pressure deficit, and fire history. Hobbs *et al*., (1994) constructed an analytical model that predicts growth directly from a negative exponential function expressed in terms of soil water storage capacity (field capacity minus wilting point). This simple approach proved effective, predicting a near constant rate of growth per unit of, 0.33 g mm^{-1} m^{-2}, throughout the growth season, but was validated across a limited range of sites in central Australia.

Soil–Vegetation–Atmosphere Transfer (SVAT) models are conceptually-based constructs of typically large scale (> 50 km) interactions between the atmosphere and the terrestrial biosphere (Menenti *et al*., 2004). The broad aim of the SVAT schemes is to estimate the exchange of water, energy and carbon between vegetation and atmosphere over multiple seasonal cycles and diverse climates (Moehrlen, 1999) by the coupling of land surface models (LSM) to large-scale general circulation (climate) models (GCM). SVAT schemes range from single tipping bucket models (to represent the soil-plant-atmosphere interface) to those that incorporate multiple layers for vegetation, soil, and snow (Warrach *et al*., 2002). They can assume that the biome (the spatial distribution of plant species) is either static or dynamic (Menenti *et al*., 2004), where most current SVAT schemes and hydrological models do not parameterize vegetation as a dynamic component (Arora, 2002), although a recent approach has included variable root density related to predictions of vegetation biomass (Arora & Boer, 2003). Equilibrial water balance is assumed for most SVAT models such that transpiration is assumed to be equal to root water uptake. Whilst microscopic soil structure (macropores) and vegetation canopy space (aerial cover) are represented, there is often a conflict between the successful integration of processes operating at these small scales with the larger scale processes at the landscape level and those resulting from atmospheric conditions (e.g., air temperature and humidity that are assumed to only vary by height, Menenti *et al*., 2004).

Extensions to SVAT schemes that introduce spatial variability for runoff and infiltration, to account for spatial heterogeneity in soil moisture, perform best when compared with homogeneous alternatives (Warrach *et al*., 2002). Also, the accuracy of heat fluxes predictions by a SVAT scheme have been shown to be improved (Yang & Friedl, 2003) by introducing more temporal (diurnal variation) and spatial (3D plant architecture) detail into the atmosphere-canopy interactions (a 'canopy interception reservoir' (Koster & Suarez, 1994), comparable to the hydraulic conductance approaches for modelling transpiration. Further improvements have been possible by using LAI to estimate spatially heterogeneous transpiration and rainfall interception by the canopy (e.g., Mo *et al*., 2004; Wattenbach *et al*., 2005). Alternatively, the terrestrial biosphere is not explicit in the model, but instead root water uptake is represented by a term for potential [evapo] transpiration, often within the expression for soil water transfer (e.g., Richard's equation), but transpiration can be underestimated when calculated from potential evapotranspiration in this way. Improved accuracy of SVAT models can result from more spatial detail, but this carries the cost of needing a large number of spatial parameters (Pachepsky *et al*., 2004).

A total system grazing model tends to involve integration of separate climate, soil, plant and animal mechanistic modules that attempt to synthesize ecological theory and empirical evidence, to give a compound estimate of the system's dynamics. Vegetation dynamics (competition for soil resources, transpiration and primary production) tend to be expressed in terms of plant functional groups, although varieties (species) may often be parameterized.

2.6 APPLICATION OF GIS IN HYDRLOGICAL MODELLING

In this section the main focus was given to the water balance modules of the three most comprehensive, spatially-explicit (in these cases by using grids of cells), process-oriented (mechanistic) systems models currently applicable to semi-arid savanna, SAVANNA and Simulation Model for Australian Savannas (SAVANNA.AU, Liedloff *et al*., 2004), a version extensively modified for Australia, and Simulation of Semi-arid Grazing Systems (SimSAGS, Illius *et al*., 1998; Illius & Gordon, 1999; Illius *et al*., 2000; Derry, 2004).

In SAVANNA soil profiles are divided into three layers, with grass roots reaching into the second layer and shrub and tree roots exclusively occupying the third layer. The middle layer is shared. Layer thickness, field capacity, wilting point and an index of porosity are used to calculate soil water holding capacities for each layer. Runoff is calculated by a similar method to that used in PERFECT and Simulation of Production and Utilization of Rangelands (SPUR, Wight & Skiles, 1987), such that runoff depends on daily rainfall, the quantity and distribution of water in the soil relative to water holding capacity, and the condition curve number for the soil according to vegetation cover (i.e., the USDA curve number method, United States Soil Conservation Service, 1964). The range of LAI allowed is between 0 and 4. Grid cells are also partitioned laterally into sub areas which captures within cell heterogeneity of topography and soils. Total runoff can therefore be distributed among all run-on sub areas according to the proportion of the landscape that they occupy.

The components modelling the soil moisture balance in SimSAGS are based the non-spatial WATDYN. To introduce spatial interactions into the processes that determine soil water dynamics, landscape topography is used to move surface water around the landscape from high to low regions in a similar manner to the other models, except that runoff is not partitioned between run-on sub areas nor neighboring cells, but is delivered entirely to the next highest cell in the sequence of decreasing altitude. Rainwater and runoff that does not soak into the soil or is not evaporated from the soil surface effectively runs across the surface as rivers and streams. Hydrology is modelled and is important in determining higher soil moisture and the increased plant growth in run-on areas that gives rise to the characteristic heterogeneity of savanna vegetation, however the adoption of Dye's (1983) simple relationship for infiltration limits WATDYN's ability to accurately predict runoff for a large range of soil type, slope and soil surface conditions (Walker & Langridge,1996), which is more possible using the family of curves in the USDA curve number method.

After runoff, changes in soil moisture are predicted as a function of losses to deep drainage, evaporation and transpiration, using a modified version of WATDYN for each grid cell in a variable number of layers, and sub-layers therein. Layers allow for accurate estimation of soil water and vegetation species dynamics from the ratios between layers. Sub-layers enable more accurate processing of small changes in local soil moisture. The minimal data set for WATDYN requires daily rainfall, wind speed, atmospheric pressure, radiation, temperature and relative humidity plus soil/plant properties including soil depth, proportional root distribution per layer and an index of soil fertility. Soil nutrient budgets are not explicitly modelled; however accurate estimates of soil moisture are possible using this fertility index which encapsulates soil capacity for primary production as a function of the concentration of cations and phosphate (Walker & Langridge, 1997). Additionally soil type (texture) is used to specify clay and sand content.

The determination of flow at ungauged locations is a common problem in hydrology. A simple approach to this problem is to eliminate time as a dimension by restricting the computation to mean annual flows. The analysis can then be constructed by using the cells of a DEM grid as the computational units. One begins with a mean annual precipitation grid over the landscape, which for the United States has been constructed by Daly *et al.* (1994) and for Africa by Hutchinson *et al.* (1995), both using approximately 3' cells. The precipitation for each DEM cell is determined from the climate grid. The watersheds of each of the stream gauging stations in the region are delineated and the mean annual precipitation, P, for the drainage areas determined. The longest stream flow record in the basin is used as an anchor record, a long period of analysis is chosen (such as 1961-1990), and the mean annual flow per unit of drainage area, Q, is determined for each gage. If some of the gages have incomplete records, the long term estimate of the mean annual flow can be found by: long term flow at a sample gage = long term flow at the anchor gage x (flow at sample gage / flow at anchor gage) where the ratio in parentheses is constructed using the means of the common period of record at the two gages.. In dry areas, the greater is the precipitation, the greater is the percentage of the precipitation which becomes runoff. By multiplying the mean annual precipitation grid by this runoff coefficient, a mean annual runoff per unit area can be determined for each DEM cell. This quantity can be used as a weight and a weighted flow accumulation performed in the same manner as the regular flow accumulation is done when constructing the watershed boundaries. The weighted flow accumulation of each DEM cell, when multiplied by the cell area, gives the mean annual flow for each cell. Thus a mean annual flow map can be derived with estimates of the flow at every stream location in the landscape. This is a very simplified method of hydrologic analysis but one that is faithful to the gauged data in the region and can be applied to large regions in a consistent manner.

A *water balance model* is a representation of the mass balance of water within a particular control volume. It is a physical statement of the law of conservation of mass which states that matter cannot be created or destroyed. As a result, the rate of change of storage of water within the control volume is equal to the difference between its rates of inflow and outflow across the control surface. One may distinguish in constructing a spatial hydrology model between the surface defining the outer boundary of the study region, and the surface defining the boundary of the spatial units within that region. A spatially distributed water balance model applies the law of conservation of mass to describe the mass balance within each spatial unit, and to this must be coupled a momentum equation (such as Darcy's law for groundwater flow) which defines how quickly water can move between units. Different sizes and shapes of spatial units are needed to deal with the different phases of the hydrologic cycle.

Most water that falls on the land surface is derived from oceanic evaporation carried inland by atmospheric circulation, so it is appropriate to study of hydrology by examining the motion of atmospheric water. The most useful way of doing this in a GIS context is to use the results of GCM modelling, where the acronym GCM means here General Circulation Model (this was the original meaning of this acronym before the more popular Global Climate Model came into vogue). In the United States, the National Meteorological Centre in Maryland maintains a global GCM in continuous operation for numerical weather forecasting, which is updated each 12 hours with data from atmospheric soundings obtained from a global network of balloon-borne sensors released from weather stations, called the Global Data Assimilation System. The condition of the atmosphere (temperature, density, wind velocity, air pressure, and moisture content) is calculated on a geographic grid of 2 degree cells covering the earth, using a very short time interval of the order of a few minutes, for a time horizon of a few days ahead.

The recent emergence of a satellite derived net radiation balance of the earth (Darnell *et al*. 1992) provides net radiation estimates for the soil water balance, an important new data source. The product of a soil water balance is a time history on a daily or a monthly basis of soil moisture content, evaporation and "water surplus" which is the water flowing from the soil to form surface runoff and groundwater recharge. Given the same input data, computation on a daily basis will always yield more water surplus than will computation on a monthly basis because daily precipitation is an episodic process, zero on most days, but when a precipitation event occurs, the soil moisture storage can be quickly filled up, thus producing a water surplus; if the same data are averaged over a monthly interval, it is as if the precipitation falls as a gentle mist, which may evaporate back to the atmosphere before the soil moisture capacity is filled. Interpolation of daily precipitation onto a grid is an uncertain undertaking because the spatial variation in daily precipitation is large. There is thus a challenge in constructing a GIS hydrology model for soil water balance in choosing the appropriate time interval for calculation.

In constructing a groundwater balance model, there are two computations to be performed: first, a water balance on each spatial unit in which all the inflows and outflows of the unit are used to determine the change in water storage and thus of the piezometric head within the unit; second, a flow computation between each pair of spatial units in which Darcy's law is used to determine the rate of groundwater flow as a function of the difference in head and the flow properties of the aquifer in the units. In a map-based groundwater modelling system, the first computation is done over all the polygons making up the aquifer, while the second is done over all the boundary lines of those polygons. Interaction between surface water in streams and underlying groundwater can be similarly determined by applying Darcy's law to the difference in piezometric head between the stream passing through an aquifer unit and the surrounding aquifer. All these computations need to be done on reasonably small units not more than say 20 km in cell size, because otherwise the head gradients in space become very small. Groundwater aquifers are usually quite confined in area and do not extend over the whole landscape, so unlike surface water flow which takes place everywhere, groundwater flow is more of a localized problem and a regional study needs to take into account each aquifer in the region individually, rather than considering groundwater flow to be a regional phenomenon.

Surface water is water in streams, lakes, wetlands and reservoirs. This water system is in some ways the most complex of all the phases of the hydrologic cycle, because it interacts with the other three phases, namely atmospheric water, soil water and groundwater, because the flow velocity is large compared to the velocity of groundwater flow, and because the flow environment is complicated, depending in part on the characteristics of the land surface and in part on the characteristics of the stream system. Fortunately, this is the area where GIS helps the most because of the detailed description of land surface features which can be presented in GIS. As described earlier, by making a suitable terrain analysis using DEM data, a conceptual model of the surface drainage system can be built up in which each watershed has one and only one stream draining it, and each watershed and stream pair can be assigned the same identification number. The watersheds so constructed are of two types: a source or head watershed in which the stream originates within the watershed, and an intermediate watershed where the stream flows both into and out of the watershed.

The stream network is manipulated so that each stream is represented by a single arc, and the arcs are flow ordered so that the "from node" is upstream and the "to node" is down stream. Each stream arc is enclosed within its associated watershed polygon. Watershed boundaries are delineated from each stream junction so at most a node can have two streams flowing into it and one flowing out of it. Three flow variables can be associated with each watershed: "From Flow", "To Flow", and "Polygon Flow". From Flow is that stream discharge at the "from node"; To Flow is the corresponding discharge at the "to node"; and Polygon Flow is that discharge which comes into the stream by drainage from the surrounding watershed. Polygon Flow is computed by applying a unit hydrograph to the water surplus computed by the soil water balance model, and it may also include a component representing exchange of water between the stream and the underlying groundwater aquifer. This implies that the soil water surplus data may have to be spatially transferred from the soil water balance spatial units to the watershed units by using polygon overlay functions.

In time-varying flow, the computation is more complex and stream routing methods such as the Muskingum method (Fread, 1993) are appropriate for computing the time distribution of the To Flow given the time distribution of the From Flow and the Polygon Flow. The time table structure is used to record the results of these calculations with a separate table being used for each of the three flow variables, a separate field for each watershed, and time on the vertical axis of the table.

2.7 CHAPTER'S SUMMARY

There are many hydrological models available to simulate surface, subsurface and groundwater flows separate or combined and linked with each other. There are some advantages and some disadvantage in using them for a particular and site specific hydrological conditions. MIKE SHE (described in next chapter) has combined many models (like surface, subsurface, groundwater, drainage, irrigation, river network etc) with the integration of GIS capability to process nearly all the hydrological process in the landscape. The integration of GIS in MIKE SHE provides an excellent opportunity to establish a good over-view and understanding of the characteristics and associated attributes of the area under study. They can interpret the spatial variability and topographical changes in agricultural catchments and provide better opportunities to integrate overland, subsurface and groundwater flows. MIKE SHE is a comprehensive numerical modeling system, and can deal with large amounts of spatially and temporal distributed data by integrating GIS applications. Therefore, in this study MIKE SHE has been used and inputs files have been generated by Arc GIS.

CHAPTER 3

DESCRIPTION OF MIKE SHE

Mike SHE is one of the most advanced, fully distributed and integrated hydrological models available in the hydrological modelling industry at present. It is spatially distributed model with GIS capabilities to spread hydrological data in the modelling domain to capture the variability in soil, vegetation, rainfall, irrigation, drainage and other hydrological process which controls water movement in x, y and z directions. Hence MIKE SHE can be used to simulate all of the processes in the land phase of the hydrologic cycle, including overland flow, channel flow, groundwater flow in the saturated and unsaturated zone. MIKE SHE allows simulating all processes in the land phase of the hydrologic cycle. That is, all of the process involving water movement after the precipitation leaves the clouds. Precipitation falls as rain or snow depending on air temperature. Initially, rainfall is either intercepted by leaves (canopy storage) or falls through to the ground surface. Once at the ground surface, the water can now either evaporate, infiltrate or runoff as overland flow. If it evaporates, the water leaves the system. However, if it infiltrates then it will enter the unsaturated zone, where it will be either extracted by the plant roots and transpired, added to the unsaturated storage, or flow downwards to the water table. If the upper layer of the unsaturated zone is saturated, then additional water cannot infiltrate and overland flow will be formed. This overland flow will follow the topography downhill until it reaches an area where it can infiltrate or until it reaches a stream where it will join the other surface water. Groundwater will also add to the base flow in the streams, or the flow in the stream can infiltrate back into the groundwater. All these hydrological process can be integrated with each other by using MIKE SHE.

The second best model in the hydrological modelling being used now-a-day is MODFLOW. MODFLOW is restricted to simulating flow only in the saturated groundwater zone. Although many of the processes simulated in MIKE SHE are used in a similar way when simulating groundwater flow with MODFLOW, they are not actually "simulated" by MODFLOW. For example, in case of groundwater recharge, MODFLOW allows to include recharge as an upper boundary condition to the groundwater model, where recharge is defined as the amount of water reaching the groundwater table after accounting for evapotranspiration, surface runoff and changing storage in the unsaturated zone. In MODFLOW, the modeller has to account for these processes him or herself usually by applying a constant rule-of-thumb fraction to the measured precipitation data. In most cases, the model results are very sensitive to this fraction and since the modeller has little data on this fraction, user will assume an initial value and use this parameter as a calibration parameter. Thus, user will adjust the amount of recharge during the calibration process until the measured groundwater levels match the calculated values.

However, the fraction of precipitation reaching the groundwater table is constant in neither space nor time. The actual amount of precipitation reaching the groundwater table depends strongly on the maximum rate of infiltration, which is a characteristic of the soil and will vary spatially over the model domain. Further, since the maximum rate occurs when the soil is saturated, different amounts of water will infiltrate during the wet periods compared to dry periods. To complicate matters further, the length of the preceding dry period will determine the amount of available storage in the unsaturated zone. For example, if there has been a long dry summer period, evapotranspiration may have created a large deficit of water in the unsaturated zone that must be satisfied before any water reaches the water table.

This example shows that infiltration of precipitation is a very dynamic process. It depends on a complex interaction between precipitations, unsaturated zone soil properties and the current soil moisture content, as well as vegetation properties. In MIKE SHE, the saturated zone is only one component of an integrated groundwater/surface water model (figure 3.1). The saturated zone interacts with all of the other components like, overland flow, unsaturated flow, channel flow, and evapotranspiration.

In comparison, MODFLOW only simulates the saturated flow. All of the other components are either ignored (e.g. overland flow) or are simple boundary conditions for the saturated zone (e.g. evapotranspiration). The Flow chart diagram for MIKE SHE is shown in Figure 3.1.

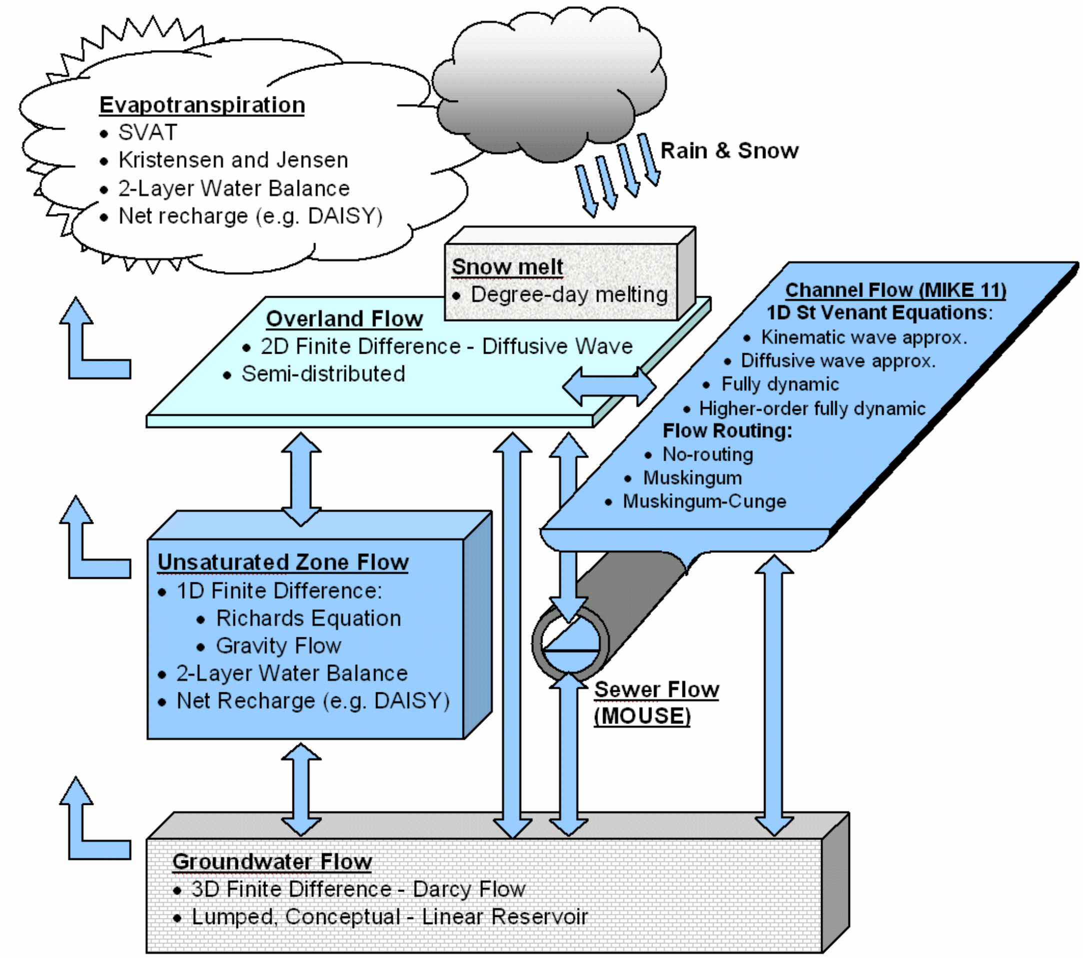

Figure 3.1: Flow chart Diagram of MIKE SHE.

There are three options in MIKE SHE for calculating vertical flow in the unsaturated zone (figure 3.1):

- the full Richards equation, which requires a tabular or functional relationship for both the moisture-retention curve and the effective conductivity,
- a simplified gravity flow procedure, which assumes a uniform vertical gradient and ignores capillary forces, and
- a simple two-layer water balance method for shallow water tables.

The full Richards equation is the most computationally intensive, but also the most accurate when the unsaturated flow is dynamic. The simplified gravity flow procedure provides a suitable solution when we are primarily interested in the time varying recharge to the groundwater table based on actual precipitation and evapotranspiration and not the dynamics in the unsaturated zone. The simple two-layer water balance method is suitable when the water table is shallow and groundwater recharge is primarily influenced by evapotranspiration in the root zone.

Richard equation requires soil zone assigned to each cell in the model domain, for which a soil profile is defined. In this way, the unsaturated zone can be nominally 'lumped', in so far as the soil profile that is defined for each soil zone represents some sort of average soil profile in the zone. MIKE SHE divides the depth to the water table into zones of equal depth. Therefore, MIKE SHE estimate unsaturated flow only once for each area with the same soil profile and water table depth. Such lumping can decrease the computational burden considerably. However, when the water table is very dynamic and spatially variable, there may be no choice but to solve the unsaturated flow equations for each cell in the model using the full Richards solution.

The main objective of this study was to determine the soil moisture distribution in saturated and unsaturated zone of the model domain along with the dynamic fluctuation of ground water table with and without drains. Other objective was to model variability in moisture content in saturated and unsaturated zones with and without drain in place, therefore a full Richard solution was selected during the MIKE SHE setup. The theoretical background and description of the Richard equation is given below:

3.1 RICHARDS EQUATION

The deriving force for transport of water in the unsaturated zone is the gradient of the hydraulic head, h, which includes gravitational potential component, z, and pressure component, ψ, therefore,

$$h = z + \psi \qquad (3.1)$$

The gravitational head at a point is the elevation of the point above the datum (z is positive upward). Thus reference level for the pressure head component is the atmospheric pressure. Under unsaturated condition the pressure head, ψ is negative due to capillary forces and short range adsorptive forces between the water molecules and the soil matrix. These forces are responsible for the retention of water in the soil. As these two forces are difficult to separate, they are incorporated in the same term.

Although the physical phenomena creating the pressure head under unsaturated and saturated conditions are very different, the pressure head is considered to be a continuous function across the water table, with the pressure being negative above and positive below the water table.

For vertical flow, the driving force for the transport of water is the vertical gradient of the hydraulic head. Hence,

$$\Delta h = \frac{\partial h}{\partial z} \tag{3.2}$$

The volumetric flux is then obtained from Darcy's law:

$$q = -K(\theta)\frac{\partial h}{\partial z} \tag{3.3}$$

where K(θ) is the unsaturated hydraulic conductivity. Assuming that the soil matrix is incompressible and the soil water has a constant density, the continuity equation will be:

$$\frac{\partial \theta}{\partial t} = -\frac{\partial q}{\partial z} - S(z) \tag{3.4}$$

Where, θ is the volumetric soil moisture and S is the root extraction sink term. Combining Equations (3.1), (3.3), and (3.4) yields

$$\frac{\partial \theta}{\partial t} = \frac{\partial}{\partial z}\left(K(\theta)\frac{\partial \psi}{\partial z}\right) + \frac{\partial K(\theta)}{\partial z} - S(z) \tag{3.5}$$

The dependent variables, θ and ψ, in Equation (3.5) are related to the hydraulic conductivity function, K(θ), and the soil moisture retention curve, ψ(θ).

Equation (3.5) is general, in the sense it is equally valid in both homogeneous and heterogeneous soil profiles, and there are no constraints on the hydraulic functions.

Introducing the concept of soil water capacity

$$C = \frac{\partial \theta}{\partial \psi} \tag{3.6}$$

which is the slope on the soil moisture retention curve, then the tension based version of Equation (3.5) is

$$C\frac{\partial \psi}{\partial t} = \frac{\partial}{\partial z}\left(K(\theta)\frac{\partial \psi}{\partial z}\right) + \frac{\partial K(\theta)}{\partial z} - S \tag{3.7}$$

This equation is usually referred to as Richard equation, which is named after L.A. Richards who first used it in 1931. It still applies when ψ becomes positive, in which case the equation degenerates to the Laplace equation. The sink term in Equation (3.7) are calculated from the root extraction for the transpiration in the upper part of the unsaturated zone. The integral of the root extraction over the entire root zone depth equals the total actual evapotranspiration. Direct evaporation from the soil is calculated only for the first node below the ground surface.

3.1.1 Numerical Solution of Richard Equation

MIKE SHE uses a fully implicit formulation in which the space derivatives of Equation (3.7) are described by their finite difference analogues at time level (n+1). The values of *C*(θ) and *K*(θ) are referred to at time level (*n*+½). These are evaluated in an iterative procedure averaging ***Cn***, ***Kn*** with ***Cm***, ***Km*** respectively. ***Cm*** and ***Km*** are calculated as a running average of the coefficients found in each iteration.

This solution technique has been found to eliminate stability and convergence problems arising from the non-linearity of the soil properties. For an interior node, the implicit scheme yields the following discrete formulation of the vertical flow:

$$q_{J+1/2}^{n+1} = -K_{J+1/2}^{n+1/2}\left(\frac{\Psi_{J+1/2}^{n+1/2} - \Psi_{J}^{n+1}}{\Delta Z_{J+1}}\right) \tag{3.8}$$

where the subscript *J* refers to the spatial increment and the superscript *n* refers to the time increment. Similar to Equation (3.8) the discrete form of Equation (3.1) gives

$$C_J^{n+1}\frac{\Psi_J^{n+1}-\Psi_J^n}{\Delta t}=\left|-K_{J+1/2}^{n+1/2}(\frac{\Psi_{J+1/2}^{n+1/2}-\Psi_J^{n+1}}{\Delta Z_{J+1}})-K_{J-1/2}^{n+1/2}(\frac{\Psi_J^{n+1}-\Psi_{J-1}^{n+1}}{\Delta Z_J})\right|\frac{1}{1/2(\Delta Z_{J+1}+\Delta Z_J)} \tag{3.9}$$

The soil property K is centred in space using the arithmetic mean:

$$K_{J+1/2}^{n+1/2}=\left(\frac{K_{J+1}^{n+1/2}}{2}\right) \tag{3.10}$$

$$K_{J-1/2}^{n+1/2}=\left(\frac{K_{J-1}^{n+1/2}}{2}\right) \tag{3.11}$$

3.2 EVAPOTRANSPIRATION

The calculation of evapotranspiration uses meteorological and vegetative data to predict the total evapotranspiration and net rainfall due to:

- Interception of rainfall by the canopy,
- Drainage from the canopy to the soil surface,
- Evaporation from the canopy surface,
- Evaporation from the soil surface, and
- Uptake of water by plant roots and its transpiration, based on soil moisture in the unsaturated root zone.

In MIKE SHE, the ET processes are split up and modelled in the following order:
A proportion of the rainfall is intercepted by the vegetation canopy, from which part of the water evaporates. The remaining water reaches the soil surface, producing either surface water runoff or percolating to the unsaturated zone. Part of the infiltrating water is evaporated from the upper part of the root zone or transpired by the plant roots. The remainder of the infiltrating water recharges the groundwater in the saturated zone.

The primary ET model is based on empirically derived equations that follow the work of Kristensen and Jensen (1975), which was carried out at the Royal Veterinary and Agricultural University in Denmark.

In addition to the Kristensen and Jensen model, MIKE SHE also includes a simplified ET model that is used in the Two-Layer UZ/ET model. The Two-Layer UZ/ET model divides the unsaturated zone into a root zone, from which ET can occur and a zone below the root zone, where ET does not occur. The Two-Layer UZ/ET module is based on a formulation presented in Yan and Smith (1994). Its main purpose is to provide an estimate of the actual evapotranspiration and the amount of water that recharges the saturated zone. It is primarily suited for areas where the water table is shallow, such as in wetland areas.

3.2.1 Leaf Area Index (LAI)

The area of leaves above a unit area of the ground surface is defined by the leaf area index, LAI. Usually, generalised time varying functions of the LAI for different crops have been established. Thus, in MIKE SHE, user must specify the temporal variation of the LAI for each crop type during the growing seasons to be simulated. Different climatic conditions from year to year may require a shift of the LAI curves in time but will generally not change the shape of the curve. Typically, the LAI varies between 0 and 7.

3.2.2 Kristensen and Jensen method

The primary ET model is based on empirically derived equations that follow the work of Kristensen and Jensen (1975), which was carried out at the Royal Veterinary and Agricultural University (KVL) in Denmark. In this model, the actual evapotranspiration and the actual soil moisture status in the root zone is calculated from the potential evaporation rate, along with maximum root depth and leaf area index for the plants. The empirical equations in the model are based on actual measurements. In the following sections, the theory and principles behind the Kristensen and Jensen (1975) evapotranspiration model are presented in detail.

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3.2.3 Canopy Interception

Interception is defined as the process whereby precipitation is retained on the leaves, branches, and stems of vegetation. This intercepted water evaporates directly without adding to the moisture storage in the soil. The interception process is modelled as an interception storage, which must be filled before stem flow to the ground surface takes place. The size of the interception storage capacity, *Imax*, depends on the vegetation type and its stage of development, which is characterised by the leaf area index, *LAI*. Thus,

$$I_{max} = C_{int} - LAI \qquad (3.12)$$

where *Cint* is an interception coefficient [L] and *LAI* is leaf area index [-].

The coefficient *Cint* defines the interception storage capacity of the vegetation. A typical value is about 0.05 mm but a more exact value may be determined through calibration.

3.2.4 Evaporation from the Canopy

The evaporation from the canopy storage is equal to the potential evapotranspiration, if sufficient water has been intercepted on the leaves, that is

$$E_{can} = \min(I_{max}, E_p \Delta t) \qquad (3.13)$$

where *Ecan* is the canopy evaporation [LT^{-1}], *Ep* is the potential evapotranspiration rate [LT^{-1}] and Δt is the time step length for the simulation.

3.2.5 Plant Transpiration

The transpiration from the vegetation, *Eat*, depends on the density of the crop green material, (i.e. the leaf area index, LAI) the soil moisture content in the root zone and the root density. Thus,

$$E_{at} = f_1(LAI) \bullet f_2(\theta) \bullet f_2(\theta) \bullet RFD \bullet E_P \qquad (3.14)$$

where

Eat	= actual transpiration [LT^{-1}],
f1(LAI)	= function based on the leaf area index,
f2(θ)	= function based on the soil moisture content in the root zone,
RDF	= root distribution function.

f_1(LAI)

The function, $f_1(LAI)$, expresses the dependency of the transpiration on the leaf area of the plant by

$$f_1(LAI) = C_2 + C_1 LAI \tag{3.15}$$

where

C1 and *C2* = empirical parameters.

f2(θ)

The second function, *f2*(θ), is given by

$$f_2(\theta) = 1 - \left(\frac{\theta_{FC} - \theta}{\theta_{FC} - \theta_W} \right)^{\frac{C_3}{E_P}} \tag{3.16}$$

where

θ_{FC} = volumetric moisture content at field capacity,

θ_W =volumetric moisture content at the wilting point,

θ = actual volumetric moisture content and *C3* is an empirical parameter [LT^{-1}].

3.3 ROOT DISTRIBUTION FUNCTION, RDF

Water extraction by the roots for transpiration varies over the growing season. In nature, the exact root development is a complex process, which depends on the climatic conditions and the moisture conditions in the soil.

MIKE SHE allows for a user-defined, time-varying root distribution determined by the root depth (time varying) and a general, vertical root density distribution, .The root extraction is assumed to vary logarithmically with depth

$$\log R(z) = \log R_0 - AROT \bullet z \tag{3.17}$$

where

Ro = root extraction at the soil surface,

AROOT = parameter that describes the root mass distribution,

Z = depth below ground surface [L].

The value of the Root Distribution Function, RDF, in each layer is then calculated by dividing the amount of water extracted in the layer by the total amount of water extracted by the roots. Thus,

$$RDF_i = \frac{\int_{z1}^{z2} R(z)dz}{\int_{0}^{L_R} R(z)dz} \tag{3.18}$$

where the numerator is the total amount of water extracted in layer *I* bounded above by *Z1* and below by *Z2* and the denominator is the total amount of water extracted by the roots between the ground surface and the maximum root depth, *LR*.

3.3.1 AROOT

Water extraction is distributed with depth and depends on the *AROOT* parameter. Assuming that the transpiration is at the potential rate with no interception loss (*Cint=0*) and no soil evaporation loss (*C2=0*). The root distribution, and the subsequent transpiration, becomes more uniformly distributed as *AROOT* approaches zero. During simulations, the total actual transpiration tends to become smaller for higher values of *AROOT* because most of the water is drawn from the upper layer, which subsequently dries out faster. The actual transpiration, therefore, becomes more dependent on the ability of the soil to conduct water upwards (capillary rise) to the layers with high root density.

The effect of the root depth, given the same value of *AROOT*. A shallower root depth will lead to more transpiration from the upper unsaturated zone layers because a larger proportion of the roots will be located in the upper part of the profile. However, again, this may lead to smaller actual transpiration, if the ability of the soil to conduct water upwards is limited. Thus, the factors *AROOT* and root depth are important parameters for estimating how much water can be drawn from the soil profile under dry conditions.

3.4 SOIL EVAPORATION

Soil evaporation, *Es*, occurs from the upper part of the unsaturated zone and consists of a basic amount of evaporation, *Ep .f3 (θ)*, plus additional evaporation from excess soil water as the soil saturation reaches field capacity. This can be described by the following function:

$$E_s = E_P \cdot f_3(\theta) + (E_P - E_{at} - E_P \cdot f_3(\theta)) \cdot f_4(\theta) \cdot (1 - f_1(LAI)) \quad (3.19)$$

where

Ep = potential evapotranspiration,

Eat = actual transpiration

After combining and solving Equation (3.14), (3.15) and the functions *f3(θ)* and *f4(θ)* we get following expression:

$$f_3 = C_3 \quad \text{for} \quad \theta \geq \theta_W \text{ , } C_3(\theta/\theta_W) \quad \text{for} \quad \theta_r \leq \theta \leq \theta_W \text{ , } 0 \text{ for } \theta \leq \theta_r \quad (3.20)$$

$$f_4 = \theta_{FC} - (\theta_W + \theta_{FC})/2, \quad \theta - (\theta_W + \theta_{FC})/2 \text{ for } = \theta \geq (\theta_W + \theta_{FC})/2, 0 \text{ for } \theta < (\theta_W + \theta_{FC})/2 \quad (3.21)$$

In the absence of vegetation *f1(LAI)* can be set to zero and E_{at} in Equation (3.20) goes to zero. This allows us to see how E_s varies in relation to E_p for different values of θ. Thus, Equation (3.20) can be simplified to:

$$\frac{E_s}{E_P} = f_3(\theta) + f_4(\theta) - f_3(\theta) \cdot f_4(\theta) \quad (3.22)$$

In the MIKE SHE, soil evaporation is restricted to the upper node in the unsaturated zone, which, generally, should be about 10 centimetres deep, or less.

3.4.1 Evapotranspiration Coefficients C1, C2 and C3

The equations for actual transpiration, Equation (3.15), and soil evaporation, Equation (3.20), contain three empirical coefficients, C_1, C_2, and C_3. The coefficients C_1 and C_2

are used in the transpiration function. C_3 is also part of Equation (15.14), but is only found in the soil moisture function, Equation (3.16).

Coefficient C_1

C_1 is plant dependent. For agricultural crops and grass, C_1 has been estimated to be about 0.3. C_1 influences the ratio soil evaporation to transpiration. For smaller C_1 values the soil evaporation becomes larger relative to transpiration. For higher C_1 values, the ratio approaches the basic ratio determined by C_2 and the input value of LAI.

Coefficient C_2

For agricultural crops and pasture, grown on clayey loamy soils, C_2 has been estimated to be about 0.2. Similar to C_1, C_2 influences the distribution between soil evaporation and transpiration. For higher values of C_2, a larger percentage of the actual ET will be soil evaporation. Since soil evaporation only occurs from the upper most nodes (closest to the ground surface) in the UZ soil profile, water extraction from the top node is weighted higher. Thus, changing C_2 will influence the ratio of soil evaporation to transpiration, which in turn will influence the total actual evapotranspiration possible under dry conditions. Higher values of C_2 will lead to smaller values of total actual evapotranspiration because more water will be extracted from the top node, which subsequently dries out faster. Therefore, the total actual evapotranspiration will become sensitive to the ability of the soil to draw water upwards via capillary action.

Coefficient C_3

C_3 has not been evaluated experimentally. Typically, a value for C_3 of 20 mm/day is used, which is somewhat higher than the value of 10 mm/day proposed by Kristensen and Jensen (1975). C_3 may depend on soil type and root density. The more water released at low matrix potential and the greater the root density, the higher should the value of C_3 be.

3.4.2 Canopy Interception

Interception is defined as the process whereby precipitation is retained on the leaves, branches, and stems of vegetation. This intercepted water evaporates directly without adding to the moisture storage in the soil. The interception process is modelled as an interception storage, which must be filled before stem flow to the ground surface takes place. The size of the interception storage capacity, *Imax*, depends on the vegetation type and its stage of development, which is characterised by the leaf area index, *LAI*. Thus,

$$I_{\max} = C_{\text{int}}.LAI \tag{3.23}$$

where

C_{itt} = interception coefficient [mm] and

LAI = leaf area index.

The coefficient, C_{int}, defines the interception storage capacity of the vegetation. A typical value is about 0.05 mm but a more exact value may be determined through calibration. The area of leaves above a unit area of the ground surface is defined by the leaf area index, *LAI*. Usually, generalised time varying functions of the LAI for different crops have been established. Thus, in MIKE SHE, the user must specify the temporal variation of the LAI for each crop type during the growing seasons to be simulated. Different climatic conditions from year to year may require a shift of the LAI curves in time but will generally not change the shape of the curve. Typically, the LAI varies between 0 and 7.

The actual interception storage, I_{act}, is then calculated as

$$I_{act} = \min(I_{\max}, P \cdot \Delta t) \tag{3.24}$$

where

P = amount of precipitation and

Δt = calculation time-step.

3.4.3 Soil Moisture

The ET surface (ETsurf) is defined as the ground surface less the thickness of the capillary fringe. If the water table is above the ET surface, then ET will not reduce the moisture content of the soil, since any water deficit will be replaced by water drawn up from the saturated zone via capillary action. The ET extinction depth is the maximum depth to which water can be removed by transpiration. It is defined as the depth of the root zone plus the thickness of the capillary fringe. Thus, if the water table is below the ET extinction depth, then water removed from the root zone by ET cannot be replaced by water drawn up by capillary action, since the roots do not reach the top of the capillary fringe. The depth of the root zone is specified in MIKE SHE's crop database and can vary in time and space.

The simplified ET module assumes that the unsaturated zone can consist of one or two layers. The upper layer extends from the ground surface to the higher of the water table or the ET extinction depth. The second layer extends from the bottom of first layer to the water table, if the water table is below the ET extinction depth. Thus, if the water table is above the ET extinction depth, the thickness of the lower layer is zero. If the water table is at the ground surface then the thickness of the upper layer is also zero. ET is only allowed from the upper of the two ET layers, if the lower layer exists.

If the water table is at the ground surface then the moisture content equals the saturated moisture content, θ_{sat}, and all ET is taken from the saturated zone. If the water table is below the ground surface, but above the ET surface, then the average moisture content of the ET layer is a linear function of the depth of the water table. That is, the average moisture content in the ET layer is lower when the water table is lower. If the water table is above the ET surface, the capillary fringe reaches the ground surface. Thus, the water content is not dependent on ET and any water lost to ET will be replaced from the groundwater table through capillary action. If the water table is below the ET surface, but above the ET extinction depth, then the average water content will vary between a minimum, θ_{min}, and a maximum, θ_{max}. θ_{max} is the water content that would be present if no ET occurred. θmin is the minimum water content that can exist in the upper ET layer when ET is active. Both θmin and θmax vary linearly with the depth to the water table. That is, θ_{min} and θ_{max} are lower when the water table is lower.

The difference between θ_{max} and the actual moisture content is the storage capacity of the unsaturated zone. Vertical infiltration to the saturated zone will only occur when the water content is equal to θ_{max}. If the water table is below the ET extinction depth, then a lower ET layer exists. The moisture content of the lower ET layer is equal to the field capacity, which is the minimum water content when ET does not exist. The average moisture content of the upper ET layer can range between the field capacity, θ_{FC}, and the wilting point, θ_{WP}, which is the minimum water content at which the plants can remove water from the soil.

3.5 INFILTRATION

In MIKE SHE, at the beginning of each computational time step, rainfall first fills the interception storage. If I_{max} is exceeded, the excess water is added to the amount of ponded water on the ground surface, d*oc*, which is the height of surface ponding before infiltration is subtracted. Next, the maximum infiltration volume is limited by the rate of infiltration. Thus,

$$Inf_k = K_{\inf} \cdot \Delta t \qquad (3.25)$$

where

Inf_k = maximum amount of infiltration allowed during the time step due to the infiltration rate,

K_{inf} = infiltration rate and

Δt = calculation time-step.

The maximum infiltration volume is also limited by the available storage volume in the unsaturated zone, which is calculated by:

$$Inf_v = (\theta_{sat} - \theta_{t-1}) \cdot z_{wt} \qquad (3.26)$$

where

θ_{sat} = saturated water content,

θ_{t-1} = water content at the end of the previous time-step and

z_{wt} = depth of the water table.

The actual infiltration to the unsaturated zone, Inf_{actual}, is then calculated as the minimum of the amount of ponded water before infiltration, the rate limited amount of infiltration or the maximum volume of infiltration. Thus,

$$Inf_{actual} = \min(d_{oc}, Inf_k, Inf_v) \qquad (3.27)$$

Subsequently doc and θact are updated

$d_{oc} = d_{oc}^* - I_{act}$ [mm] (3.28)

$\theta_{act} = \theta_{act}^* - (I_{act}/(zd \cdot 1000))$ (3.29)

where

* refers to the parameter value before updating

3.6 EVAPOTRANSPIRATION

Actual evapotranspiration is calculated from the reference evapotranspiration rate (E_p). The reference rate is typically described as a time-series, which may be derived from pan-measurements or calculated using, for example, the Penman-Monteith equations. The reference ET is satisfied in the following order:

- Evaporation is first deducted from the interception storage assuming the potential ET rate.
- If the interception storage cannot satisfy the potential ET, water is evaporated from the ponded water, d*oc*, until the ponded water is exhausted or the potential ET is satisfied
- If the potential ET has not yet been satisfied, water is ET is removed from the unsaturated zone until the potential ET is satisfied or the water content of the upper ET layer is reduced to θ_{min}.

If the potential evapotranspiration demand is still not satisfied water is extracted from the saturated zone. The amount that can be extracted is expressed as a function of the depth to the ground water table as described by the MODFLOW ET package. The actual evapotranspiration is calculated as the sum of the above 4 processes (figure 3.2).

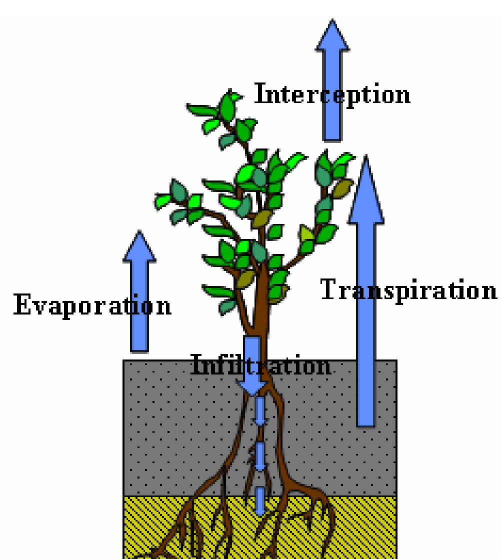

Figure 3.2: Interception, Evaporation and Transpiration process.

3.6.1 ET from the Canopy

Evapotranspiration is deducted from the canopy storage assuming potential evapotranspiration rate. The actual evapotranspiration from canopy, E_{can} is given as minimum of potential evapotranspiration rate multiplied with the time step and actual interception storage:

$$E_{can} = \min(INT_a, E_p . \Delta t) \quad [mm] \qquad (3.30)$$

INT_a is subsequently updated by deducting E_{can}

$$INT_a = INT_a^* - E_{can} \quad [mm] \qquad (3.31)$$

3.6.2 ET from Ponded Water

If the interception water storage cannot satisfy potential evapotranspiration rate, water is extracted, to the extent possible, from the ponded water storage, d_{oc}. (* refers to the parameter value before updating).

$$E_{pon} = \min (d_{oc}, (E_p - E_{can}). \ \Delta t \quad [mm] \qquad (3.32)$$

and d_{oc} is updated

$$d_{oc} = d_{oc}^* - E_{pon} \quad [mm] \qquad (3.33)$$

3.6.3 ET from the Unsaturated Zone

If the potential evapotranspiration demand is still not satisfied water is extracted from the unsaturated zone (if available).

$$E_a = E_a + \min(V_{uz} /dt, E_p - E_a) \qquad (3.34)$$

where

V_{uz} = available water in the unsaturated zone given as:

$V_{uz} = (\theta_{act} - \theta_{min}(zd)) .zd$ (3.35)

3.6.4 ET from the Saturated Zone

If the potential evapotranspiration demand is still not satisfied water is extracted from the saturated zone. The amount that can be extracted is expressed as a function of the depth to the ground water table.

$$E_{SZ} = E_p \cdot \Delta t - E_{can} - E_{pon} - E_{UZ} \quad \text{for} \quad z_d < H_c \tag{3.36}$$

$$E_{SZ} = \max\left(E_p \cdot \Delta t - E_{can} - E_{pon} - E_{UZ}, \Delta t \frac{(h_c + z_{ext} - z_d)}{z_{ext}} \right) \tag{3.37}$$

where

z_{ext} extinction depth [m]

H_c- ET surface elevation [m]

z_d is considered equal to the root depth. Thus z_d may be time variant.

3.6.5 Actual ET

Finally, the actual evapotranspiration can be computed as the sum of the above contributions:

$E_a = E_{can} + E_{pon} + E_{uz} + E_{sz}$ [mm] (.3.38)

3.7 RECHARGE TO THE SATURATED ZONE

If the average water content θ_{act} exceeds the maximum water content (θ_{max}) groundwater recharge (Q_R) is produced.

$Q_R = \max((\theta_{act}-\theta_{max}(zd)).\ zd),0)$ [mm] (3.39)

3.8 SATURATED FLOW

The saturated zone component determines the saturated subsurface component in hydrological modeling of a catchment. The governing flow equation for three-dimensional saturated flow in a saturated porous media is:

$$\frac{\partial}{\partial x}\left(K_{xx}\frac{\partial h}{\partial x}\right)+\frac{\partial}{\partial y}\left(K_{yy}\frac{\partial h}{\partial y}\right)+\frac{\partial}{\partial z}\left(K_{zz}\frac{\partial h}{\partial z}\right)-Q=S\frac{\partial h}{\partial t} \qquad (3.40)$$

where

K_{xx}, K_{yy}, K_{zz} = the hydraulic conductivities along x, y and z axes, which are assumed to be parallel to the principle axes of hydraulic conductivity tensor

h = the hydraulic head

Q = source/sink term

S = specific storage coefficient

Two special features of this apparently straightforward elliptic equation should be noted. First, the equations are non-linear when flow is unconfined; second, the storage coefficient is not constant but switches between the specific storage coefficient for confined conditions and the specific yield for unconfined conditions.

3.9 SOLUTION OF THREE DIMENSIONAL FLOW EQUATION

3.9.1 The Preconditioned Conjugate Gradient (PCG) Solver

Groundwater component is computed by the pre-conditioned conjugate solver, PCG, (Hill, 1990). The PCG solver includes an inner iteration loop, where the head dependent boundaries are kept constant, and an outer iteration loop where the (non-linear) head dependent terms are updated. The PCG solver includes a number of additional solver options that are used to improve convergence of the solver. The PCG solver is identical to the one used in MODFLOW (McDonald and Harbaugh, 1988).

The potential flow is calculated using Darcy's law

$$Q=\Delta hC \qquad (3.41)$$

where

Δh = the piezometric head difference

C = is the conductance of water in soil

The horizontal conductance in Equation (3.41) is derived from the harmonic mean of the horizontal conductivity and geometric mean of the layer thickness. Thus, the horizontal conductance between node I and node *i*-1 will be:

$$C_{i-1/2} = \frac{KH_{i-1,j,k} KH_{i,j,k} (\Delta z_{i-1,j,k} + \Delta z_{i,j,k})}{(KH_{i-1,j,k} + KH_{i,j,k})} \quad (3.42)$$

where, KH is the horizontal hydraulic conductivity of the cell and Δz is the saturated layer thickness of the cell.

The vertical conductance between two cells is computed as a weighted serial connection of the hydraulic conductivity, calculated from the middle of layer k to the middle of the layer k+1. Thus,

$$C_v = \frac{\Delta x^2}{\frac{\Delta z_k}{2K_{z,k}} + \frac{\Delta z_{k+1}}{2K_{z,k+1}}} \quad (3.43)$$

In dewatering condition the actual flow between cell k and k+1 is calculate by

$$q_{k+1/2} = Cv_{k+1/2}(z_{top,k+1} - h_k) \quad (3.44)$$

The above equation can also be written in the following form if we substitute h for z:

$$q_{k+1/2} = Cv_{k+1/2}(h_{k+1} - h_k) \quad (3.45)$$

Subtracting Equation (3.44) from Equation (3.45) gives the correction term

$$q_c = Cv_{k+1/2}(h_{k+1} - z_{top,k+1}) \quad (3.46)$$

Which is added to the right-hand side of the finite difference equation using the last computed head? A correction must also be applied to the finite difference equation if the cell above becomes dewatered.

Thus the flow from cell k-1 to k is:

$$q_{k-\frac{1}{2}} = Cv_{k-\frac{1}{2}}(h_{k-1} - z_{top,k}) \tag{3.47}$$

where again the computed flow is:

$$q_{k-\frac{1}{2}} = Cv_{k-\frac{1}{2}}(h_{k-1} - h_k) \tag{3.48}$$

Subtracting Equation (38) from (39) gives the correction term:

$$q_c = Cv_{k-\frac{1}{2}}(z_{top,k} - h_k) \tag{3.49}$$

Which is added to the right-hand side of the finite difference equation using the last computed head?

3.10 LINEAR RESERVOIR METHOD

A single linear reservoir is a special case of the Muskingum model, Chow (1988). The theory behind linear reservoir method has been developed for the solution of saturated zone to provide an alternative to the physically based, fully distributed model approach. In many cases, the complexity of natural catchment area poses a problem with respect to data availability, parameter estimation and computational requirements. Most of the time very limited information on catchment characteristics is available. Satellite data may increasingly provide surface data estimates for vegetation cover, soil moisture, and evaporation in a catchment. However, subsurface information is generally very sparse. In many cases, subsurface flow can be described satisfactorily by a lumped conceptual approach such as the linear reservoir method.

Linear reservoir module for the saturated zone may be viewed as a compromise between limitation on data availability, the complexity of hydrological response at the catchment scale, and the advantages of model simplicity. The combined lumped/physically distributed model was primarily developed to provide a reliable, efficient instrument in the following field of application:

- Assessment of water balance and simulation of ungauged catchment
- Prediction of soil moisture distribution with land use changes
- Estimation of change in saturated and unsaturated zone as well as fluctuation of water table

A linear reservoir is one, whose storage is linearly related to output by storage constant with the dimension time, also called a time constant as follow:

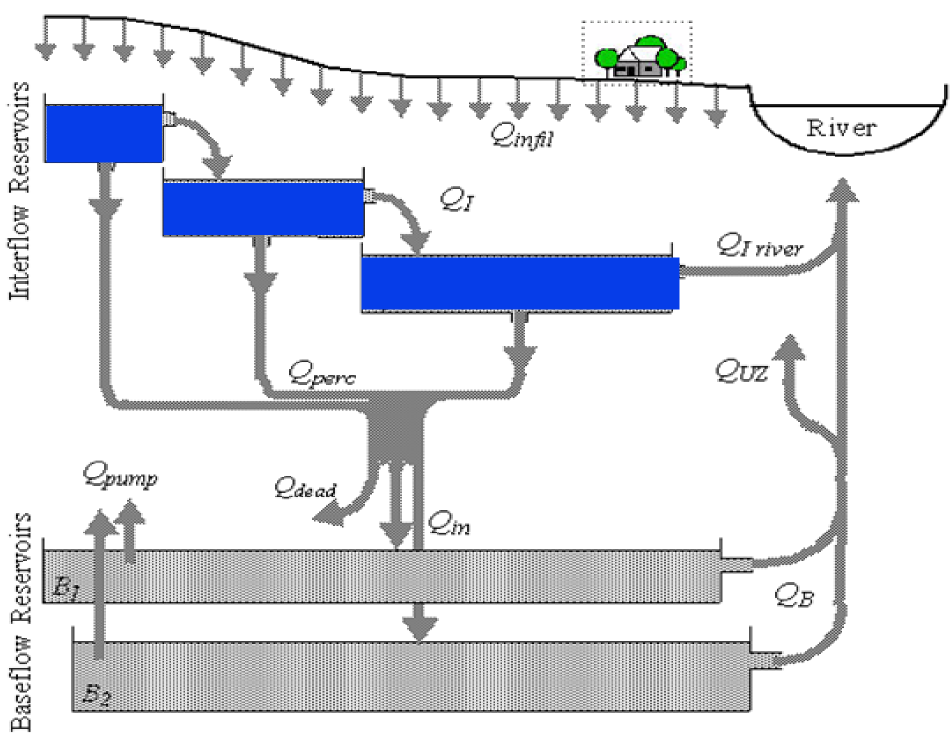

Figure 3.3: Schematic Diagram of Linear Reservoir Module of MIKE SHE

$$S = kQ \tag{3.50}$$

Where

S = is storage in the reservoir,

k = is the time constant

Q = is the outflow rate from the reservoir

The continuity equation for a single, linear reservoir with one outlet can be written as:

$$\frac{dS}{dt} = I - Q \qquad (3.51)$$

where,

t = is time,

I = is the inflow rate to the reservoir

Combining Equations (3.47) and (3.48) yields a first order, linear differential equation which can be solved explicitly:

$$\frac{dQ}{dt} + \frac{1}{k}Q_{(t)} = \frac{1}{k}I_{(t)} \qquad (3.52)$$

If the inflow (I) to the reservoir is assumed constant, the outflow (Q) at the end of a time step dt can be calculated by the following expression:

$$Q_{(t+dt)} = Q_t e^{-dt/k} + I(1 - e^{-dt/k}) \qquad (3.53)$$

The outflow from a linear reservoir with two outlets can also be calculated explicitly. In this case storage is merely, is given by:

$$S = k_p Q_p = k_o Q_o + thd \qquad (3.54)$$

where,

k_p= is the time constant for the percolation outlet

Q_p= is percolation

K_o= is time constant for the overflow outlet

Q_o= is outflow from the overflow outlet and

thd= is the threshold value for the overflow outlet

Combining Equations (3.52) and (3.54) yields a solution for S, still assuming I is constant in time, the expression for Q_p and Q_o at time (t+dt):

$$Q_p = Q_{pt} e^{\frac{k_o + k_p}{k_p k_o}} + \frac{k_o}{k_p + k_o}(I + \frac{thd}{k_o})\left[1 - e^{\frac{k_o + k_p}{k_p k_o}}\right] \tag{3.55}$$

$$Q_o = \frac{k_p Q_p - thd}{k_o} \tag{3.56}$$

The Linear Reservoir method is not as accurate as the 3D Finite Difference (Darcy Flow). Therefore, saturated zone modelling in this study was accomplished by using 3D Finite Difference method. Similarly for unsaturated zone, Richard Equation was selected.

CHAPTER 4

MATERIAL AND METHOD

This study has been carried out in two phases. Both phases used Physical Based Modelling. The first phase used idealised parameters whilst the second phase actual data from the field. Mike SHE fully distributed hydrological model was selected for both phases. The objective of the first phase was to learn MIKE SHE in depth and evaluate the different component of water balance fluxes in case of drained and un-drained scenarios. It was tried to replicate the actual filed conditions (in term of soil physical and hydraulic properties, land use, irrigation, crops and meteorological data etc.) in first phase of study to make it as close to the actual modelling scenarios later on in the second phase of the study.

4.1 PHASE 1

The main objective of this phase was to run MIKE SHE with a learning objective. In this phase MIKE SHE was run without calibration on an idealized irrigated and non-irrigated catchment under different scenarios. In this phase the basic steps of building a model were used as shown in Figure 4.1. The main focus of discussion in this phase was restricted to the open drains, mainly considering conditions typical of the Southwest region of the agricultural catchment in Western Australia. Idealized catchments with homogeneous soil type and depth was used for modelling with and without drain installed in irrigated and non irrigated catchments.

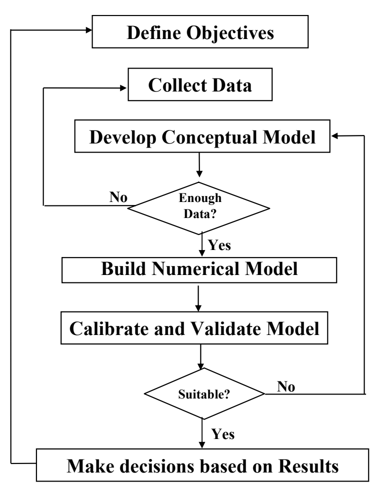

Figure 4.1: Basic steps in Building a Model.

Physically based modelling is a useful technique for analyzing the effect of physical changes to a system, because the required change can be imposed directly on the model. An interpretation of the relevant hydrological processes can be made and comparison can be carried out between model predictions before and after changes have been imposed. This is difficult to achieve by other modelling approaches, because generally the change cannot be directly imposed and some assumptions must be made about how to incorporate them. Using a physically based approach, it is not necessary to make a priori assumptions about how the changes may affect the system. The aim of this study was to model the changes in the soil moisture distribution and groundwater fluctuations with and without drainage system installed in an idealized irrigated and non- irrigated catchments. MIKE SHE was used to carry out the modelling of two different scenarios, i.e., with and without drainage system in an idealized catchment (homogeneous and uniform soil depth). The following components of water balance were compared with and without drained scenarios:

- Actual transpiration from crops
- Actual evaporation from crops
- Actual soil evaporation
- Actual evaporation from interception
- Actual evaporation from ponded water
- Canopy interception storage
- Evaporation from saturated zone
- Depth of overland flow
- Infiltration to unsaturated zone
- Exchange between saturated and unsaturated zones
- Unsaturated zone deficit
- Water content in unsaturated zone
- Head elevation in saturated zone

Each simulation produced very large files for the above mentioned water balance components. The results of this phase have not been documented into this manuscript as the sole objective of this phase was to be master in using MIKE SHE for the later phase of the study.

4.2 PHASE 2

In Phase 2, Groundwater, Unsaturated, Cropping, Irrigation, Drainage, Overland Flow, and Water Balance Modules of MIKE SHE were calibrated and validated. Figure 4.2 shows the schematic integration of these modules.

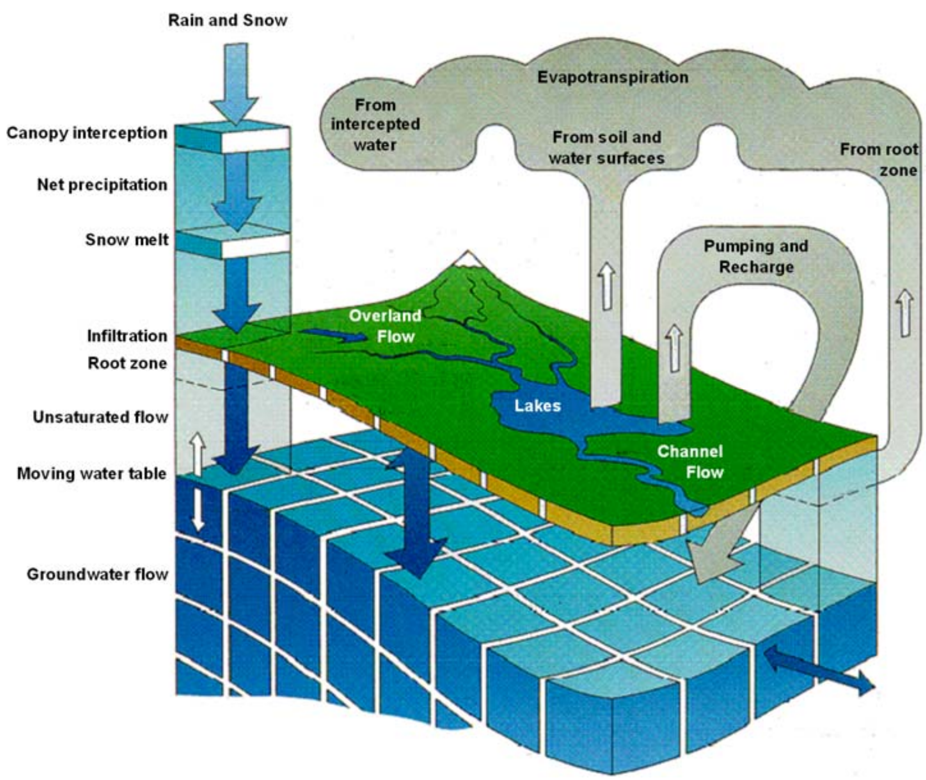

Figure 4.2: Schematic Integration of different Modules in MIKE SHE.

The model was calibrated by collecting actual field data from the Southwest Irrigation Area Project (SWIA) of Western Australia. For this purpose one sub catchment of about 8000 hectares was selected (Fig 4.3). The groundwater table data was available for six sites from 1983 to 2005 (Table 4.1). The meteorological data from 1976 to 2004 was collected from adjacent 11 meteorological stations (Appendix 6). Meteorological data was averaged for all 11 stations and the average values of the data were used in the hydrological modelling. This data was used to classify climate into wet, average and dry.

4.3 CALIBRATION OF MIKE SHE

The calibration of the model is important to remove the uncertainties and errors during the actual modelling phase. There are some confusion and difference in the opinion among the hydrologist in the literature about model calibration and validation of the hydrological models. Oreskes, 1994; Konikow and Bredehoeft, 1992 have documented these confusions and differences in detail. The main point in their discussion are the uncertainties in term of the algorithms used by the model and how well they describe the physical processes, the error in data used for calibration, the mismatch in model calibration and extrapolation of results. This uncertainty dictates how well the model answers the question that is being asked.

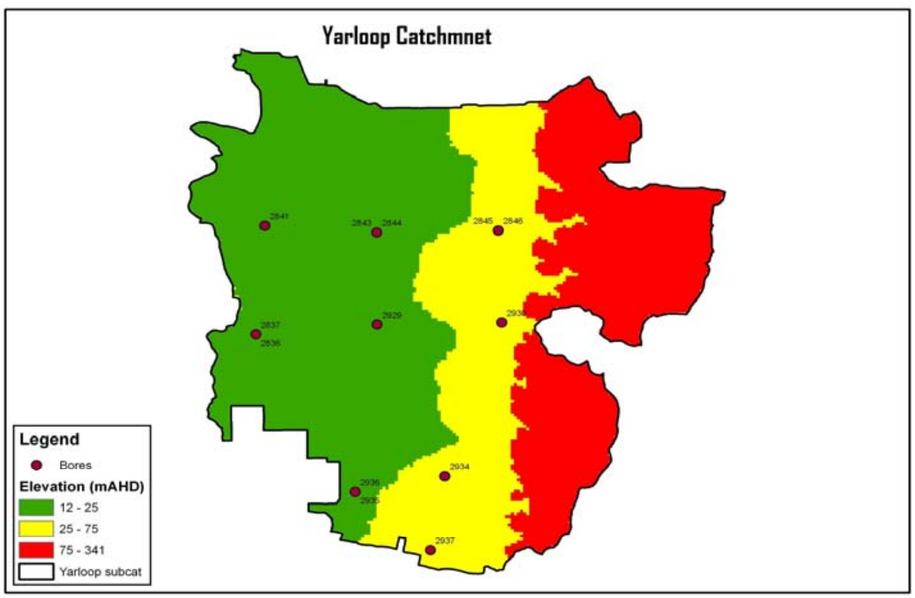

Figure 4.3: Yarloop Catchment and location of Bores used for Calibration and Validation of MIKI SHE.

There are some basic steps to set up MIKE SHE properly for calibration. These steps were carried out in sequence as they are interlinked with each other. The first step is to setup MIKE SHE for saturated zone. The second step is to setup for unsaturated zone. The third step is to link (couple) saturated and unsaturated zone model with each other. The modelling of saturated and unsaturated zones in MIKE SHE is approximately similar to the HYDRUS2D hydrological model. Its mean to setup MIKE SHE saturated and unsaturated zone module is equal to the same effort if someone is using HYDRUS2D hydrological model.

In this study, the Overland flow, Crop, Irrigation, Drainage and Water Balance Modules of MIKE SHE were also calibrated. The procedure of calibrating MIKE SHE for all of these Modules is very lengthy to document in this dissertation. Only the important steps of calibration have been included in this section. For further details, readers are referred to the MIKE SHE Reference Guide (2007) and Technical Manual (2007). The brief procedure of the important steps to calibrate MIKE SHE's Saturated Zone (Groundwater) Module is given below:

- Defining the model domain and grids
- Defining the topography
- Specifying the recharge (precipitation)
- Defining the geological model,
- Defining the vertical numerical discretisation,
- Defining the initial conditions, and
- the boundary conditions.

In the MIKE SHE graphical user interface, the geological model and the vertical discretisation are essentially independent, while the initial conditions are defined as a property of the numerical layer. Similarly, subsurface boundary conditions are defined based on the numerical layers, while surface boundary conditions such as drains were defined independently of the subsurface numerical layers.

The use of grid independent geology and boundary conditions provided a great deal of flexibility in the development of the saturated zone model for calibration. The same geological model and many of the boundary conditions were re-used for different model discretisation and different model parameterization scenarios during calibration. The description of each step in setting up groundwater model for calibration is given below:

4.3.1 Defining the model domain and grid

The first step in setting up the model for calibration is to define the model area. On a catchment scale, the model boundary is typically a topographic divide, a groundwater divide or some combination of the two. In general, there are no constraints on the definition of the model boundaries. The topographic divide was selected as the model boundary in the calibration of MIKE SHE in this study. A shape file for the Yarloop catchment was generated using Arc GIS program and was imported into the MIKE SHE during calibration setup for saturated zone. A grid cell size varying from 50 x 50 to 500 x 500 metres were selected for defining the domain of the model. Grid cells inside the model domain were assigned a value of 1. Grid cells on the model boundary were assigned a value of 2. This distinction between interior grid cells and boundary cells was to facilitate the definition of boundary conditions.

4.3.2 Defining the Topography

In MIKE SHE, the topography defines the upper boundary of the model. The topography is used as the top elevation of both the unsaturated zone model and the saturated zone model. The topography also defines the drainage surface for overland flow. Many of the elevation parameters were defined relative to the topography, including depth parameters, such as ET Surface Depth. Topography was typically defined from a digital elevation map (DEM), defined from a point theme shape file generated by Arc GIS computer package.

4.3.3 Defining Precipitation

The precipitation rate is the measured rainfall. Precipitation rate were specified as mm/day. The daily meteorological data (from 1976 to 2004) from 11 adjacent stations was collected and an average value of daily rainfall was estimated and used in the calibration of the model.

4.3.4 Defining the Geologic Model

The development of the geological model for calibration is the most time consuming part of the initial model development. The geological properties of the study area was obtained from the data collected from different sources and Arc GIS shape file were prepared to specify sub-surface geology. MIKE SHE allows specifying subsurface geologic model independent of the numerical model. The parameters for the numerical grid were interpolated from the grid independently during the pre processing. The use of Arc GIS point and line files facilitated the process of defining geological model in MIKE SHE. Since lines are simply a set of connected points, the .shp file is essentially identical to the case of distributed point values. Thus, geological properties were interpolated into the numerical model during the pre process stage of the model according to the soil profile and its properties defined in the geological model.

4.3.5 Defining the Vertical numerical discretisation

The vertical discretisation of the soil profile was accomplished so that the upper layer contains small cells near the ground surface and increasing cell thickness with depth. However, the soil properties were averaged if the cell boundaries and the soil boundaries were not aligned. The discretisation was tailored to the profile description and the required accuracy of the simulation. Full Richards's equation was used in the simulation so the vertical discretisation was varying from 1-5 cm in the uppermost grid points to 10-50 cm in the bottom of the profile.

4.3.6 Defining the Initial Groundwater Level

The important step in calibration of MIKE SHE was to define the initial ground water levels to start the simulation process. The initial ground water level was obtained from the measured/observed data in the field (Table 1). During the simulation process, MIKE SHE determines the dynamic depth of the groundwater for each time step of simulation. MIKE SHE has a geological and computation model to carry out these calculations.

4.3.7 Defining Boundary Conditions

In MIKE SHE we can select one out of the following three types of boundary conditions:

- Dirichlet conditions, (Type 1) where the hydraulic head is prescribed on the boundary
- Neumann conditions, (Type 2) where the gradient of the hydraulic head (flux) across the boundary is prescribed
- Fourier conditions, (Type 3) where the head dependent flux is prescribed on the boundary.

The Type 2, Neumann conditions, was used in calibration. The upper boundary of the top layer was either the infiltration/exfiltration boundary, which in MIKE SHE is calculated by the unsaturated zone. The lower boundary of the bottom layer was considered as impermeable.

4.3.8 Hydraulic Conductivity values

Hydraulic conductivity can vary by many orders of magnitude over a space of a few metres or even centimetres. MIKE SHE has got special tools to deal with spatial variability of hydraulic conductivity. In this calibration a uniform values of hydraulic conductivities were selected from the literature according to the soil type for the first simulation. The initial values for horizontal and vertical hydraulic conductivities were 0.000015 m/s and 0.0000015 m/s respectively. The hydraulic conductivities values were varied in order of 0.000001 m/s for horizontal hydraulic conductivity and 0.0000001 m/s for vertical hydraulic conductivity during the calibration process.

4.3.9 Groundwater Drainage

Drainage is a special boundary condition in MIKE SHE used to defined natural and artificial drainage. In calibration process, drainage was applied to the layer of the Saturated Zone model containing the drain level. Water that was removed from the saturated zone by surface drainage was routed to local surface water bodies. Drainage flow was simulated using an empirical formula, which requires, for each cell, a drainage level and a time constant (leakage factor) that were used for routing the water out of the element. Both drain levels and time constants were assumed uniform spatially. For first simulation for calibration the leakage factor was assumed equal to 0.00005/sec was used and varied in the range of plus minus 0.000005/sec.

4.4 SIMULATIONS FOR CALIBRATING MIKE SHE FOR SATURATED ZONE

After completing all above steps, the calibration of Groundwater Module of MIKE SHE was carried out by using the actual field data, which include, land use, crop, irrigation application, metrological, soil physical properties, soil hydraulic properties, stream flow and water table depths. Appendices 6 and 7 show all of this data in different tables used in the calibration of MIKE SHE.

Water table depths were extracted from the results of each simulation. These simulated (Sim) depths were compared with the observed (Obs) data. After each simulation the standard calibration statistics were calculated based on differences between the measured observation (Bore data in this case) and simulated values at the same time and location (Figure 4.). The error or residual for an observation and simulated calculation pair was found by:

4.4.1 Calibration Statistics

$$Ei,t = Obs_{i,t} - Sim_{i,t} \tag{4.1}$$

Where

$E_{i,t}$ = the difference between the observed and simulated values at location i and time t.

$Obs_{i.t}$ = the observed values at location i and time t.

$Sim_{i,t}$ = the simulated values at location i and time t.

The mean error at location "i" where "n" observations were made was calculated by:

$$ME_i = \bar{E}_i = \frac{\sum_t (Obs_{i,t} - Sim_{i,t})}{n} \tag{4.2}$$

The mean Absolute Errors at location "i" where "n" observations were taken was calculated by:

$$MAE_i = \left|\bar{E}_i\right| = \frac{\sum_t \left|Obs_{i,t} - Sim_{i,t}\right|}{n} \tag{4.3}$$

Root Mean Square Errors (RMSE) were estimated by:

$$RMSE_i = \frac{\sqrt{\sum (Obs_{i,t} - Sim_{i,t})^2}}{n} \tag{4.4}$$

Standard Deviation of the Residuals (STDres) was estimated by:

$$STDres_i = \sqrt{\frac{\sum_t ((Obs_{i,t} - Sim_{i,t}) - \bar{E}_i)^2}{n}} \tag{4.5}$$

Correlation Coefficient (R) was calculated by:

$$R_i = \sqrt{\frac{\sum_t (Sim_{i,t} - \overline{Obs_{i,t}})^2}{\sum_t (Obs_{i,t} - \overline{Obs_{i,t}})^2}} \tag{4.6}$$

where:

$\overline{Obs_i}$ is the mean of the observed values at location “i”.

The outputs of MIKE SHE simulations during the calibration of the Saturated Zone Model were very large. The results of these simulations have been burnt on a DVD and are available at the Department of Civil Engineering, Curtin University of Technology, WA, Australia.

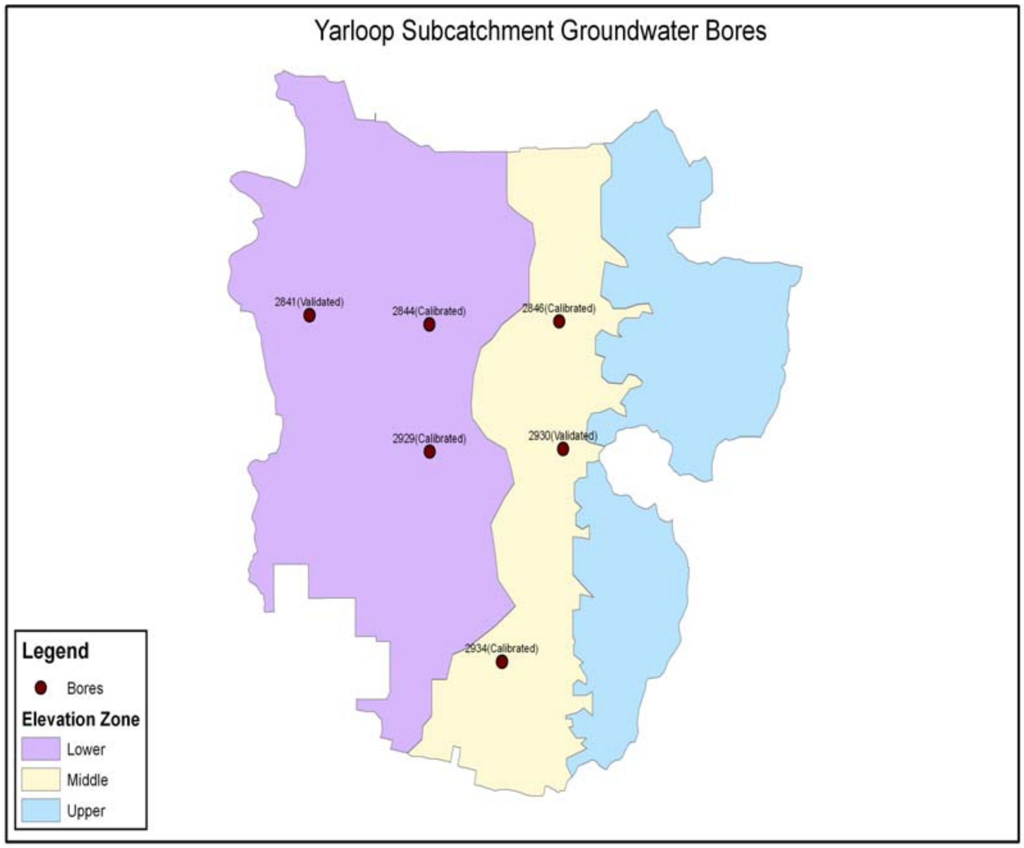

Figure 4.4: Location of Calibrated and Validated Bores in the Yarloop catchment.

4.5 SETTING UP UNSATURATED FLOW MODULE

Calibration of unsaturated flow was one of the central processes in calibration process. The unsaturated zone is usually heterogeneous and characterized by cyclic fluctuations in the soil moisture as water is replenished by rainfall and removed by evapotranspiration and recharge to the groundwater table. Unsaturated flow is primarily vertical since gravity plays the major role during infiltration. Therefore, unsaturated flow in MIKE SHE was calculated only vertically in one-dimension. However, this may limit the validity of the flow description in some situations, such as on very steep hill slopes with contrasting soil properties in the soil profile. MIKE SHE includes an iterative coupling procedure between the unsaturated zone and the saturated zone to compute the correct soil moisture and the water table dynamics in the lower part of the soil profile.

The steps in setting up unsaturated zone model in MIKE SHE are nearly similar as for saturated zone. These steps are listed below:

- Defining the topography,
- Specifying precipitation,
- Specifying evapotranspiration,
- Specifying a soil profile
- Defining the geological model,
- Defining the vertical numerical discretisation,
- Defining the lower boundary conditions.

The unsaturated zone was setup using the same procedure as described for saturated zone. After the setup, it was coupled with saturated zone as described below:

4.6 COUPLING BETWEEN UNSATURATED AND SATURATED ZONE

The following procedure was used to ensure that the unsaturated zone didn't drop below the bottom of the first calculation layer of the saturated zone:

After a simulation, a map of grid statistics of the potential head was created in the first calculation layer of the saturated zone and was subtracted from the map of the minimum potential head from the map of the bottom level of the first calculation layer of the saturated zone. If the difference was very small in some areas of the map (e.g. <0.5 m), it was moved to the bottom level of the first calculation layer of the saturated zone downwards. This procedure was repeated until there were no small differences (the maximum difference of 0.5 mm). The water balance program was used to get an overview of errors due to a bad setup of the unsaturated zone.

4.7 RESULTS OF CALIBRATION

When saturated and unsaturated zone were linked properly, MIKE SHE simulations were carried out to calibrate the parameters shown in Table 1. After each simulation, the simulated water table depths were extracted and compared with the actual water table depth data. The actual water table depth data was collected from the field. The actual data of four observation wells (bores) was used in the calibration of MIKE SHE model.

Figure 4.4 shows the location of the bores used in calibration. Table 4.2 shows water table depth data from bores 2844, 2929, 2930 and 2846 used in calibration process.

The simulations were repeated many times by adjusting the parameters shown in Table 4.1. The water table depths produced by each simulation were compared with the actual water table depths. The statistics calculations were used to estimate the correlations between observed and simulated water table depths. When correlation between actual and simulated data was about 0.7, no further simulations were carried out.

MIKE SHE generated very large outputs for each simulation process. All the simulation run for calibration and their outputs have been burnt on a DVD and may be accessed from the Department of Civil Engineering, Curtin University, WA, Australia.

The last setup of MIKE SHE for calibration was posted on the Danish Hydraulic Institute (DHI), Denmark International Shared Web Site for verification of the calibration process. One expert of MIKE SHE from DHI, Denmark checked the setup and its results. The final values of the calibrating parameters used for the last simulation are shown below. The values for few other simulations are given in Appendix 7.

Table 4.1 Calibrated Parameters from the Last Simulation

Parameter	Maximum Value	Minimum Value	Increments	Final Value
Vertical Hydraulic Conductivity (m/s)	0.000003	0.0000007	0.0000005	0.000001
Horizontal Hydraulic Conductivity (m/s)	0.00002	0.000008	0.000005	0.00001
Specific Yield	0.5	0.1	0.05	0.2
Saturated Moisture contents	0.45	0.35	0.05	0.38
Residual Moisture contents	0.02	0.03	0.005	0.01
Coefficient Alpha (1/cm)	0.1	0.008	0.0011	0.067
Capillary pressure at field capacity (m)	5	1	0.25	2
Capillary pressure at wilting (m)	8	2	0.5	4.2
Saturated Hydraulic conductivity (m/s)	0.0001	0.00001	0.00001	0.0002
Leakage factor	0.00001	0.0000001	0.000002	0.000056
ET parameter C1	0.35	0.2	0.05	0.3
ET parameter C2	0.15	0.25	0.05	0.2
ET parameter C3	30	15	1	20
ET parameter Cint	0.08	0.04	0.01	0.05
Parameter Aroot	0.35	0.15	0.05	0.25
Leaf Area Index (LAI)	7	1	1	2.5
Rooting depths (m)	2	0.2	0.1	0.4

Tables 4.2 shows the observed and calibrated water table levels for the four bores used for the calibration of MIKE SHE.

Table 4.2: Calibrated and Observed Data for Yarloop Catchment for Bores 2844 and 2929 (m).

WATER TABLE DEPTH BORE 2844 (m)			WATER TABLE DEPTH BORE 2929 (m)		
Date	**Observed**	**Simulated**	**Date**	**Observed**	**Simulated**
15/9/83	0.84	1.9	15/09/83	1.9	1.52
2/8/88	1.67	1.5	2/08/88	2.1	1.9
6/12/88	2.6	1.98	6/12/88	2.6	2.5
8/3/89	3.1	3.15	9/03/89	2.25	2.8
4/7/89	1.6	2.01	4/07/89	1.3	1
16/10/89	1.7	1.81	12/10/89	2.4	2.5
16/1/90	3.1	2.95	16/01/90	2.7	2.95
5/4/90	3.4	3.82	5/04/90	2	1.9
16/7/90	2.5	2.48	18/07/90	1.4	1.48
17/10/90	1.88	1.9	17/10/90	2.5	2.4
15/1/91	3.3	2.99	15/01/91	3.1	3.2
4/4/91	3.6	3.25	8/04/91	1.9	2.02
10/7/91	1.7	1.6	10/07/91	1.3	1.2
18/9/91	1.35	2.8	17/09/91	2.95	2.85
16/4/92	3.56	3.21	21/04/92	1.45	1.5
24/9/92	1.7	2.1	24/09/92	2.57	2.6
24/3/93	3.4	2.9	25/03/93	1.65	1.74
14/9/93	1.46	1.3	13/09/93	2.8	2.7
7/4/94	3.7	3.52	7/04/94	2.18	2.41
24/11/94	2.97	3.11	24/11/94	2.93	2.9
10/4/95	3.78	3.59	10/04/95	2.08	2.22
10/11/95	2.65	2.68	10/11/95	3.2	3.1
17/5/96	3.77	3.85	21/05/96	1.875	1.98
17/10/96	1.945	2.01	17/10/96	2.83	2.91
3/6/97	3.65	3.59	3/06/97	2.95	3.05
24/5/98	4.37	4.1	24/05/98	1.48	1.25
8/12/98	3.17	4.25	23/09/98	2.08	2.41
19/5/99	4.46	4.24	8/12/98	2.95	3.01
5/10/00	1.95	2.5	6/05/99	1.5	1.4
14/3/01	4.12	3.97	4/10/00	2.78	2.58
25/9/01	1.91	1.8	14/03/01	2.03	2.02
4/4/02	4.24	4.01	25/09/01	3.05	3.04
17/9/02	1.58	1.92	17/09/02	1.56	1.92
10/4/03	4.08	3.94	14/05/03	2.93	2.52
2/9/03	1.7	1.88	2/09/03	2.93	2.88
5/4/04	3.74	3.6	6/04/04	1.82	1.92
7/9/04	1.5	1.6	6/09/04	2.98	3.01
5/4/05	3.68	3.54	4/04/05	1.74	1.7
			18/10/05	2.89	3.54

Table 4.2: Calibrated and Observed Data for Yarloop Catchment for Bores 2846 and 2930 (m).

WATER TABLE DEPTH BORE 2846 (m)			WATER TABLE DEPTH BORE 2930 (m)		
Date	Observed	Simulated	Date	Observed	Simulated
6/12/88	2.1	1.82	2/8/88	8	6.9
9/3/89	2.6	2.05	21/9/88	7.1	6.72
4/7/89	2.25	2.8	6/12/88	7.6	6.95
12/10/89	1.3	1.8	10/3/89	9.2	8.84
17/1/90	2.4	1.81	29/6/89	9.4	9.55
10/4/90	2.7	2.95	12/10/89	7.1	7.8
18/7/90	2	2.01	16/1/90	8.5	8.6
17/10/90	1.4	1.48	5/4/90	9.5	9.8
15/1/91	2.5	2.4	17/10/90	8.54	8.6
5/4/91	3.1	2.99	15/1/91	9.3	9.5
9/7/91	1.9	1.8	12/4/91	9.5	9.2
18/9/91	1.3	1.2	10/7/91	8.8	8.4
7/4/92	2.95	2.72	18/9/91	5.85	6
24/9/92	1.45	1.54	15/4/92	9.45	8.9
24/3/93	2.57	2.1	24/9/92	6.36	6.5
13/9/93	1.65	1.74	24/3/93	9.5	9.25
6/4/94	2.8	2.88	14/9/93	9.02	9.1
22/11/94	2.18	2.41	7/4/94	10.09	9.5
10/4/95	2.93	3.11	24/11/94	9.21	9.4
10/11/95	2.08	2.22	10/4/95	10.56	9.9
21/5/96	3.2	3.41	10/11/95	8.88	9.1
24/10/96	1.875	1.98	17/5/96	10.46	9.95
3/6/97	2.83	2.91	17/10/96	7.005	7.54
24/5/98	2.95	3.05	29/5/97	10.43	9.87
24/9/98	1.48	1.25	24/5/98	10.42	9.95
8/12/98	2.08	2.41	19/5/99	9.89	9.54
6/5/99	2.95	3.01	5/10/00	7.4	8.01
4/10/00	1.5	2.01	14/3/01	9.7	9.2
13/3/01	2.78	2.58	17/9/02	9.71	9.55
25/9/01	2.03	2.02	2/9/03	9.79	9.82
4/4/02	3.05	3.04	5/4/04	10.6	9.86
17/9/02	1.56	1.92	7/9/04	9.2	9.45
10/4/03	2.93	2.52	5/4/05	10.4	9.82
10/4/03	2.93	2.88	20/10/05	8.65	8.85
2/9/03	1.82	1.92			
5/4/04	2.98	3.01			
7/9/04	1.74	1.7			
5/4/05	2.89	3.54			
20/10/05	1.46	1.65			

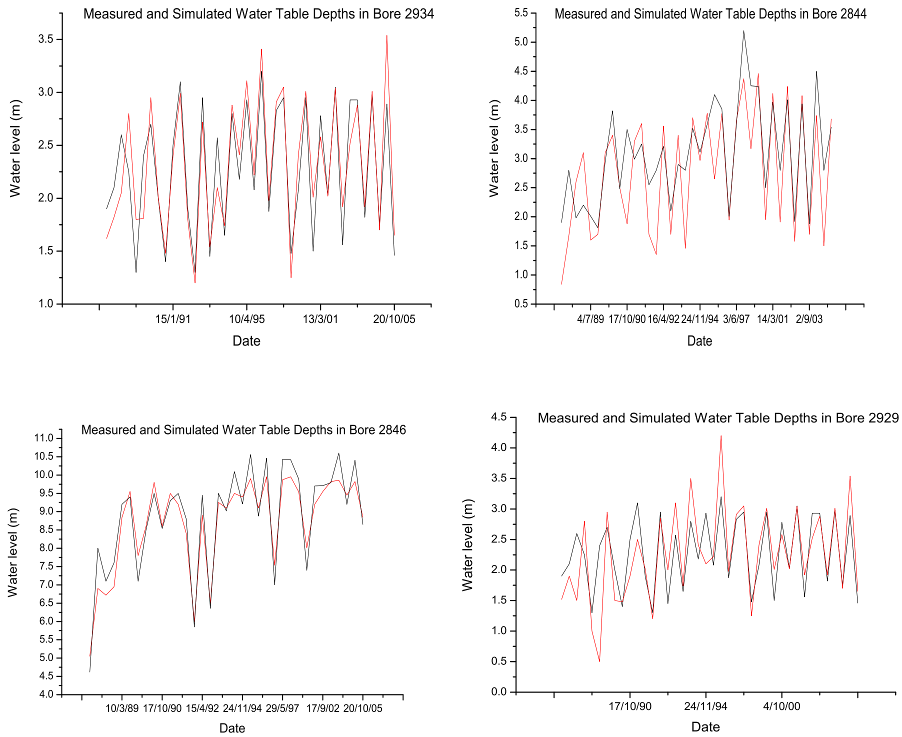

Figure 4.5*:* Observed and Simulated Water Table Depths.

Table 4.3: Correlation between Observed and Simulated Water Table Depths.

Correlation	Bore 2844	Bore 2929	Bore 2934	Bore 2930
R	0.83	0.85	0.93	0.87
R^2	0.69	0.73	0.87	0.76

Figure 4.5 shows the observed and simulated water table depth. Table 4.3 shows the correlation between the simulated and observed data. The correlation between observed and simulated data was between 0.7 and 0.87 basis, therefore, no further simulation was carried out to improve the average correlation.

4.8 VALIDATION OF MIKE SHE

The procedure adopted for calibration and validation was nearly same. The calibrated MIKE SHE was used for a set of another two bores' water table data set to verify that the calibrated model is simulating water table depths close to the observed one. For this purpose the calibrated parameters from Table 4.1 were used and water table depths were generated by calibrated MIKE SHE. Table 4.4 shows the simulated and observed data in bore 2841 and 2937.

Table 4.4: Validated and Observed Data for Yarloop Catchment for Bores 2841 and 2937.

WATER TABLE DEPTH BORE 2841 (m)			WATER TABLE DEPTH BORE 2937 (m)		
Date	Observed	Simulated	Date	Observed	Simulated
4/8/88	2.505	2.52	2/8/88	8	7.8
9/12/88	2.05	1.98	21/9/88	7.1	7.4
8/3/89	2.4	2.45	6/12/88	7.6	7.5
17/1/90	2.4	2.95	12/10/89	7.1	7.5
11/7/90	2.2	2.15	16/1/90	8.5	8.54
17/10/90	2.18	2.2	5/4/90	9.5	9.52
15/1/91	2.2	2.32	17/10/90	8.54	8.56
5/4/91	2.8	2.99	15/1/91	9.3	9.38
10/7/91	2.15	2.22	12/4/91	9.5	9.25
24/9/91	2.05	1.98	10/7/91	8.8	8.54
7/4/92	2.35	2.45	18/9/91	5.85	6.05
24/9/92	2.06	2.15	15/4/92	9.45	9.34
24/3/93	1.95	1.92	24/9/92	6.36	6.48
13/9/93	1.97	1.9	24/3/93	9.5	9.56
6/4/94	2.28	2.35	14/9/93	9.02	9.02
3/6/97	1.83	1.92	7/4/94	10.09	10.5
24/5/98	2.77	2.8	24/11/94	9.21	9.25
24/9/98	1.94	1.87	10/4/95	10.56	10.25
8/12/98	2.55	2.52	10/11/95	8.88	8.75
5/5/99	3.02	3.08	17/5/96	10.46	10.25
4/10/00	2.06	2.01	17/10/96	7.005	6.98
13/3/01	2.31	3.28	29/5/97	10.43	9.89
25/9/01	2.02	2.05	24/5/98	10.42	10.26
4/4/02	2.71	2.78	19/5/99	9.89	10.12
17/9/02	1.97	1.85	5/10/00	7.4	7.8
10/4/03	2.94	2.88	14/3/01	9.7	9.4
2/9/03	1.98	2.02	17/9/02	9.71	9.54
5/4/04	2.28	2.25	2/9/03	9.79	9.85
7/9/04	1.95	1.94	5/4/04	10.6	10.5
5/4/05	2.42	2.38	7/9/04	9.2	9.52
20/10/05	2.01	1.96	5/4/05	10.4	10.5

The correlations between the simulated data using calibrated model and the observed data were very encouraging. The calibrated model generated a little better correlation during validation as compare to calibration.

Table: 4.5 Correlation between Water Table Depths Predicted by Calibrated model and Observed Data.

Correlation	Bore 2841	Bore 2937
R	0.87	0.91
R^2	0.75	0.82

Table 4.5 shows that the correlation between the observed and simulated water table depth for bore 2937 were better than bore 2841. The square of correlations for both bores was more than 0.7. These correlations showed that MIKE SHE has been properly calibrated and validated. These results verified that MIKE SHE has been calibrated for the Yarloop catchment and is ready to be used in scenarios based study.

To further strengthen this confidence, the results of simulation produced during validation of MIKE SHE were used to run the WATER BALANCE MODULE of MIKE SHE to check the water balance errors. The water balance errors were less than one percent. This was another check for making sure that MIKE SHE is properly calibrated. The outputs of WATER BALANCE MODULE are very large and have been burnt on DVD as mentioned earlier.

The validated MIKE SHE set up and results files were sent to the Danish Hydraulic Institute, Denmark for checking. One expert of MIKE SHE checked all the file and results.

Calibrated and validated MIKE SHE was used for actual simulation for the three different types of climate, drain depths and irrigation applications. Climates were defined as wet, average and dry. Drain depths were selected from 0, 1 and 2 metres (0 = un-drained/no drain, 1 and 2 m deep drain). Three type of irrigation rates were chosen as zero (no irrigation), ten and sixteen mega litres per hectare per year. In Southwest Irrigation Areas (SWIA), farmers have no drains, 1 and 2 m deep drains. They usually apply irrigation from 0 to 16 ML per hectares per year. Before scenarios based simulations the rainfall data from 1976-2004 was processed to find out the wet, average and dry years. The following procedure was used for these classifications:

4.9 CLASSIFICATION OF CLIMATE

The daily rainfall and meteorological data from 1976 to 2004 was collected from 11 meteorological stations nearby the study area. The daily effective rainfall was estimated by ignoring the daily rainfall less than two millimeters. The effective average annual rainfall of all meteorological station was estimated. This average effective annual rainfall from 1976 to 2004 was arranged in descending order. Then it was grouped into three equal parts. The upper, middle and lower part's averages were calculated and found to be equal to 839, 738 and 596 mm respectively. Year 1982 had effective annual rainfall close to 839 and was selected as wet rainfall year. All the meteorological data for 1982 was also classified as wet climate data and used in this study for MIKE SHE simulations for wet climate.

Similarly, the year 1995 and 2001 had effective annual rainfall values closer to 738 and 596 mm respectively. Therefore, 1995 and 2001 were selected as average and dry years. Appendix 6 shows the meteorological data used for these classifications. All meteorological data for year 1982, 1995 and 2001 was used from the Appendix 6 into MIKE SHE simulations for the second phase. Table A7.13 in Appendix 7 shows the rainfall data used to classify climate into wet, average and dry climates.

4.10 DRAINAGE DEPTHS

The main objective of this study was to investigate the distribution and interaction of water flux in saturated and unsaturated zones with and without drained installed in three climate conditions. Three drains depths were selected for this comparison. The first drain depth was zero meter. This depth was used as untreated or un-drained scenario. Second and third depth was 1 and 2 m deep drains respectively. Most of the farmers in the study area have drains varying in depth from 1 to 2 m.

4.11 IRRIGATION APPLICATIONS

Three different irrigation rates were selected for comparing the impact of irrigation on water table depth, unsaturated zone deficit, overland flow and flooding and waterlogging risk. The first application rate was zero mega litres per year per hectare. This irrigation rate was selected to represent untreated or non-irrigated scenario. The second and third irrigation rate was 10 and 16 mega litres per year per hectare. Nearly eighty five percent farmers in SWIA grow pasture and use flood irrigation method to apply irrigation water to the pasture. The ten mega litres per year per hectare is the most common irrigation rate applied to the pasture crop by the farmers in SWIA. Sixteen mega litres per year per hectare irrigation rate was selected to represent the over irrigation scenario. Few farmers apply irrigation at this rate in SWIA.

4.12 NUMBER OF SCENARIOS

There were three set of drain scenarios, three types of climate scenarios and three types of irrigation application. The total numbers of combination were twenty seven (3x3x3=27). MIKE SHE was calibrated for irrigated and non-irrigated catchments with and without drained installed and used to simulate all above mentioned scenarios to achieve the objective of this study.

CHAPTER 5

SIMULATED RESULTS OF GROUNDWATER FLUCTUATIONS

5.1 DESCRIPTION OF SIMULATIONS' SCENARIOS

Calibrated MIKE SHE was used to simulate twenty seven (3 x 3 x 3) scenarios for three climates, drain depths and irrigation application rates. The actual meteorological data for 1982, 1995 and 2001 was used as an input into MIKE SHE for wet, average and dry climates. Soil physical and hydraulic properties data used in MIKE SHE was collected from field and literature. The cropping pattern and irrigation application data was also collected from the field. All twenty seven simulations were divided in three sets of nine for each drainage depth. The first set of nine scenarios was defined for no drain depth. In MIKE SHE the no drain depth scenarios were simulated by assuming zero metre depth in the drain level dialog and it is represented in this study as D0. Similarly, for second and third set of nine scenarios drain depth was selected as 1 and 2 m deep and represented in this study as D1 and D2 respectively. The climate scenarios were defined as wet, average and dry and represented by SW, SA, and SD respectively. The irrigation rates were defined as no irrigation (0 ML/Y/H), ten mega litres per years per hectare (10 ML/Y/H) and sixteen mega litres per year per hectare (16 ML/Y/H). In this study 0, 10 and 16 ML/Y/H irrigation scenarios have been mentioned as I0, I10 and I16 respectively. For example Scenario one has been mentioned as SWD0I0, which indicates that it was simulated for wet climate without irrigation and drainage.

Tables 5.1, 5.2 and 5.3 show the description of the each set of nine scenarios which were simulated for zero metre drain depth (D0), 1 m drain depth (D1) and 2 m drain depth (D2) respectively.

Table 5.1: Description of Scenarios with no Drains, D0 (Drain depth = 0 M).

IRRIGATION (ML/Y/H)	TYPE OF CLIMAT		
	WET (W)	AVERAGE (A)	DRY (D)
0	S1 = SW-D0-I0	S2 = SA-D0-I0	S3 = SD-D0-I0
10	S4 = SW-D0-I10	S5 = SA-D0-I10	S6 = SD-D0-I10
16	S7 = SW-D0-I16	S8 = SA-D0-I16	S9 = SD-D0-I16

(Note Subscripts SW=Wet, SA=Average, SD= Dry, 0 = no drain, I0, I10 and I16 = 0, 10 and 16 mega litres/year irrigation)

Table 5.2: Description of Scenarios with One Metre Deep Drains, D1 (Drain depth = 1M).

IRRIGATION (ML/Y/H)	TYPE OF CLIMAT		
	WET (W)	AVERAGE (A)	DRY (D)
0	S10 = SW-D1-I0	S11 = SA-D1-I0	S12 = SD-D1-I0
10	S13 = SW-D1-I10	S14 = SA-D1-I10	S15 = SD-D1-I10
16	S16 = SW-D1-I16	S17 = SA-D1-I16	S18 = SD-D1-I16

(Note Subscripts SW=Wet, SA=Average, SD= Dry, 0 = no drain, I0, I10 and I16 = 0, 10 and 16 mega litres/year irrigation)

Table 5.3: Description of Scenarios with Two Metres Deep Drains, D2 (Drain depth = 2M).

IRRIGATION (ML/Y/H)	TYPE OF CLIMAT		
	WET (W)	AVERAGE (A)	DRY (D)
0	S19 = SW-D2-I0	S20 = SA-D2-I0	S21 = SD-D2-I0
10	S22 = SW-D2-I10	S23 = SA-D2-I10	S24 = SD-D2-I10
16	S25 = SW-D2-I16	S26 = SA-D2-I16	S27 = SD-D2-I16

(Note Subscripts SW=Wet, SA=Average, SD= Dry, 0 = no drain, I0, I10 and I16 = 0, 10 and 16 mega litres/year irrigation)

Calibrated MIKE SHE was used to run the simulation for all the 27 scenarios as described in above mentioned tables. MIKE SHE produces a wide range of results of soil water movement above and below the ground surface for each simulation. The movement of water out of the domain produced by MIKE SHE is actual evapotranspiration, actual transpiration, actual evaporation from interception, actual evaporation from ponded water, canopy interception storage, evapotranspiration from saturated zone, depth of overland flow in x and y directions, root water uptake, groundwater flow in x, y and z-directions and groundwater abstraction. MIKE SHE requires the initial groundwater depth to start the simulations for each scenario. The initial groundwater table depth was taken from the calibration results and was kept same for each scenario's simulation. The similar boundary conditions were applied to the

MIKE SHE during the twenty seven simulations as were selected in calibration process. These boundary conditions have already been discussed in previous chapters. Actual rainfall and reference evapotranspiration data was used for wet, average and dry year as described above.

The results of twenty seven simulations were about 14 GB and have been burnt on two DVDs and are available from the Department of Civil Engineering, Curtin University of Technology, Bentley, WA, Australia.

From each simulation's outputs the following components were extracted:

- Depth of water table (Appendix 1),
- Water deficit in unsaturated zone (recharge/discharge) (Appendix 2),
- Exchange between saturated and unsaturated zones (Appendix 3),
- Depth of overland flow (Appendix 4)
- Drains outflow (Appendix 5).

These extracted results were used to analyse:

- The impact of different drain depth on land and water resources in different climate.
- The impact of 10 and 16 ML/ha-annum irrigation as compare to zero irrigation (no irrigation) on waterlogging and salinity.
- Impact of recharge and discharge from unsaturated zone on land productivity.
- Amount of overland flow and risk of flooding in drained and un-drained scenarios.
- Annul volume of drain outflow and its impact on downstream flooding.

5.2 IMPACT OF DRAINS ON LAND AND WATER RESOURCES

Drains are commonly used in the SWIA to mange waterlogging and salinity hence to improve the agricultural land productivity. The basic objectives of the drains are to remove excessive surface, sub-surface and groundwater. The depth of drains and hydraulic properties of soil are the main factors in the performance of the drains. Drains are like blood vessels for the land and play a significant role in maintaining its health. If these vessels are clogged or blocked, the land health would deteriorate. In some sever cases land may become completely unproductive. The major sign of poor land drainage is the development of waterlogging and salinity.

To evaluate the impact of drains with and without irrigation on land and water resources the following comparison were made to understand their role in managing waterlogging and salinity. The simulation results are discussed in current and next two chapter as described below:

- **Comparison of water table depths in different scenarios as described below (CHAPTER 5)**:
    - Water table depths without irrigation and drainage in three climates.
    - Water table depths with 1 m deep drains and without irrigation in three climates.
    - Water table depths with 2 m deep drains and without irrigation in three climates
    - Water table depths with 1 m deep drain and 10 ML/ha-annum irrigation in three climates.
    - Water table depths with 2 m deep drains and 10 ML/ha-annum irrigation in three climates
    - Water table depths with 1 m deep drain and 16 ML/ha-annum irrigation in three climates.
    - Water table depths with 2 m deep drains and 16 ML/ha-annum irrigation in three climates.

- **Comparison of recharge and discharge in different scenarios as described below (CHAPTER 6):**
    - Recharge and discharge without irrigation and drainage in three climates.
    - Recharge and discharge with 1 m deep drains in three climates.
    - Recharge and discharge with 2 m deep drains in three climates
    - Recharge and discharge with 1 m deep drain and 10 ML/ha-annum irrigation in three climates.
    - Recharge and discharge with 2 m deep drains and 10 ML/ha-annum irrigation in three climates

- Recharge and discharge with 1 m deep drain and 16 ML/ha-annum irrigation in three climates.
- Recharge and discharge with 2 m deep drains and 16 ML/ha-annum irrigation in three climates

- **Comparison of overland flow in different scenarios as described below (CHAPTER 7):**
  - Overland flow without irrigation and drainage in three climates.
  - Overland flow with 1 m deep drains in three climates.
  - Overland flow with 2 m deep drains in three climates
  - Overland flow with 1 m deep drain and 10 ML/ha-annum irrigation in three climates.
  - Overland flow with 2 m deep drains and 10 ML/ha-annum irrigation in three climates
  - Overland flow with 1 m deep drain and 16 ML/ha-annum irrigation in three climates.
  - Overland flow with 2 m deep drains and 16 ML/ha-annum irrigation in three climates

The effectiveness of drains with different irrigation rates will be evaluated by following the above mentioned procedure. For this purpose the twenty seven scenarios will be compared with each other according to the sequence defined above.

The results of each scenario's simulation will be extracted from Appendix 1 to 5 and plotted in the figures against each other and the results will be discussed with the help of tables. The following section compares the water table depths in different scenarios:

5.3 WATER TABLE DEPTH WITHOUT IRRIGATION AND DRAINAGE IN THREE CLIMATES

The depth of water table is most significant indication of the land health. If water table is close to the surface, the land would become waterlogged and salinity will start to develop in the upper unsaturated zone. To compare the impact of drains on water table we will compare the scenarios SW-D0-I0, SA-D0-I0 and SD-D0-I0 with each other to see how water table would fluctuate without irrigation and drainage in this section.

The results of simulations produced by MIKE SHE for scenarios SW-D0-I0, SA-D0-I0 and SD-D0-I0 were used as base line because no drainage and irrigation applications were intervened during these scenarios simulation. The results of simulations for water table depth for scenario SW-D0-I0, SA-D0-I0 and SD-D0-I0 were extracted from Appendix 1 and compared with each other in Figure 5.1.

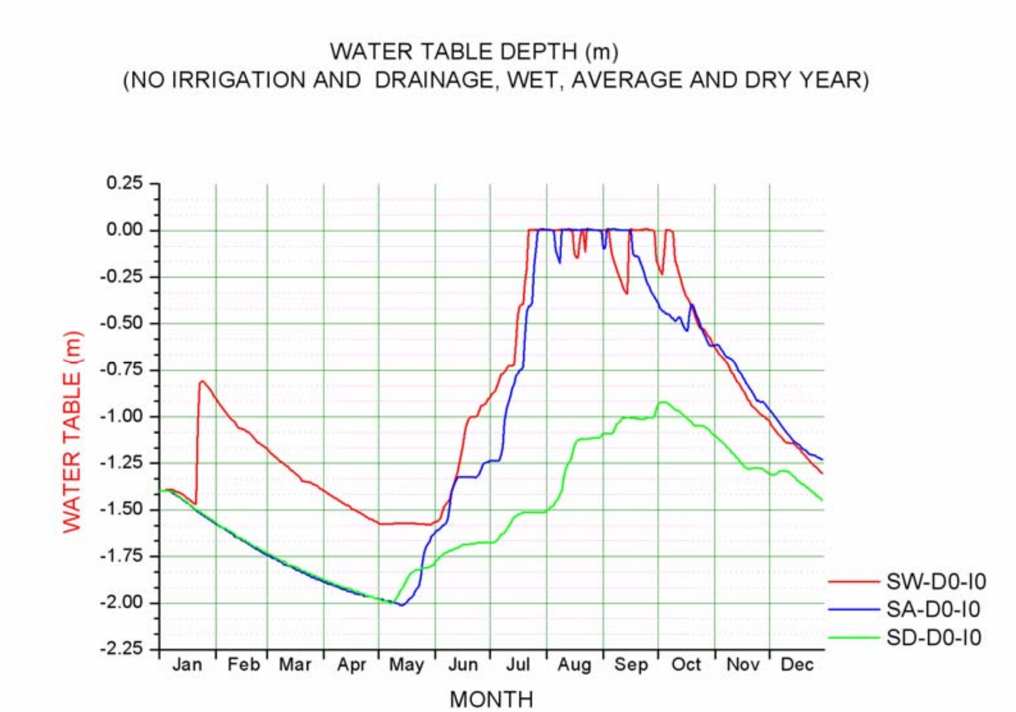

Figure 5.1: Water Table Depth during Wet, Average and Dry Climates.

Figure 5.1 indicates that water table depth during the wet climate (scenario SW-D0-I0) was close to the ground level on 20th of July, during winter rainfall season. In average climate (scenario SA-D0-I0) there was about 5 days delay in the water table level to reach the ground surface as compare to the wet climate. It is important to note that for scenarios SW-D0-I0, SA-D0-I0 and SD-D0-I0, no irrigation was applied (see Table 5.1) therefore; rainfall was the only factor to recharge the groundwater. The amount of rainfall, its intensity, infiltration rate of soil, overland flow, groundwater inflow and outflow are the main factors which play a role in groundwater recharge. All these parameters except rainfall and potential evapotranspiration were same in scenario SW-D0-I0, SA-D0-I0 and SD-D0-I0.

Figure 5.2 and 5.3 shows the rainfall and potential evapotranspiration for wet, average and dry climates. It can be noticed that there was more rainfall and less potential evapotranspiration in winter season. Therefore, in winter, crops will not be using enough water and as a result most of the rainfall water would recharge the ground water table. Once the water table reaches the ground surface, any additional water from rainfall starts to pond on the ground surface. When water table is close to the ground surface the land is defined as waterlogged. The duration of waterlogging depends on many factors, the important one are rainfall intensity and duration, potential evapotranspiration by crop, evaporation from ground surface and runoff out of the area.

Figure 5.1 shows that during dry climate (SD-D0-I0) the water table depths was always below the ground surface. The water table stayed at an average depth of 1.75 and 1.35 metres during the summer and winter season in the dry climate. The maximum and minimum water table depths for dry climate were 2.0 and 0.9 metre respectively. This indicates that without drains and irrigation water table was deep enough in dry climate and there was no waterlogging.

The water table depths data from Appendix 1 was analysed for SW-D0-I0, SA-D0-I0 and SD-D0-I0 to estimate the extent of waterlogging. The numbers of days when water table was at the ground surface, 0 to 0.5, between 0.5 and 1.0 and below 1 metre depth were estimated for scenarios SW-D0-I0, SA-D0-I0 and SD-D0-I0 and listed in Table 5.4.

Table 5.4: Extent of Waterlogging without Irrigation and Drainage in three Climates.

SCENARIOS	WATER TABLE DEPTH OUT OF 365 DAYS (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SW-D0-I0	55	44	78	188
SA-D0-I0	43	49	55	218
SD-D0-I0	0	0	19	346

Table 5.4 indicates that the number of days when the water table depth was at ground surface for SW-D0-I0, SA-D0-I0 and SD-D0-I0 was 55, 43 and 0 respectively. This indicates that during wet climate the water table depth was close to the ground surface for almost two months during winter rainy season. During average climate the water table was close to ground surface for one and a half month. If we compare the number

of days when water table depth was between 0 and 0.5 metre depths for wet and average climate, we see a difference of seven days in favour of average climate.

It has been earlier mentioned that rainfall and potential evapotranspiration is the major parameter which were changed during the MIKE SHE model setup for wet, average and dry climate. Therefore, Rainfall intensity duration and pattern during the winter time will have the impact on groundwater recharge. The increase or decrease in water table depth is directly related with recharge or discharge from the unsaturated zone.

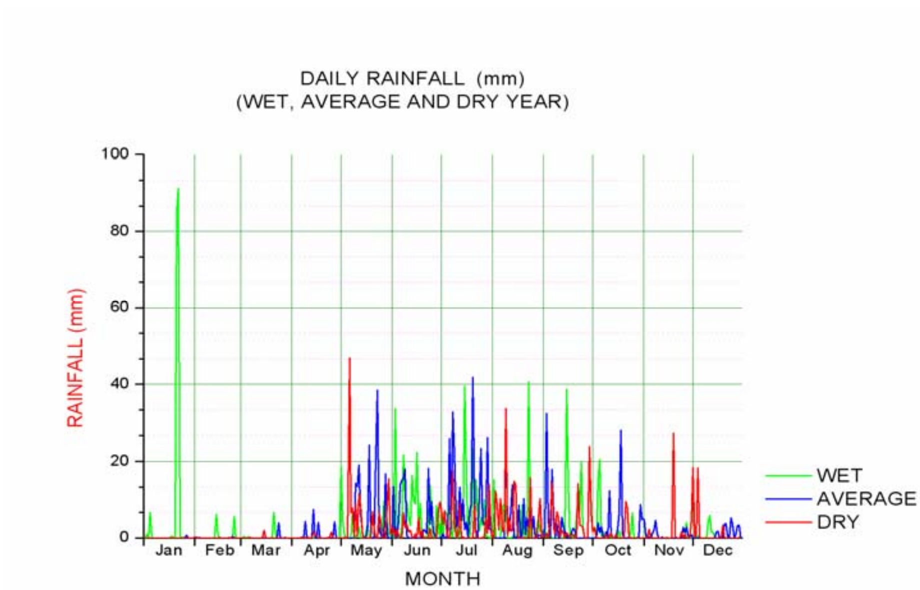

Figure 5.2: Daily Rainfall during Wet, Average and Dry Climate.

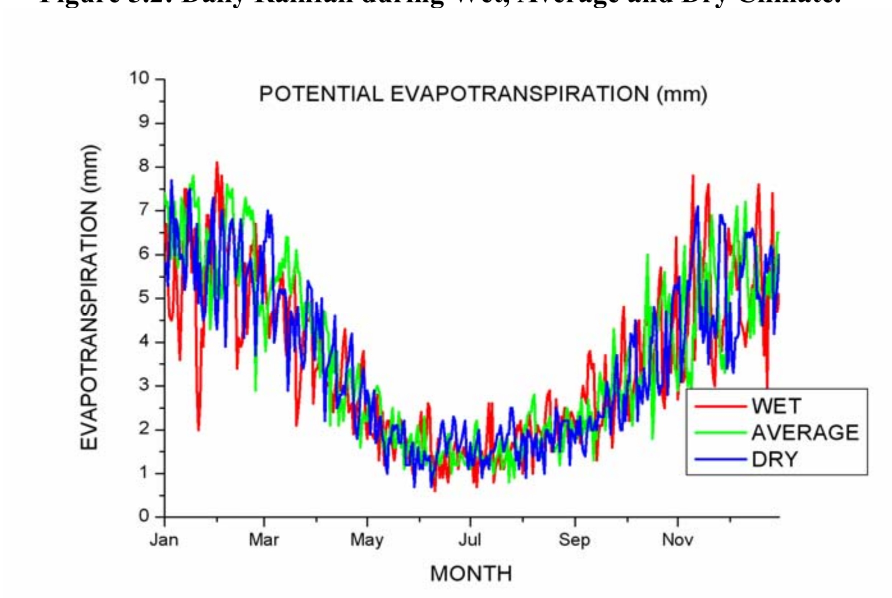

Figure 5.3: Potential Evapotranspiration during Wet, Average and Dry Climate.

Figure 5.2 and 5.3 shows the daily rainfall and potential evapotranspiration pattern during the wet, average and dry climate. Figure 5.2 shows that most of the rainfall came during 1st of May to 30th of October for wet, average and dry climate. The reason for seven days difference between the numbers of day when water table was at 0.5 metre for wet and average year can be explained as follow:

- The study area is close to the coastal plain and groundwater inflow and outflow may be considered at equilibrium. Hence, the influence of groundwater inflow and outflow on water table depth may also be considered negligible. Therefore, it can be inferred that the increase in water table level was directly related to the recharge from the rainfall.
- If we zoom in and plot the rainfall and potential evapotranspiration data for the month of May to September (Figure 5.4 and 5.5), we see that there is nearly same rainfall and potential evapotranspiration during wet and average climate.
- Table 5.5 indicates that the total amount and pattern of rainfall and potential evapotranspiration during May to October (winter season) was nearly same for wet and average climate

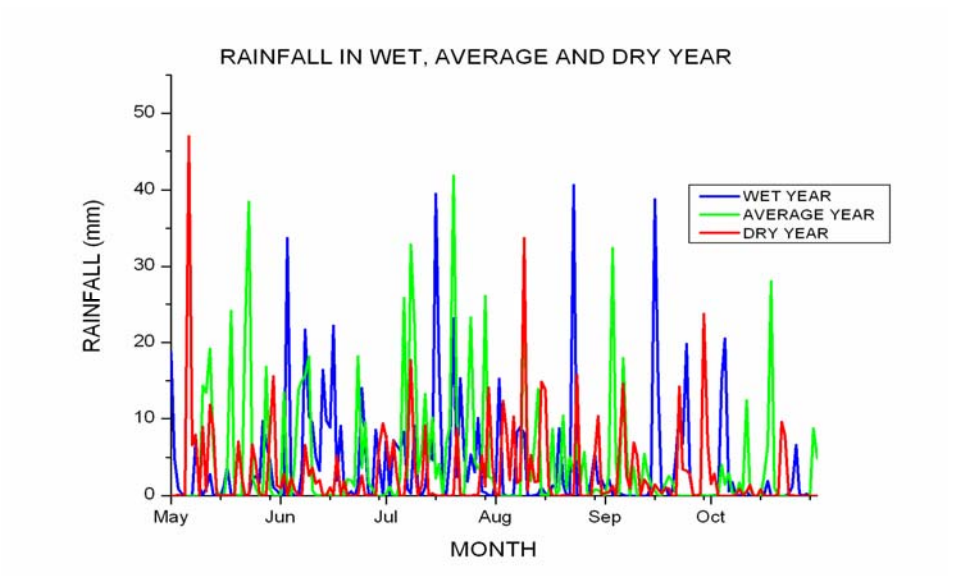

Figure 5.4: Rainfall during May to October in Wet, Average and Dry Climate.

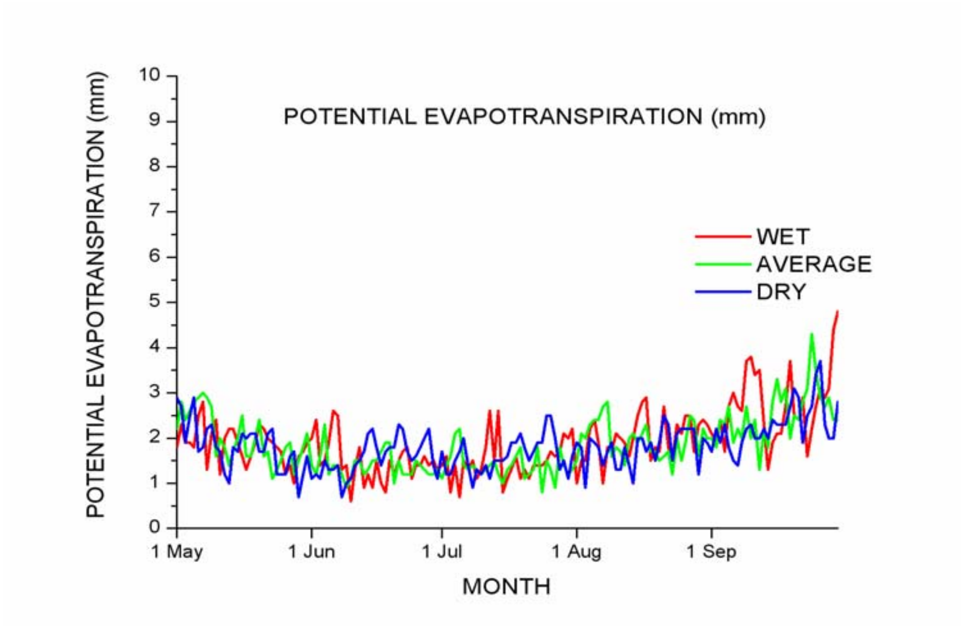

Figure 5.5: Potential Evapotranspiration during May-October for Wet, Average and Dry Climates.

Figure 5.2 shows that there was bout 90 and 0 mm of rainfall in January for wet and average climates respectively. This is the big difference in the rainfall amount during summer times for wet and average climates. Appendix 6 shows the daily rainfall and potential evapotranspiration for wet, average and dry climates. The monthly rainfall, potential evapotranspiration and average water table for wet, average and dry climates are given in Table 5.5.

Table 5.5: Monthly Rainfall, Potential Evapotranspiration and Average Water Table Depths for Wet, Average and Dry Climates without Irrigation and Drainage.

MONTH	POTENTIAL EVAPOTRANSPIRATION (mm)			RAINFALL (mm)			WATER TABLE DEPTH (m)		
	WET	AVERAGE	DRY	WET	AVERAGE	DRY	WET	AVERAGE	DRY
JAN	170	201	186	186	1	0	1.35	1.40	1.40
FEB	165	171	158	13	1	1	1.15	1.65	1.65
MAR	136	161	150	9	4	2	1.28	1.82	1.82
APR	92	96	100	0	21	5	1.45	1.90	1.90

MAY	57	62	57	71	163	138	1.56	1.86	1.82
JUN	44	42	47	193	122	50	1.38	1.41	1.72
JUL	46	43	50	188	275	92	1.15	1.16	1.54
AUG	62	61	55	109	99	142	0.24	0.26	1.24
SEP	82	76	69	106	84	100	0.12	0.12	1.05
OCT	120	118	112	49	76	26	0.15	0.26	0.98
NOV	142	139	154	8	24	38	0.74	0.76	1.23
DEC	166	172	164	15	27	42	1.13	1.14	1.45

Table 5.5 gives in detail the distribution of water table depth during each month for wet average and dry climates without drains. The depth of water table is considered an indication of waterlogging for the agricultural land. If the depth is close to the ground surface, the potential of waterlogging and salinity is higher. The salinity risk will increase if the quality of the irrigation and/or groundwater is saline. When water table comes close to the ground surface, it mobilise salt into the unsaturated zone. The water is transpired and/or evaporates from the unsaturated zone leaving salt behind. The fluctuation of water table results in the increased concentration of the salt in the unsaturated zone. The unsaturated zone is the best host of the crops roots, if the health of this zone is not good, the crop productivity of the agricultural land will reduce. The combination of waterlogging and salinity may become more dangerous for agricultural land productivity.

5.4 WATER TABLE DEPTH WITH 1 M DEEP DRAIN WITHOUT IRRIGATION

In this section the impact of 1 m deep drains on water table depths without irrigation in three climates will be discussed.

5.4.1 Wet Climate

The impact of drains on agricultural land productivity was analysed by extracting the water table depth outputs generated by MIKE SHE for the scenarios SW-D1-I0, SA-D1-I0 and SD-D1-I0 from Appendix 1. In the simulations of these scenarios, 1 m deep drains were introduced. All parameters like rainfall, evapotranspiration, soil hydraulic conductivities, topography, soil physical properties, land use, and crops parameters were kept same as for un-drained scenario.

Figures 5.6 compare the water table depths with and without 1 m deep drains in wet climate.

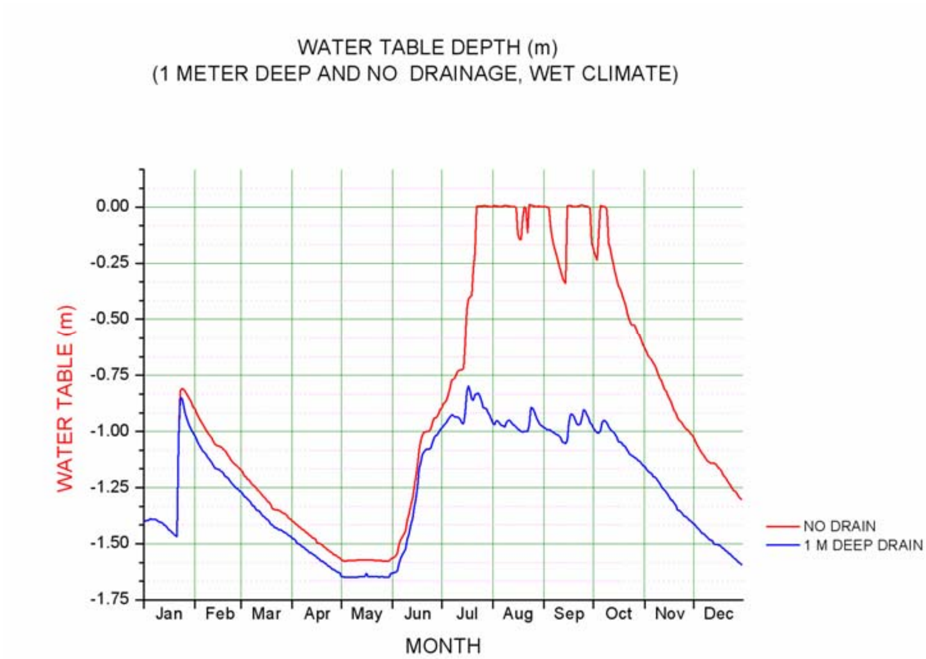

Figure 5.6: Water Table Depths with and without 1 m Deep Drains, no Irrigation in Wet Climate.

Figure 5.6 shows that depth of water table with 1 m deep drains scenario was always lower than the un-drained scenario. Specifically in winter season the water table was on ground surface in un-drained scenario. With 1 m deep drains the water table dropped at an average depth of about 0.85 metre. Table 5.6 shows the extent of water logging with and without 1 m deep drains in wet climate.

Table 5.6: Extent of Waterlogging with and without 1 m deep drains in Wet Climate.

SCENARIOS	WATER TABLE DEPTH OUT OF 365 DAYS (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SW-D0-I0	63	44	78	188
SW-D1-I0	0	0	102	263

From Table 5.6 it can be concluded that extent of waterlogging was nearly negligible with the introduction of 1 m deep drains in wet climate. The water table was always more than 0.5 metre deep in 1 m deep drain scenario. The waterlogging will occurs if water table depth is less than 0.5 metre deep. The extent of waterlogging was at least 107 days more in case of un-drained scenario as compare to 1 m deep scenarios.

5.4.1.1 Impact of one metre Deep Drains in Wet Climate

- The average water table depth with 1 m deep scenario was always lower than un-drained scenario.
- The depth of water table during summer season with 1 m deep drains was 1.75m from ground surface.
- The depth of water table during winter season with 1 m deep drains was 0.8 m from ground surface.
- The extent of water logging was 107 days less with 1 m deep drains.

5.4.2 Average Climate

Figure 5.7 shows the water table depth with 1 m deep drains in average climate. The water table depth was same with and without 1 m deep drain in summer season from 1st of Jan to 15th of Jun. The water table rose sharply after 15th of Jun in case of un-drained scenario. With 1 m deep drains it rose about 0.25m and was still below the ground surface at a depth of 0.75m. The depth of water table was varying from 0.75 to 1.0 m in winter season with 1 m deep drains. Table 5.7 shows the extent of waterlogging with and without 1 m drains in average climate.

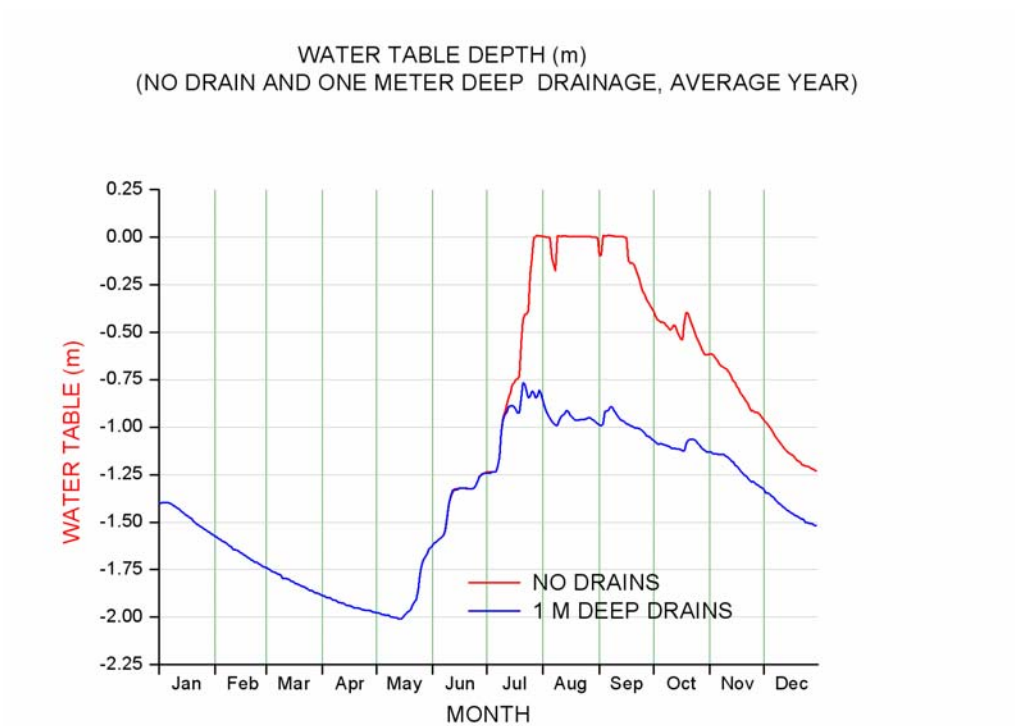

Figure 5.7: Water Table Depths with and without 1 m Deep Drains and no Irrigation in Average Climate.

Table 5.7: Extent of Waterlogging with and without 1 m deep drains in Average Climate.

SCENARIOS	WATER TABLE DEPTH OUT OF 365 DAYS (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SA-D0-I0	43	49	55	218
SA-D1-I0	0	0	71	294

Table 5.7 reveals that water table depth with 1 m deep drains in average climate was more than 1 m deep for 294 days. The explanation for deeper water table in average climate is the distribution of rainfall. Figure 5.2 and Table 5.5 showed the daily rainfall for average climate was 1, 1, 4 and 21 mm for the month of Jan, Feb, Mar and April respectively. There was less rainfall during these months, therefore, there was no recharge in to the groundwater table and because of high evapotranspiration there was more discharge. Similarly, there was less rainfall in winter season during average climate as compare to wet climate which resulted in less recharge and as a result deeper water table.

5.4.2.1 Impacts of one metre Deep Drains in Average Climate

- The water table was deeper with 1 m deep drains in average climate as compare to wet climate.
- The extent of water logging was negligible with 1 m deep drains.
- There was less rainfall during summer season in average climate which resulted in less recharge.
- The water table depth with and without 1 m deep drains was same during the summer season in average climate.
- In winter season, 1 m deep drains kept water table at a depth of 0.75 m from ground surface.

5.4.3 Dry climate

Figure 5.7 show the water table depth with and without 1 m deep drains in dry climate. The water table depth was nearly same with and without 1 m deep drain during the dry climate. Table 5.8 shows the extent of waterlogging with and without 1 m deep drains in dry climate.

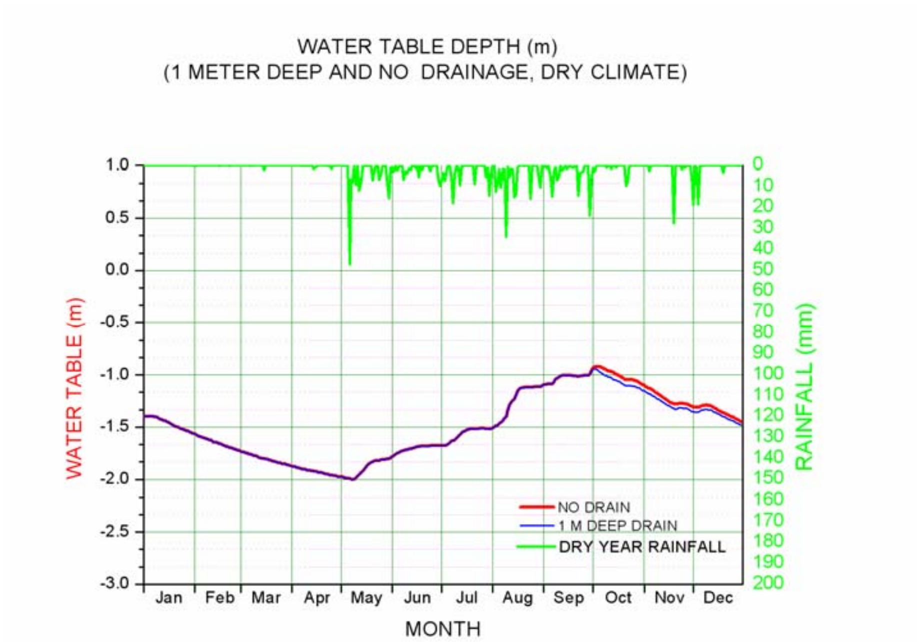

Figure 5.8: Water Table Depths with and without 1 m Deep Drains and no Irrigation in Dry Climate.

Table 5.8: Water Table Depth with and without 1 m Deep Drains in Dry Climate.

SCENARIOS	WATER TABLE DEPTH OUT OF 365 DAYS (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SD-D0-I0	0	0	19	346
SD-D1-I0	0	0	9	356

5.4.3.1 Impacts of one metre Deep drains in Dry Climate

- In dry climate 1 m deep drains were ineffective. The recharge from the rainfall during summer and winter season was not creating the problem of waterlogging.
- The water table depth with and without 1 m deep drains was about 1 m deep during winter time.
- There was absolutely no waterlogging throughout the year in dry climate.

5.5 WATER TABLE DEPTH WITH 2 M DEEP DRAINS AND NO IRRIGATION

Most of the farmers have 1 m deep drains in the SWIA. Few farmers have 2 m deep drains in the study area. Therefore, in this section the impact of 2 m deep drains on controlling water table depth would be discussed in wet and average climate.

5.5.1 Wet climate

The impact of one and 2 m deep drain to control waterlogging and associated salinity was evaluated by comparing the SW-D1-I0 with SW-D2-I0 in Figure 5.9.

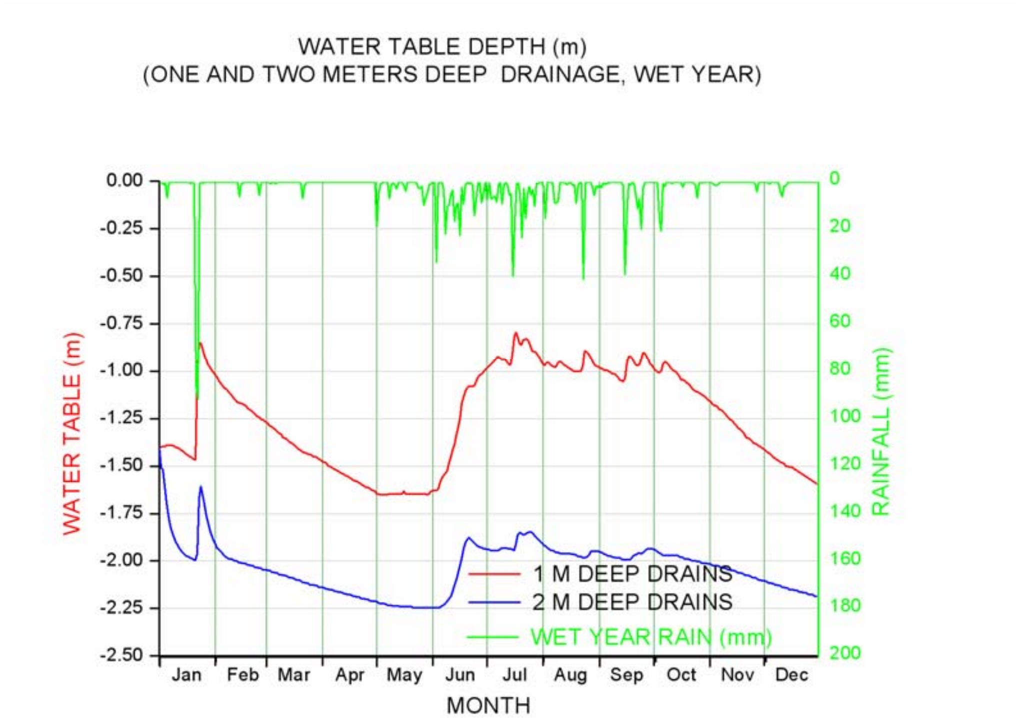

Figure 5.9: Water Table Depths with 1 and 2 m Deep Drains and no Irrigation in Wet Climate.

Figure 5.9 shows that the water table depth was deeper with 2 m deep drains as compare to 1 m deep drains. The maximum depth of water table during summer season with 2 m deep drain was about 2.25. In winter season there was an increase of about 0.4 m in water table depth. Its mean the water table was closer to ground surface during winter time as compare to summer time with 1 and 2 m deep drains. Whereas, without 1 and 2 m deep drains water table was at ground surface during winter season.

The 2 m deep drains were removing more water as compare to 1 m deep drains from the saturated zone. Therefore, there was more recharge into the groundwater table with 1 m deep drains as compare to 2 m deep drains. It should be kept in mind that there was no irrigation applied in the simulation of these scenarios. Therefore, the water table was deep with 2 m deep drains. This might effect on land productivity as crops were have less opportunity to use the water stored by rainfall into the saturated and unsaturated zone. Two metres deep drains were discharging and removing this water from saturated and unsaturated zones.

Table 5.9: Water Table Depth with 1 and 2 m Deep Drains in Wet Climate.

SCENARIOS	TOTAL NO. 0F DAYS WATER TABLE DEPTH (m)			
	0	**0.5 < 0**	**1.0 < 0.5**	**≥ 1**
SW-D1-I0	0	0	102	263
SW-D2-I0	0	0	0	365

Table 5.9 shows that the water table was always deeper than 1 with 2 m deep drains in wet climate. The water table depth with 1 m deep drain was between 0.5 to 1 m for 102 day. This shows that 2 m deep drain were more effective in removing water from groundwater table. As a result water table was deeper with 2 m deep drains as compare to 1 m deep drains.

5.5.1.1 Impacts of two metre Deep Drains in Wet Climate

- Figure 5.9 and Table 5.9 revealed that with the 2 m deep drain the water table depth was deeper than 1 m throughout the year in wet climate.
- Two metres deep drains are not suitable for non-irrigated agricultural land under the similar hydrological and land use parameters as in the study area.
- Excessive drain flow was resulted with 2 m deep drain and the moisture contents in unsaturated zone were very low. Therefore, the availability of water to the crop was affected. This will result in poor crop productivity.
- The water table was always deeper than 1.5 m in wet climate during winter season.

5.5.2 Average climate

Figure 5.10 shows the water table depth simulated with and without 2 m deep drain in average climate. The major difference in water table depths with 2 m deep drains in average and wet climate was seen in summer season. In wet and average climate the water table depth on 18th of January was 1.7 and 2.1m respectively. This difference was due to the recharge from the 90mm thunder storm in wet climate on 17th of January.

This heavy rainfall recharged water table and the depth of water table was closer to the ground surface in wet climate as compare to average climate with 2 m deep drains.

In winter season during average climate 2 m deep drains were effectively discharging the rainfall water. Therefore, the water table rose by 0.35 m during winter season as compare to the summer season with 2 m deep drains. The water table depth during winter season with 2 m deep drains was always more than 1.61 m.

Table 5.10 shows the extent of waterlogging with one and 2 m deep drains in average climate.

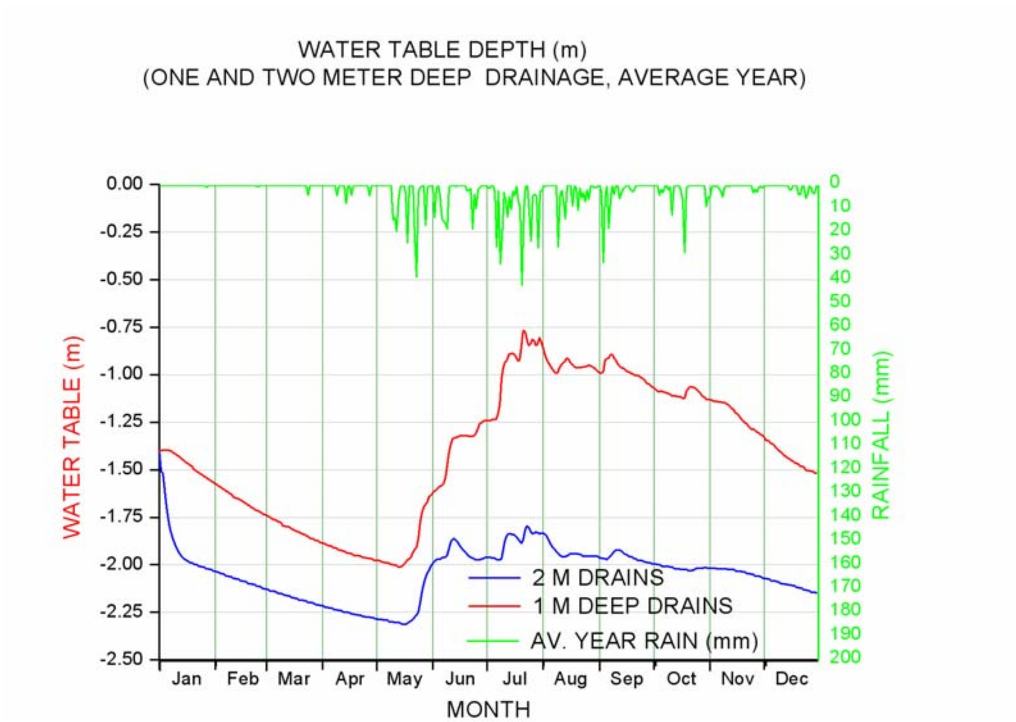

Figure 5.10: Water Table Depths with 1 and 2 m Deep Drains and no Irrigation in Average Climate.

Table 5.10: Water Table Depth with 1 and 2 m Deep Drains in Average Climate.

SCENARIOS	WATER TABLE DEPTH OUT OF 365 DAYS (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SA-D1-I0	0	0	71	294
SA-D2-I0	0	0	0	365

Table 5.10 compares the water table depth with 1 and 2 m deep drains in average climate. With 1 m deep drain the water table was between 0.5 and 1 m deep for 71 days.

With 2 m deep drains the depth of water table was more than 1 m throughout the year in average climate.

The minimum depth of water table during winter season in wet and average climate was 1.50 and 1.61 m respectively with 2 m deep drains (Appendix 1). This shows that the water table was deeper in average climate as compare to wet climate with 2 m deep drains. In other words water table was closer to the ground surface in wet climate as compare to average climate with 2 m deep drains. This can be explained from Table 5.5 and Figure 5.2. Table 5.5 and Figure 5.2 show that there was more rainfall during wet climate as compare to the average climate. Therefore, more water was recharging to groundwater table in wet climate as compare to average climate. This had resulted in shallower water table in wet climate as compare to average climate in winter seasons.

5.5.2.1 Impacts of two metre Deep Drains in Average Climate

- Two metres deep drains discharged more water than the 1 m deep drains in average climate.
- Two metres deep drains discharged less water in average climate as compare to the wet climate.
- No waterlogging was observed with 2 m deep drain during winter season.
- The water table was always deeper than 1.61 metre in average climate with 2 m deep drains.

5.5.3 Dry climate

Figure 5.11 shows that the maximum water table depths during summer season for 1 and 2 m deep drain is shown as 2.0 and 2.25 metres respectively. During winter rainfall the maximum water table depth for scenario (SD-D1-I0) and (SD-D2-I0) was 0.95 and 1.8 metres respectively. This reveals that 1 and 2 m deep drains were effective in lowering the water table during winter rainfall. There was no waterlogging observed as water table were deep enough during the summer and winter seasons. The 2 m deep drains in dry climate lowered the groundwater table up to 2.25 metres. This would have created the less moisture in the unsaturated zone. Therefore, crop productivity would have been affected negatively in the presence of 2 m deep drains.

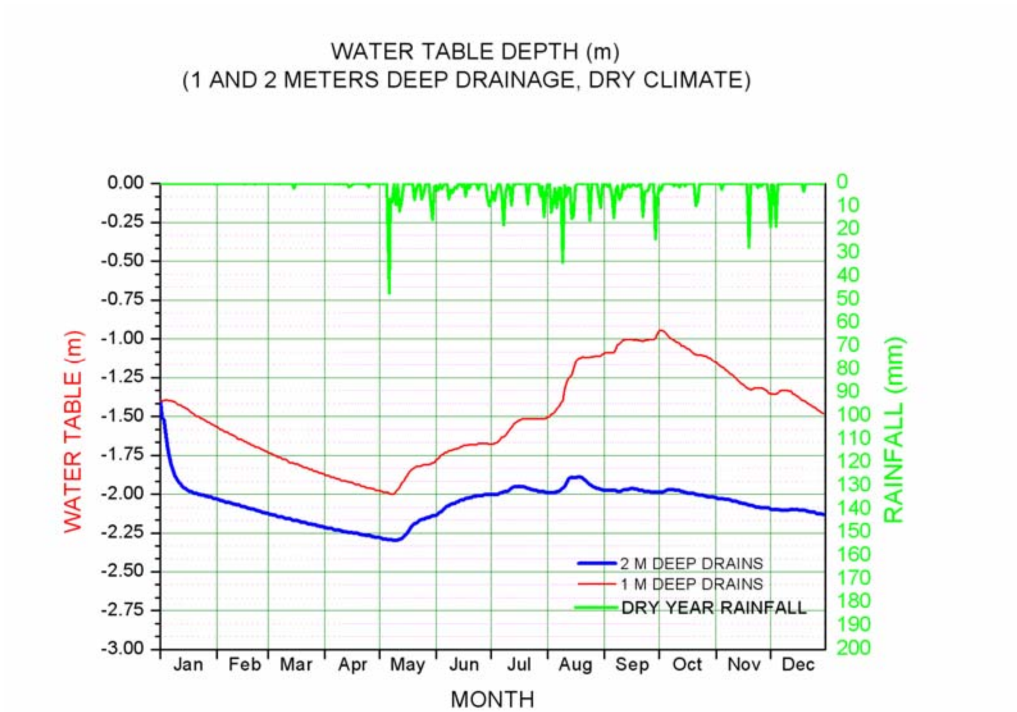

Figure 5.11: Water Table Depths with 1 and 2 m Deep Drains and no Irrigation in Dry Climate.

Table 5.11 shows the extent of waterlogging with 1 and 2 m deep drains in dry climate. It shows that there was no waterlogging with 1 m deep drains in dry climate. Therefore, 2 m deep drains are not required for the dry climate with similar hydrological and land use parameters as in the study area. It should be noticed that the initial ground water level for dry climate was 1.5 m deep. Therefore, the recharge from dry climate rainfall was not raising the groundwater table. In addition to this the groundwater inflow was also negligible for this particular condition.

In wheat belt agricultural catchment the water table is near to the ground surface in valley floors. There is also groundwater and subsurface water inflow due to the topographic effect into the valley floors. In these particular conditions 1 and 2 m deep drains may discharge subsurface and ground water effectively even in dry climate from the valley floors. Therefore, it is strongly emphasized that the conclusion drawn from this study are site specific and can't be used in other sites with different set of boundary and initial conditions.

Table 5.11: Water Table Depth with and without 1 m Deep Drains in Dry Climate.

SCENARIOS	TOTAL NO. 0F DAYS WATER TABLE DEPTH (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SD-D1-I0	0	0	9	346
SD-D2-I0	0	0	0	356

5.5.3.1 Impacts of two metre deep Drains in Dry Climate

- Two metre deep drains are not required for this particular environment.
- They excessively discharge the rainfall water and crops were not able to use it.
- The crop productivity will reduce in the presence of 2 m deep drains in this particular environment.

5.7 WATER TABLE DEPTH WITH DRAINS AND IRRIGATION IN THREE CLIMATES

In previous section the drains performance was analysed without irrigation in wet, average and dry climate. In this section, the irrigation water would be applied with two different rates during summer season of wet, average and dry climates. The 10 and 16 ML/ha-annum irrigation was divided into twenty equal parts. For 10 and 16 ML/ha-annum 50 and 80 mm per day irrigation was applied after a fortnight during summer season. Appendix 6 shows the distribution and application dates for 10 and 16 ML/ha-annum irrigations for wet, average and dry climates.

5.7.1 Water Table Depth with 10 ML/ha-annum Irrigation

There is an urgent need to understand that how engineering interventions in term of drainage and irrigation can help in improving the use of the limited agricultural land and water resources. Sprinkler and drip irrigation, dams, bank, evaporation pond, siphon and vertical drainage may also help to improve the use of land and water resources. It is out of the scope of this study to investigate the role of all engineering interventions in improving the use of agricultural land and water resources. The main focus of this study is to gain understanding about the role of drains and irrigation application rates in wet and average climates to improve the use of agricultural land and water resources.

The role of drains in dry climate is not significant and has been discussed in detail in previous sections. Therefore, this section will discuss the role of 1 and 2 m deep drains scenarios when 10 ML/ha-annum irrigation were applied in wet and average climate.

The main cause of waterlogging is due to the over irrigation and/or poor drainage in the SWIA. Most of the farmers in Southwest Irrigation Areas (SWIA) apply irrigation to the pasture at a rate of 10 ML/ha-annum. The impact of this irrigation on water table depth with and without 1 m deep drain is shown Figure 12. These results have been plotted from the outputs of MIKE SHE simulation of Scenario SW-D0-I10 against SW-D1-I10 in which 10 ML/ha-annum irrigation was applied. For un-drained scenario SW-D0-I10, it can be seen from Figure 12 that water table was at an average depth of about 0.48 metre during summer season and very close to ground surface during winter rainfall seasons. This indicates that nearly for half of the year there would be no aeration into the root zone and the production of the crop would be severely affected. If the ground water quality is saline, then the impact of high water table would be more adverse on agricultural land productivity.

5.7.1.1 One metre Deep Drains in Wet Climate:

In Scenario SW-D1-I10 1 m deep drains were introduced and simulated by using calibrated MIKE SHE. During the simulation of scenario SW-D1-I10 and SW-D1-I0, all parameters except the irrigation were same. Fig 12 shows the comparison between the water table depths for the un-drained and 1 m deep drained scenarios SW-D0-I10 and SW-D1-I10. For the 1 m deep drained scenario, it can be noticed that the average depth of water table during summer and winter seasons were 1.1 and 0.8 metre respectively. The average increase in water table depth during winter rainfall was 0.3 metre with 1 m deep drained scenario.

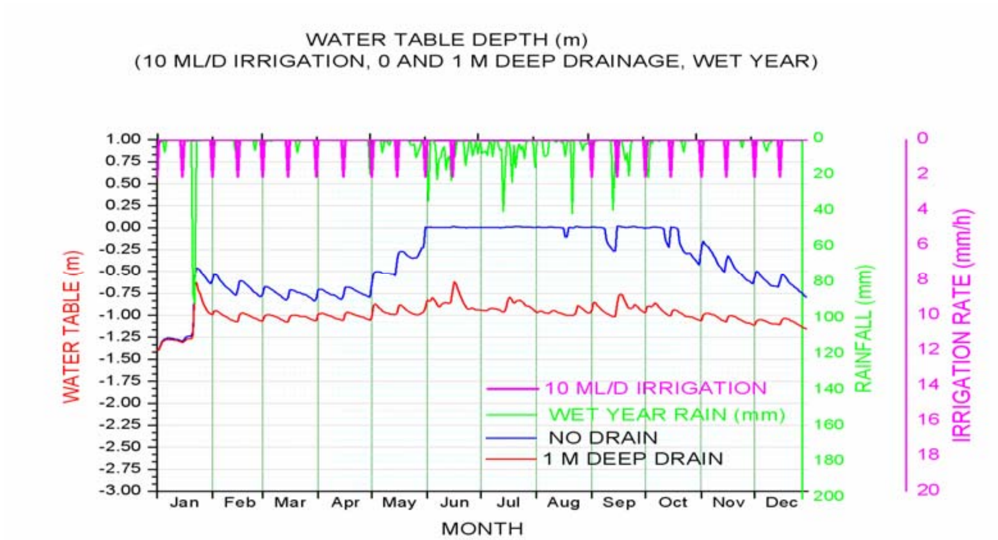

Figure: 5.12: Water Table Depths with and without 1 m Deep Drains and 10 ML/ha-annum Irrigation in Wet Climate.

Table 5.12 show the extent f water logging with and without 1 m deep rains with 10 ML/ha-annum irrigation in wet climate. The water table was at ground surface for 101 days without 1 m deep drains after applying 10 ML/ha-annum irrigation. When 1 m deep drains were installed the depth of water table was always deeper than 0.5 m. The water table stayed between 0.5 and 1.0 metre for 217 days with 1 m deep drains. This is ideal water table depth for the crops roots to use water as sub-surface irrigation. The only concern is the quality of irrigation and groundwater. In SWIA the irrigation water is delivered from Harvey Dam. The quality of this water is excellent (less than 200 ppm). The groundwater quality in the Harvey catchment is also better than the Collie catchment. Therefore, it can be concluded that water quality will not be issue in the study area.

Table 5.12: Water Table Depth with and without 1 m Deep Drains in Wet Climate with 10 ML/ha-annum Irrigation.

SCENARIOS	TOTAL NO. 0F DAYS WATER TABLE DEPTH (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SW-D0-I10	101	92	151	21
SW-D1-I10	0	0	217	148

5.7.1.2 Impacts of Drains with 10 ML/ha-annum Irrigation

- Without on metre deep drains there was sever waterlogging with 10 ML/ha-annum irrigation.

- One metre deep drains were very effective in controlling waterlogging.
- Water table stayed at an ideal depth for sub-surface irrigation for more than seven months during wet climate with 10 ML/ha-annum irrigation.
- Water table never reached to the ground surface with 1 m deep drains.
- Water table was deeper than 1 m only during the summer season with 1 m deep drains.

5.7.2 One metre Deep Drains in Average Climate

Figure 5.13 shows the water table depth with and without 1 m deep drains in average climate with 10 ML/ha-annum irrigation. It can be noticed that the water table was fluctuating with the application of irrigation. This fluctuation was due to the recharge from the irrigation water into the water table. The water table depth was nearly same till 15th March with and without 1 m deep drain. After 15th of March water table was sharply rose and reached at ground surface on 31st of May. In case of 1 m deep drained it was 0.8 m deep on 31st of May. This indicates that 1 m deep drained controlled water table effectively.

Water table stayed at ground surface for most of the winter season with 10 ML/ha-annum irrigation. The reason for this was more recharge from irrigation water but less discharge in the absence of 1 m deep drains. When 1 m deep drains were installed, they discharged the excessive recharge from the groundwater table. Hence, the water table didn't rise as sharply as in case of un-drained scenario.

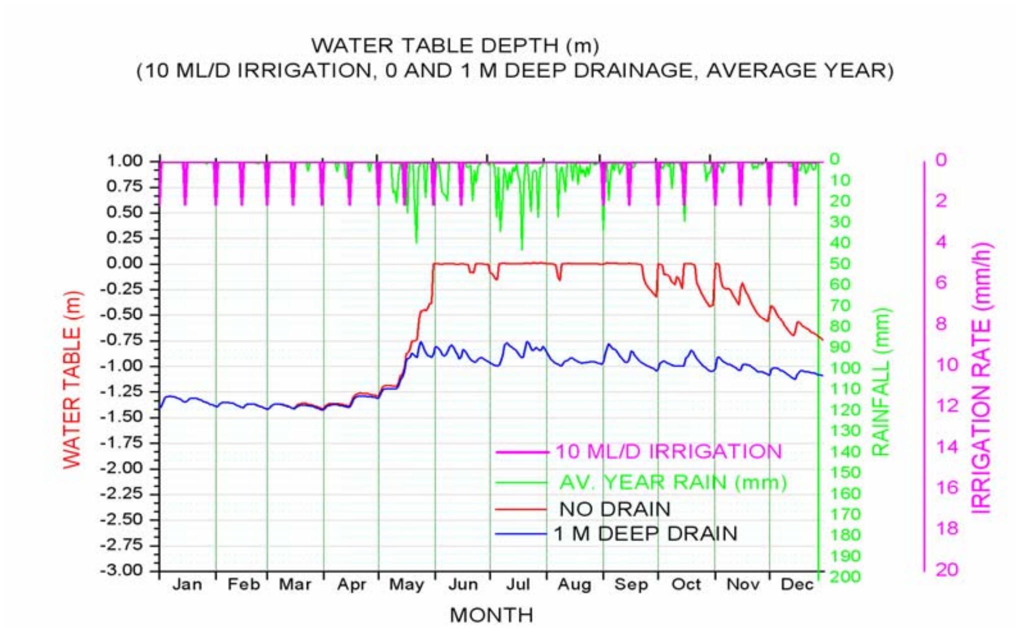

Figure: 5.13: Water Table Depths with and without 1 m Deep drains and 10 ML/ha-annum Irrigation in Average Climate.

Table 5.13 shows the extent of waterlogging with and without 1 m deep drains for average climate.

Table 5.13: Water Table Depth with and without 1 m Deep Drains in Wet Climate with 10 ML/ha-annum Irrigation.

SCENARIOS	TOTAL NO. 0F DAYS WATER TABLE DEPTH (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SA-D0-I10	87	103	40	135
SA-D1-I10	0	0	173	192

Table 5.13 reveals that the water table was at ground surface for 87 days without 1 m deep drains. When 1 m deep drains were installed the water table never reached to the ground surface. Water table stayed more than 1 m depth for 192 days with 1 m deep drains. It was at an ideal depth range of 0.5 to 1.0 metre for about six months. This depth range is ideal because crops roots can use water stored in saturated and unsaturated zone as sub-surface irrigation. It will improve crop productivity.

5.7.2.1 Impacts of one metre Deep Drain in Wet Climate

- Without on metre deep drains there was sever waterlogging with 10 ML/ha-annum irrigation in average climate.
- One metre deep drains were very effective in controlling waterlogging in average climate.
- Water table stayed at an ideal depth for sub-surface irrigation for more than seven months during wet climate with 10 ML/ha-annum irrigation.
- Water table never reached to the ground surface with 1 m deep drains.

5.7.3 Two metres Deep Drains in Wet Climate

Scenario SW-D2-I10 was simulated by implementing 2 m deep drains and 10 ML/ha-annum irrigation application. The simulation results generated by MIKE SHE have been plotted in Figure 5.14. Figure 5.14 compare the water table depth with and without 2 m deep drains. Figure 5.15 compares the water table depths with 1 and 2 m deep drains. The comparison of water table depths with and without 2 m deep drains shows that there was a significant impact of drains on water table depths though out the year. The average water table depths with 2 m deep drain during summer and winter seasons were 2.05 and 2.15 metres respectively. The maximum heights of water table during summer and winter time with 2 m deep drains were 1.5 and 1.65 metres respectively. This indicates that the water table was comparatively deeper than the root zone of the clover pasture. The implication of deeper water table will be on the moisture availability in the unsaturated zone. The root zone is usually located in the unsaturated zone of the soil.

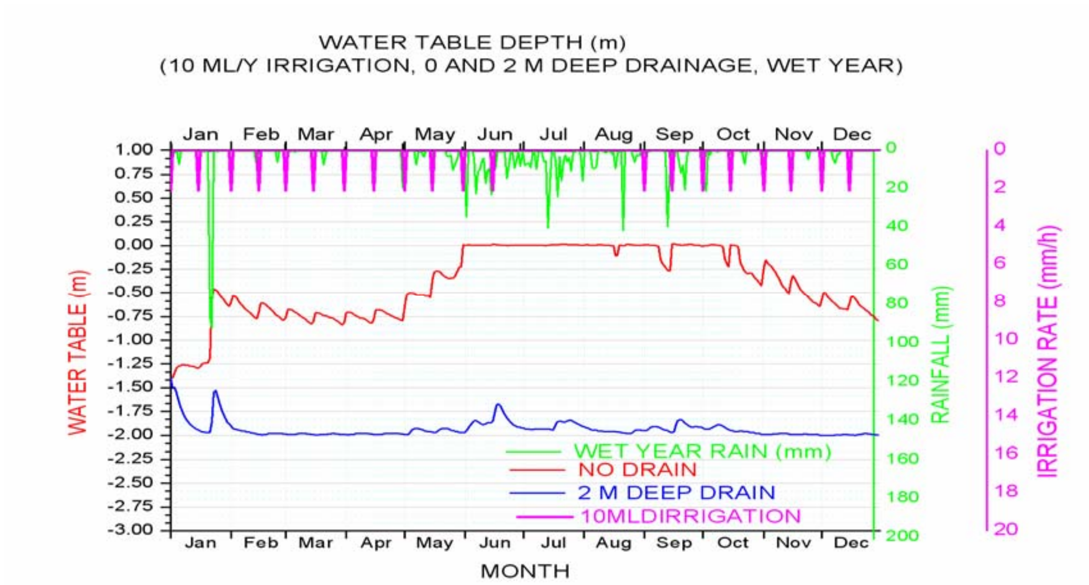

Figure: 5.14: Water Table Depths with and without 2 m Deep drains and 10 ML/ha-annum Irrigation in Wet Climate.

Figure 5.14 shows the water table depths with and without 2 m deep drains in wet climate. The minimum and maximum water table depth with 2 m deep drains was 1.49 and 2.01 m (Appendix 1). The waterlogging extent is shown in Table 5.14 with and without 2 m deep drains.

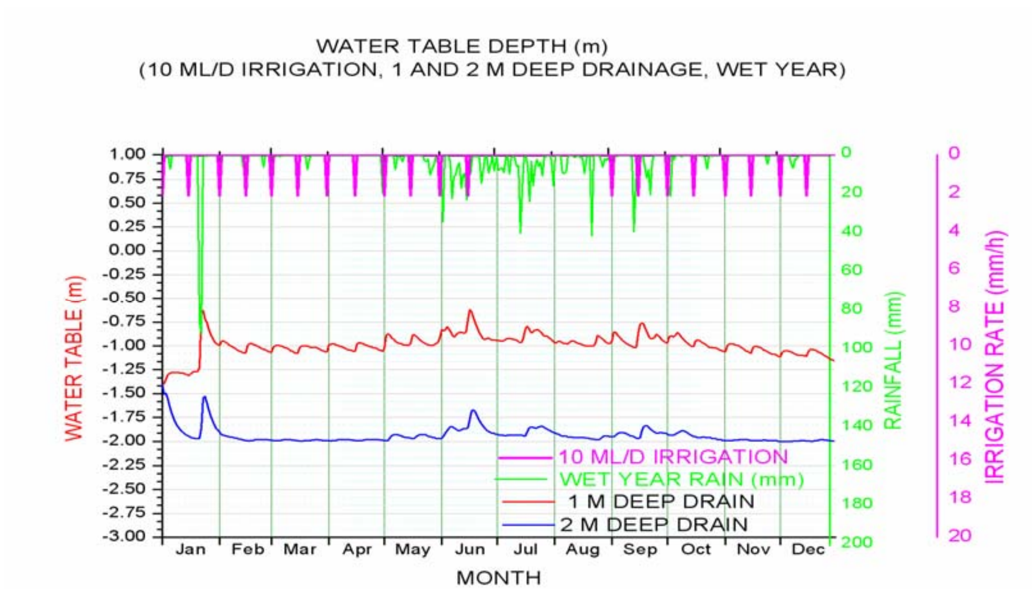

Figure: 5.15: Water Table Depths with 1 and 2 m Deep drains and 10 ML/ha-annum Irrigation in Wet Climate.

Table 5.14: Water Table Depth with and without 2 m Deep Drains in Wet Climate with 10 ML/ha-annum Irrigation.

SCENARIOS	TOTAL NO. 0F DAYS WATER TABLE DEPTH (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SW-D0-I10	101	92	151	21
SW-D2-I10	0	0	0	365

Table 5.14 shows that the water table depth with 2 m deep drains was always greater than 2 m. Therefore, it can be concluded that 2 m deep drains were not suitable for average climate. It has been already discussed the consequences of excessive drainage on crop productivity.

5.7.3.1 Impacts of 2 m Deep Drains in Wet Climate

- Two metres deep drains excessively discharged water from the saturated and unsaturated zones.
- The crop productivity would have been affected negatively.

5.7.4 Two metres Deep Drains in Average Climate

Scenario SA-D2-I10 was simulated by implementing 2 m deep drains. The simulation results generated by MIKE SHE have been plotted in Figure 5.16. The comparison of water table depths with and without 2 m deep drains shows that there was a significant impact of 2 m deep drains on water table depths though out the year. The average water table depths with 2 m deep drain during summer and winter seasons were 1.95 and 1.9 metres respectively. The maximum depths of water table during summer and winter time with 2 m deep drains were 1.9 and 1.82 metres respectively.

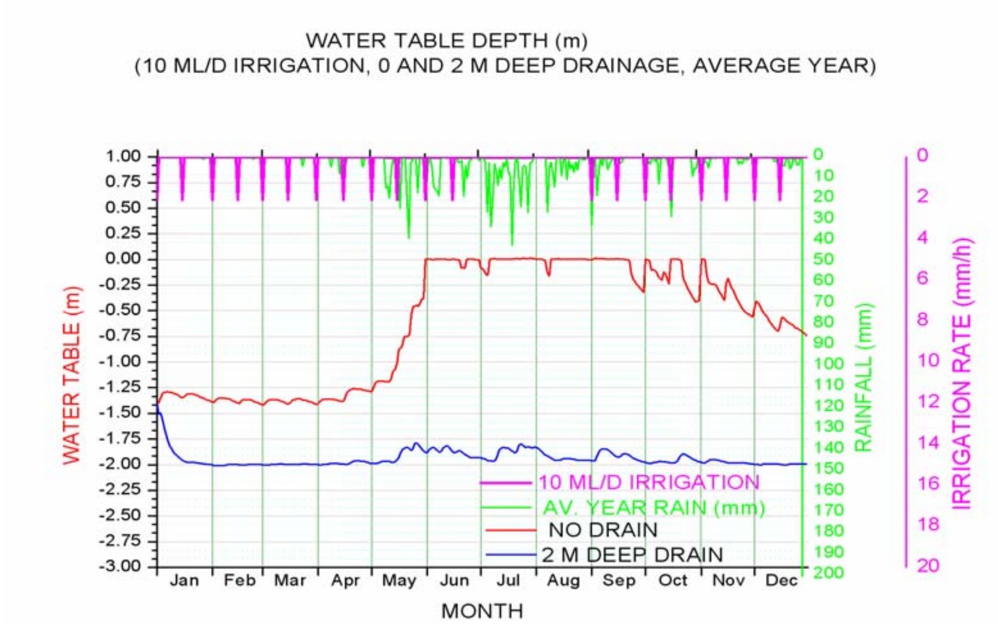

Figure: 5.16: Water Table Depths with and without 2 m Deep drains and 10 ML/ha-annum Irrigation in Average Climate.

5.7.5 Water Table Depth with 16 ML/Y per Hectare Irrigation

Few farmers in Southwest Irrigation Areas (SWIA) apply irrigation to the pasture at a rate of 16 ML/ha-annum. The impact of this irrigation with and without 1 and 2 m deep drains was simulated for wet and average climate.

5.7.5.1 One and 2 m Deep Drain Wet Climate

Scenario SW-D1-I16 was simulated by applying 16 ML/ha-annum irrigation. Figure 5.17 indicates that the depth of the water table was almost near to the ground level in case of scenario SD-D0-I16. In Scenario SW-D1-I16, 1 m deep drains with 16 ML/ha-annum irrigation rate was introduced and simulated by using calibrated MIKE SHE. All other parameters of simulation were similar to scenario SD-D0-I16. The average depth of water table during summer and winter seasons for scenarios SW-D1-I16 were 1.17 and 0.84 metre respectively. The average increase in water table depth during winter rainfall was 0.43 metre.

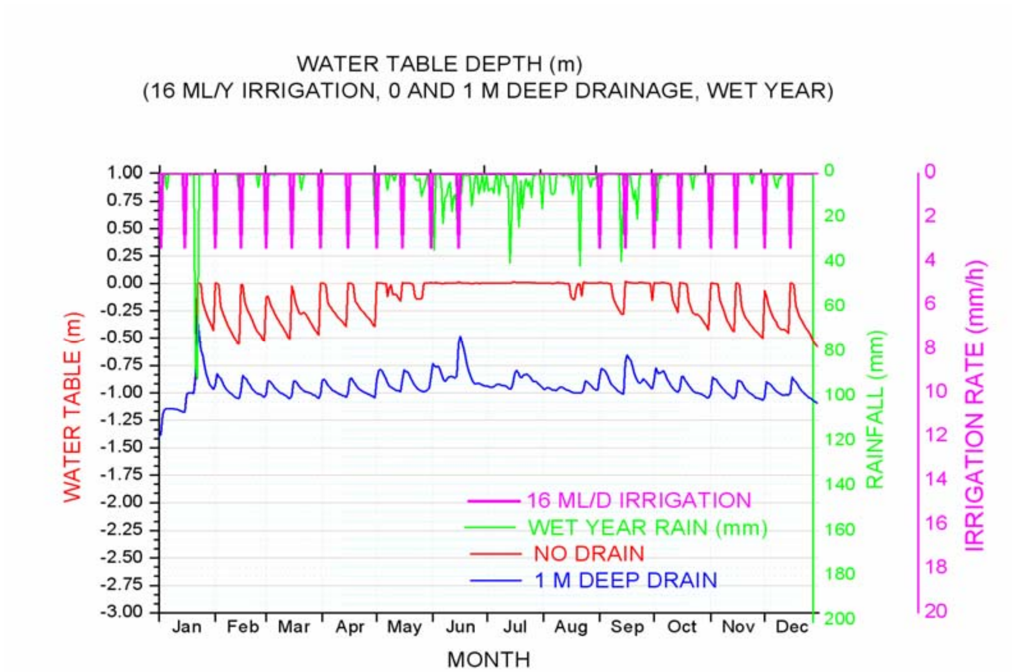

Figure: 5.17: Water Table Depths with and without 1 m Deep drains and 16 ML/ha-annum Irrigation in Wet Climate.

Figure 5.18 shows the water table depth with and without 2 m deep drains for wet climate. This figure shows that 2 m deep drains were discharging excessive water and kept water table well below the ideal zone of 0.5 to 1 metre depth. Table 6.1 shows the extent of waterlogging with 2 m deep drains in wet climate with 16 ML/ha-annum irrigation.

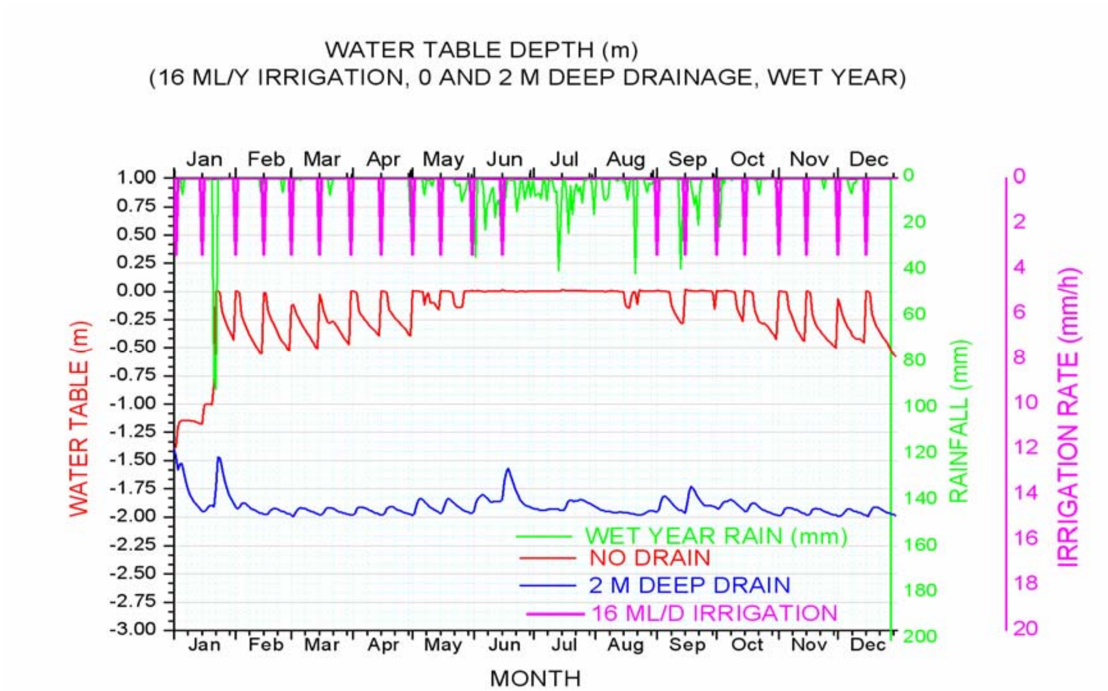

Figure: 5.18: Water Table Depths with and without 2 m Deep drains and 16 ML/ha-annum Irrigation in Wet Climate.

Figure 5.18 shows the comparison of water table depths for un-drained and 2 m deep drains with 16 ML/ha-annum irrigation during wet climate. The water table was on ground surface 1.75 m depth in the first week of May in case of un-drained and 2 m deep drained scenarios.

Table 5.15: Water Table Depth with and without 1 and 2 m Deep Drains in Wet Climate with 16 ML/ha-annum Irrigation.

SCENARIOS	TOTAL NO. 0F DAYS WATER TABLE DEPTH (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SW-D0-I16	152	181	15	17
SW-D1-I16	0	3	269	92
SW-D2-I16	0	0	0	365

Table 5.15 shows the extent of waterlogging with and without 1 m deep drains with 16 ML/ha-annum irrigation application in wet climate. It can be seen that water table was at the ground surface for more than five months without 1 m deep drains with 16 ML/ha-annum irrigation. When 1 m deep drains were installed the water table was effectively

controlled. Most of the year water table stayed between 0.5 and 1 m. This depth is considered as the ideal depths for crop roots to use water as sub-irrigation.

5.7.5.2 Impacts of 16 ML/ha-annum Irrigation in Wet Climate

- The impact of 16 ML/ha-annum irrigation resulted in sever water logging in un-drained scenarios.
- The water table was between 0 and 0.5 metre for about eleven months with 16 ML/ha-annum irrigation without one or 2 m deep drains.
- With 1 m deep drains water table was between 0.5 and 1.0 metre for 269 days.
- Two metres deep drains excessively discharged water from the saturated and unsaturated zones.
- The crop productivity would have been affected negatively in the presence of 2 m deep drains.

5.7.6 One and 2 m Deep Drain in Average Climate

Figure 5.19 shows the comparison of water table depth with and without 1 m deep drain impact in average climate when 16 ML/ha-annum irrigation were applied. Scenario SA-D1-I10 was simulated with the similar parameters as for SA-D0-I10 except the irrigation rate. Figure 5.19 shows that the introduction of 1 m deep drains have a significant impact on water table depths throughout the year. When there was no drainage, the water table in summer was at 1.25 metres deep on 1^{st} of January. The first and second irrigation was applied on 1^{st} and 15^{th} of January respectively. On 16^{th} of January water table depth with and without drains was about 0.5 and 0 metre respectively. Just before the irrigation on 1^{st} of February the water table dropped to 0.95 and 0.35 metre with and without 1 m deep drains. This indicates that 1 m deep drains were able to lower the water table up to 0.6 metre more as compare to un-drained scenario. 16 ML/ha-annum irrigation was applied in 20 equal amounts of 80mm each. One metre deep drains were more effective in summer as compare to winter season.

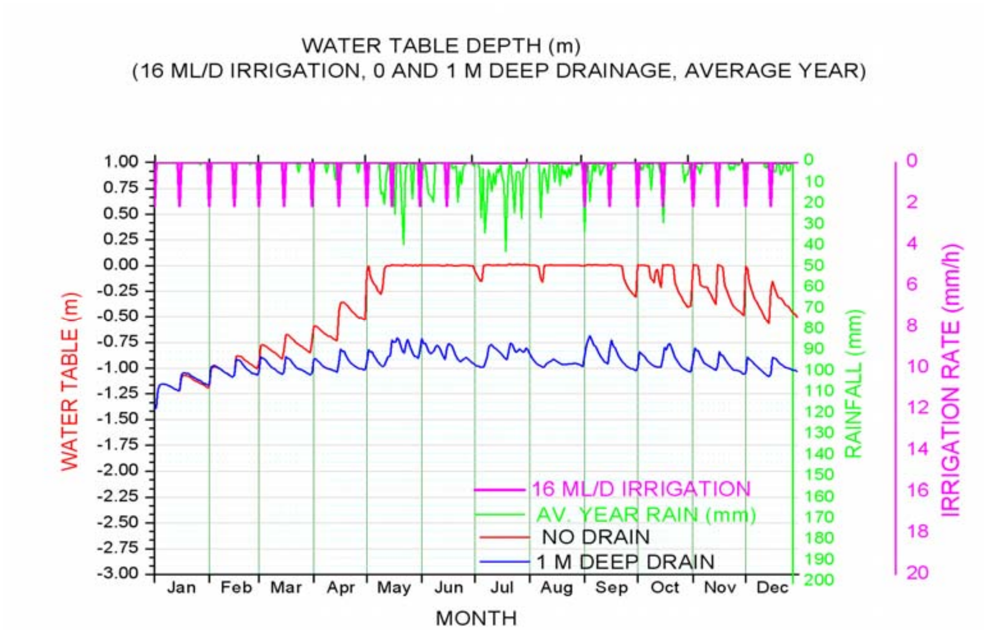

Figure: 5.19 Water Table Depths with and without 1 m Deep drains and 16 ML/ha-annum Irrigation in Average Climate.

Figure 5.20 shows the water table depth with and without 2 m deep drains in average climate and with 16 ML/ha-annum irrigation. The average water table depths with 2 m deep drain during summer and winter seasons were 2.21 and 2.35 metres respectively. The maximum depths of water table during summer and winter time with 2 m deep drains were 1.85 and 1.55 metres respectively. This indicates that the water table was comparatively deeper than the 1 m deep drains.

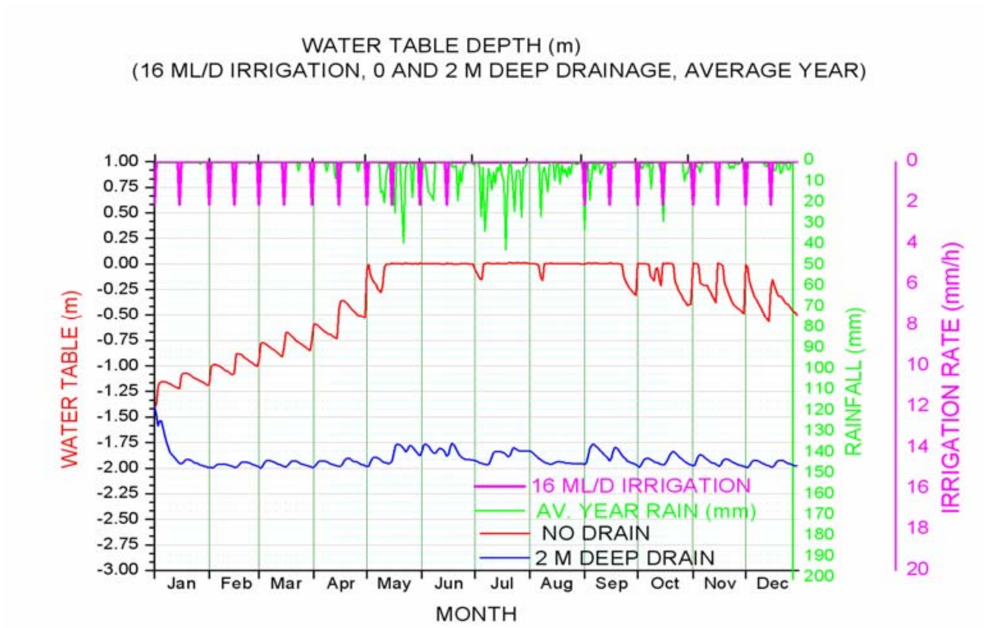

Figure: 5.20 Water Table Depths with and without 2 m Deep drains and 16 ML/ha-annum Irrigation in Average Climate.

Table 5.16 shows the extent of waterlogging with and without 1 and 2 m deep drains in average climate with 16 ML/ha-annum irrigation. It can be noticed that extent of waterlogging without 1 and 2 m deep drain was less in average climate as compare to wet climate (Table 5.15).

Table 5.16: Water Table Depth with and without 1 and 2 m Deep Drains in Average Climate with 16 ML/ha-annum Irrigation.

SCENARIOS	TOTAL NO. 0F DAYS WATER TABLE DEPTH (m)			
	0	0.5 < 0	1.0 < 0.5	≥ 1
SA-D0-I16	135	115	72	43
SA-D1-I16	0	0	257	108
SA-D2-I16	0	0	0	365

One metre deep drains were very effective in controlling water table between 0.5 and 1.0 m depth which is considered as ideal depth of water table for subsurface irrigation. In previous sections it has been described that this is the best depth for crop roots to grow vigorously in the presence of suitable soil moisture environment.

5.7.6.1 Impacts of 16 ML/ha-annum Irrigation in Average Climate

- There was severe waterlogging without 1 and 2 m deep drains and with 16 ML/ha-annum irrigation. The extent of waterlogging was less as compare to wet climate.
- The water table was between 0 and 0.5 metre for about nine months with 16 ML/ha-annum irrigation without one or 2 m deep drains.
- With 1 m deep drains water table was between 0.5 and 1.0 metre for 257 days.
- Two metres deep drains excessively discharged water from the saturated and unsaturated zones.
- The crop productivity would have been affected negatively in the presence of 2 m deep drains.

5.8 CHAPTER'S SUMMARY

5.8.1 Impacts of Drains Without Irrigation

The water table depths with and without 1 and 2 m deep drains under wet, average and dry climate are compared in Table 5.17.

Table 5.17: Water Table Depths in Wet, Average and Dry Climates with and without 1 and 2 Metres Deep Drains.

DEPTH OF DRAINS (m)	WATER TABLE DEPTHS (m)					
	WET CLIMATE		AV. CLIMATE		DRY CLIMATE	
	END OF SUMMER	MID WINTER	END OF SUMMER	MID WINTER	END OF SUMMER	MID WINTER
0	1.55	0	2.0	0	2	1.1
1	1.62	0.8	2.0	0.8	2	1.05
2	2.25	1.88	2.05	1.79	2.29	1.89

Table 5.17 indicates that the water table was at 1.55 metre depth before the winter rain for the un-drained scenario (SW-D0-I0). It started to rise on 1st of Jun and reached at ground surface on 25th of July (Figure 5.1). In case of 1 m deep drain it started to rise on 3rd of June from 1.62 metre depth and reached at 0.8 metre depth on 15th of July (Figure 5.6). This indicates that the increase in water table depth was less when 1 m deep drains were installed in the scenario SW-D1-I0. In addition to this there was no waterlogging during winter season with 1 m deep drains.

It is very interesting to note that the impact of 1 m deep drain scenario (SD-D1-I0) is negligible when compared with un-drained scenario (SD-D0-I0) for dry climate (Figure 5.8). Similarly the impact of 2 m drain scenario (SW-D2-I0) was not as significant when compared with 1 m deep drain scenario (SW-D1-I0) for the dry climate (Figure 5.9). Two metres deep drains were more effective in wet climate as compare to the average and dry climates. In case of dry climate the performance of 1 and 2 m deep drains was almost negligible if we compare it with the un-drained scenario SD-D0-I0.

It can be concluded that the drains depth has a great impact in removing water from the waterlogged soils during winter time and during wet climate as compare to the dry climate. The timely removal of the excessive water from the root zone of the crops would have a significant impact on the productivity and would reduce the salinity of the root zone soil profile during the wet years. The leaching of the salts from the top layer of the soil during the drain flow would also improve the productivity of the waterlogged soils.

5.8.2 Impacts of 1 and 2 M Deep Drains

The comparison of the average water table depth between un-drained and 1 m deep drained scenarios during summer and winter season revealed a difference of 0.6 and 0.8 metre respectively.. Its mean water table was 0.6 and 0.8 metre deeper in case of 1 m deep drains. It has been mentioned before that most of the farmer in SWIA grow pasture (clover). The rooting depth of clover varies from 0.2 to 0.4 metre. During summer season, the existence of water table close to the root zone may prove very productive if the ground water quality is not saline. Similarly, during winter time the depth of water table below the ground surface and close to the root zone may increase land productivity by increasing sub-surface irrigation and aeration into the root zone. Therefore, it can be concluded that the implementation/intervention of 1 m deep drain is very important in the efficient use of agricultural land and water resources during 10 ML/ha-annum irrigation application. Without 1 m deep drains, the application of 10 ML/ha-annum had resulted in sever waterlogging during winter rainfall in wet climate.

Two metres deep drains excessive discharged saturated and unsaturated zone in wet and average climate. The crop productivity would have affected negatively.

Further investigation and research may lead the cost effective and viable methods to harvest the water from the drains. MIKE SHE has got a Water Balance Module which can be used to estimate the amount of drain flow from the drained area. These calculations have been done for wet and dry scenarios with 1 and 2 m deep drains and 10 and 16 ML/ha-annum irrigation application rate and are shown in chapter 7.

CHAPTER 6

SIMULATED RESULTS OF RECHAGE TO GROUNDWATER

Excessive recharge into the groundwater is the main cause of waterlogging and salinity. During each irrigation and rainfall event, the recharge may take place into the unsaturated zone and then into the saturated zone. When rainfall or irrigation water is applied, it may recharge to unsaturated and saturated zones. The amount of recharge will depend on amount of rainfall and irrigation water, unsaturated zone deficit, infiltration rate, rainfall intensity and irrigation rate. MIKE SHE results for each simulation have produced the daily rate and amount of recharge. In this section we will discuss the role of drains in managing recharge to the groundwater by plotting daily results in figures for wet, average and dry climate. The total monthly amount of recharge will be shown in tabular form for wet, average and dry climate for comparison. These figures will show the daily comparison and table will show the overall picture for three climates.

The results of unsaturated zone deficit can be used to analyse the recharge by the rain and irrigation For example, if unsaturated zone on a given time (t_1) is -200 mm and after a rain or irrigation it is -150 mm at time (t_2), we would say that the unsaturated zone was recharged by 50 mm. Similarly if at time (t_1) the exchange between unsaturated and saturated zone was -3 mm/h we would say that unsaturated zone was recharged at a rate of 3 mm/h into saturated zone.

Keeping in view above mentioned theory we will analyse the impact of drains on land productivity by using unsaturated zone deficit and rate of exchange between unsaturated and saturated zones data generated by MIKE SHE in the simulations of different scenarios.

Water table close to the ground surface is the indication that unsaturated zone is fully saturated due to excessive recharge from rainfall or irrigation water. For example if water table is at 0.5 metre depth, its mean we have unsaturated zone from ground surface to 0.5 metre depth and below 0.5 metre we have fully saturated zone. This particular situation is explained as a conceptual model in Figure 6.1.

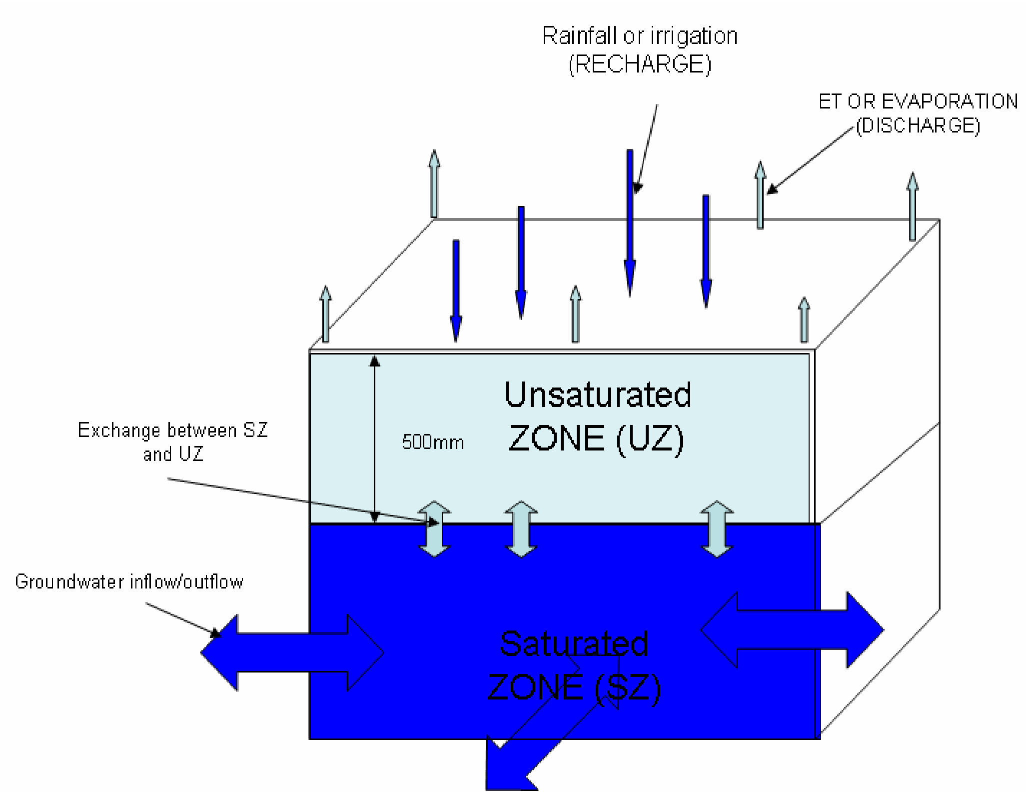

Figure 6.1: Conceptual Model of Exchange in Saturated and Unsaturated Zones.

This conceptual model shows us that how the change in one component of water balance will affect to others. For example, if we construct drains and drains discharge/remove x cubic metre of water in a given time, this discharge would impact on other components. Before seeing the impact of drains on recharge, we will discuss the recharge without the drains and irrigation applications during winter and summer season. Scenario SW-D0-I0, SA-D0-I0 and SD-D0-I0 were simulated without the drainage and irrigation application. In next section we will discuss that how the recharge from unsaturated and saturated zone interact with each other in these three scenarios.

6.1 RECHARGE WITHOUT DRAINAGE AND IRRIGATION

Scenario SW-D0-I0, SA-D0-I0 and SD-D0-I0 were simulated without the drainage and irrigation application for wet, average and dry climate respectively. The daily unsaturated zone deficit and exchange rate between saturated and unsaturated zones results were extracted from Appendix 2 and 3 for these scenarios and plotted in Figure 6.2 and 6.3 respectively.

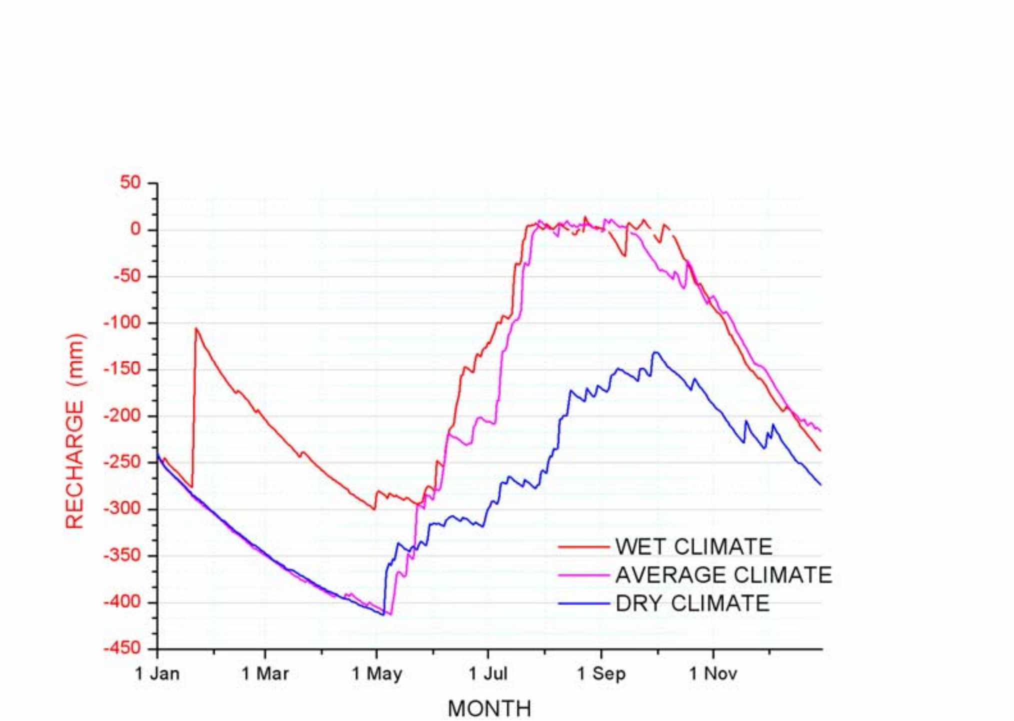

Figure 6.2: Daily Recharge without Irrigation and Drainage in Wet, Average and Dry Climate.

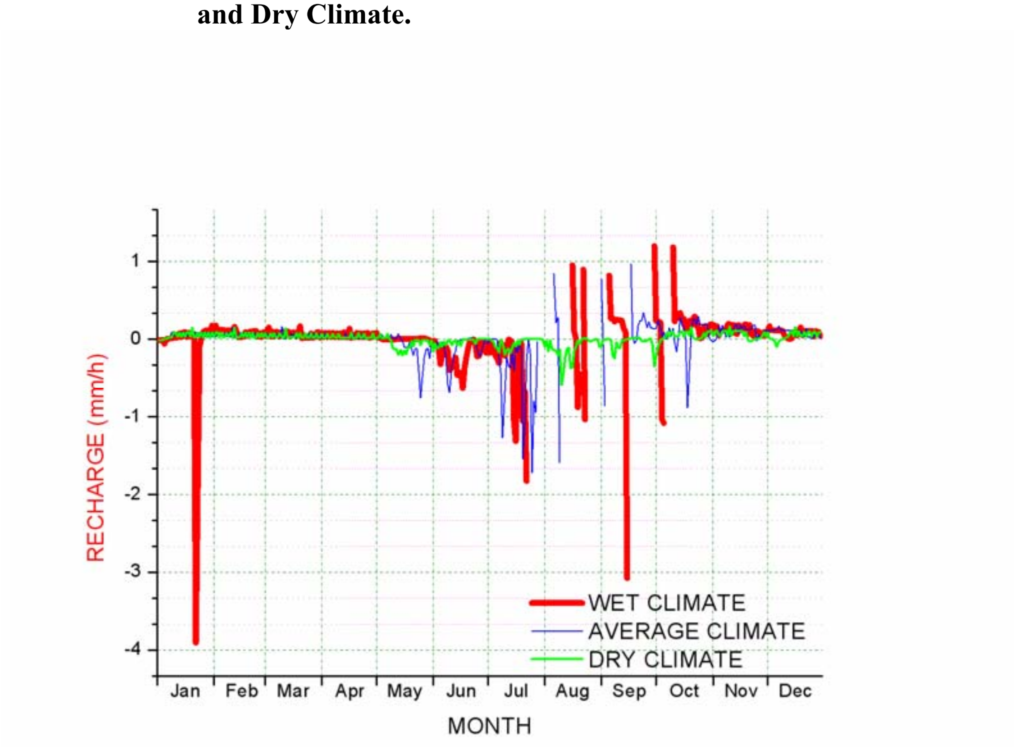

Figure 6.3: Daily Recharge Rate without Irrigation and Drainage in Wet, Average and Dry Climate.

Figure 6.3 and 6.4 show the daily unsaturated zone deficit and rate of exchange between saturated and unsaturated zone respectively. These Figures show the maximum and minimum recharge and rate of recharge in wet average and dry climate without irrigation and drainage. To understand Figure 6.3, we should keep in mind the explanation of recharge and discharge as given in previous section. For a given value t_1, if the unsaturated zone deficit was -200 mm and at time t_2, if it is -150 mm, its mean that there was a recharge of 50 mm. If at time t_3 it is -175 mm, its mean there was discharge of 25 mm. This mean discharge is a positive value and recharge is the negative value.

The daily unsaturated zone deficit data for all twenty seven scenarios was further analysed by using above definition of recharge and discharge. The daily net recharge/discharge was estimated and monthly values were calculated for all twenty seven scenarios. Figure 6.4 shows the monthly recharge/discharge for wet, average and dry climate without irrigation and drainage.

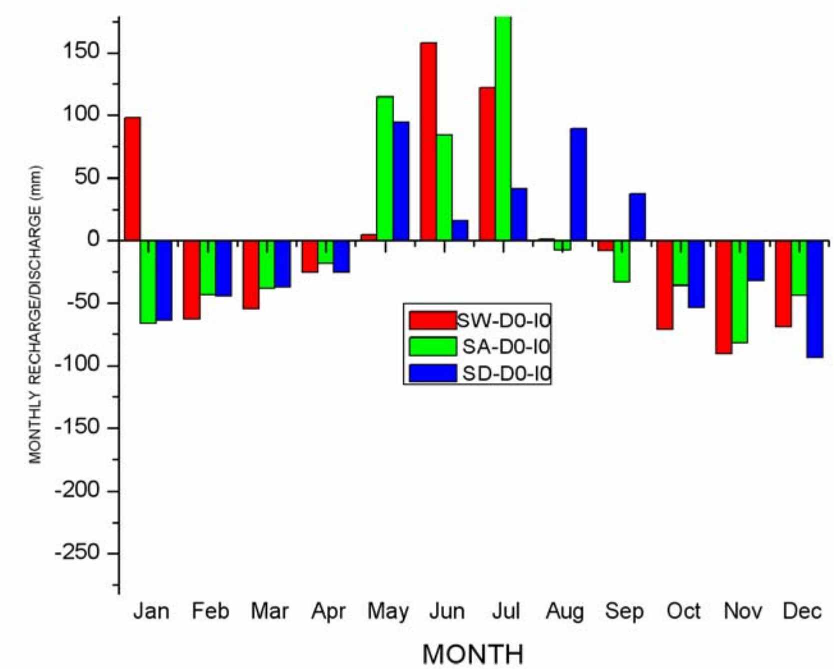

Figure 6.4: Monthly Recharge/Discharge without Irrigation and Drainage in Wet, Average and Dry Climate.

In Figure 6.4, the positive values indicate recharge and negative value indicates discharge. Recharge indicates that water was stored into the unsaturated and saturated zone by rainfall and irrigation. Discharge reveals that water was discharged from the unsaturated zone into the atmosphere by evapotranspiration through crops and/or direct evaporation from ground surface. These monthly values would be used as a base line for comparing the impact of irrigation and drainage in wet, average and dry climate. In addition to this, recharge and discharge values would also be compared with monthly rainfall and potential evapotranspiration. These values are given in Table 6.1.

It is more convenient if we compare Figure 6.4 and Table 6.1 together for the comparison of recharge/discharge with rainfall and potential evapotranspiration for wet, average and dry climate.

Table 6.1: Monthly Rainfall, Potential Evapotranspiration and Recharge/Discharge Wet, Average and Dry Climates without Irrigation and Drainage

	POTENTIAL EVAPOTRANSPIRATION (mm)			RAINFALL (mm)			RECHARGE/DISCHARGE (mm)		
MONTH	WET	AVERAGE	DRY	WET	AVERAGE	DRY	WET	AVERAGE	DRY
JAN	170	201	186	186	1	0	98	-66	-64
FEB	165	171	158	13	1	1	-62	-43	-44
MAR	136	161	150	9	4	2	-55	-38	-37
APR	92	96	100	0	21	5	-25	-18	-26
MAY	57	62	57	71	163	138	5	115	94
JUN	44	42	47	193	122	50	158	84	16
JUL	46	43	50	188	275	92	122	213	41
AUG	62	61	55	109	99	142	1	-8	90
SEP	82	76	69	106	84	100	-8	-33	37
OCT	120	118	112	49	76	26	-71	-36	-53
NOV	142	139	154	8	24	38	-91	-82	-32
DEC	166	172	164	15	27	42	-69	-44	-94

Table 6.1 reveals that in wet climate in January, there were 170 and 186 mm of potential evapotranspiration and rainfall respectively. There was 98 mm of recharge into the unsaturated zone. Its means out of 186 mm of rainfall 98 mm was stored into the unsaturated zone leaving 88 mm for evapotranspiration. This is nearly half of the potential evapotranspiration. This is due to the reason that pasture crop was at stage one

and roots were not developed and the value of leaf area index was also lowest for the first stage of the crop. In chapter 3 it has been discussed that how root depth and leaf area index contribute in evapotranspiration of the crops.

In July the potential evapotranspiration and rainfall were 46 and 188 mm respectively. The recharge was 122 m, this shows that there was 168 mm of water flux used out of 188 mm of rainfall and 20 mm of water was either overland flow or was error in water balance calculations. If we see the monthly overland flow in Table 7.1, for the month of July we find it is 33.28 mm. This shows that the evapotranspiration by crops was not at potential rate, instead it was 13.28 mm less. We can compare each month in similar way and can see how different fluxes were distributed in a particular month.

6.2 RECHARGE WITH 1 M DEEP DRAINS AND 10 ML/HA-ANNUM IRRIGATION

Scenario SW-D1-I10, SA-D1-I10 and SD-D1-I10 were simulated with 10 ML/ha-annum irrigation for wet, average and dry climate respectively. Figure 6.5 and 6.6 shows the amount of recharge and rate of recharge respectively for the wet, average and dry climate.

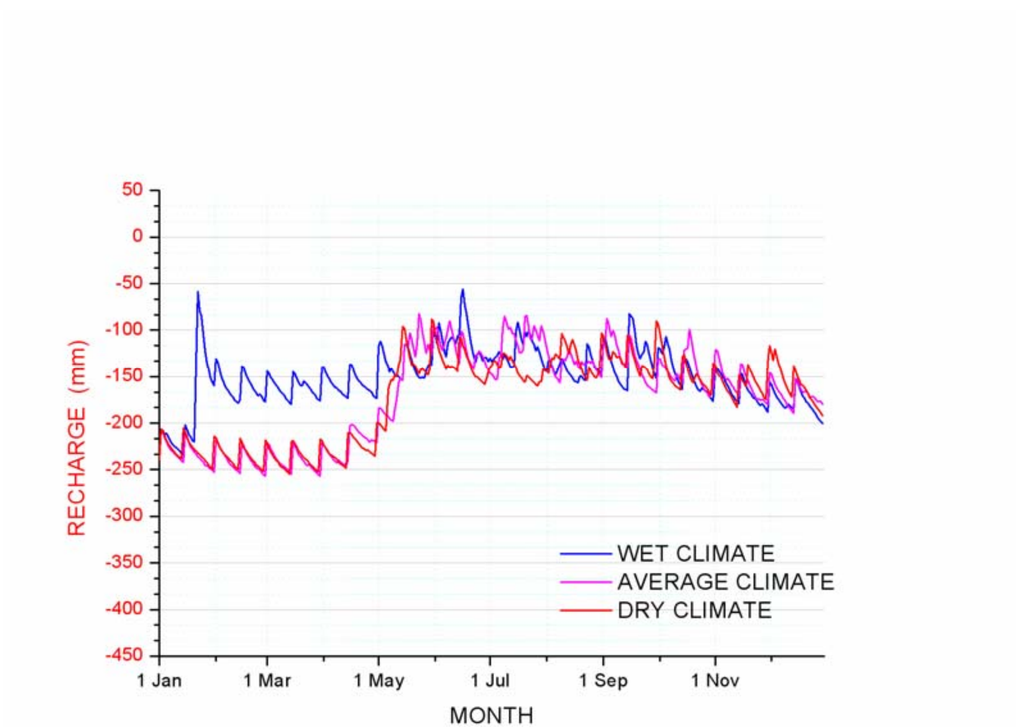

Figure 6.5: Recharge with 1 m Deep Drains and 10 ML/ha-annum Irrigation in Wet, Average and Dry Climate.

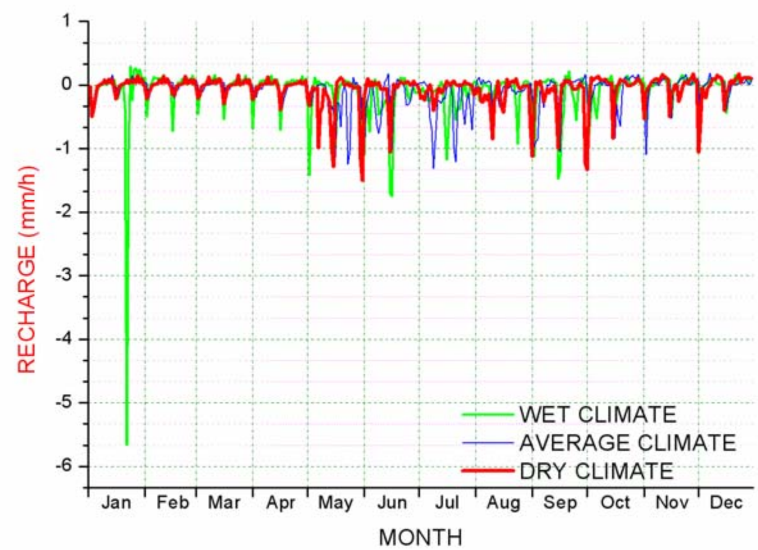

Figure 6.6: Rate of Recharge with 1 m Deep Drains and 10 ML/ha-annum Irrigation in Wet, Average and Dry Climate.

The comparison of recharge in wet, average and dry climate shown in Figure 6.5 indicates that there was same amount of recharge during summer season in average and dry climate. The explanation for this is that there was nearly same rainfall during summer season in average and dry climate. In wet climate there was more recharge in summer due to the 90 mm rainfall event.

Figure 6.6 shows the rate of recharge during summer (18th of Jan) was about 5.7 mm/h. In Figure 6.3 the rate of recharge for same day was 3.9 mm/h. The increase in rate of recharge was due to the irrigation application and the presence of 1 m deep drain. The rate of recharge from unsaturated zone into saturated zone depends on the discharge from the saturated zone. One metre deep drains were discharging water from the saturated zone and providing a gradient for water to flow at a faster rate from unsaturated zone into saturated zone. The recharge from irrigation water was also providing more flux of water to flow from unsaturated zone to saturated zone.

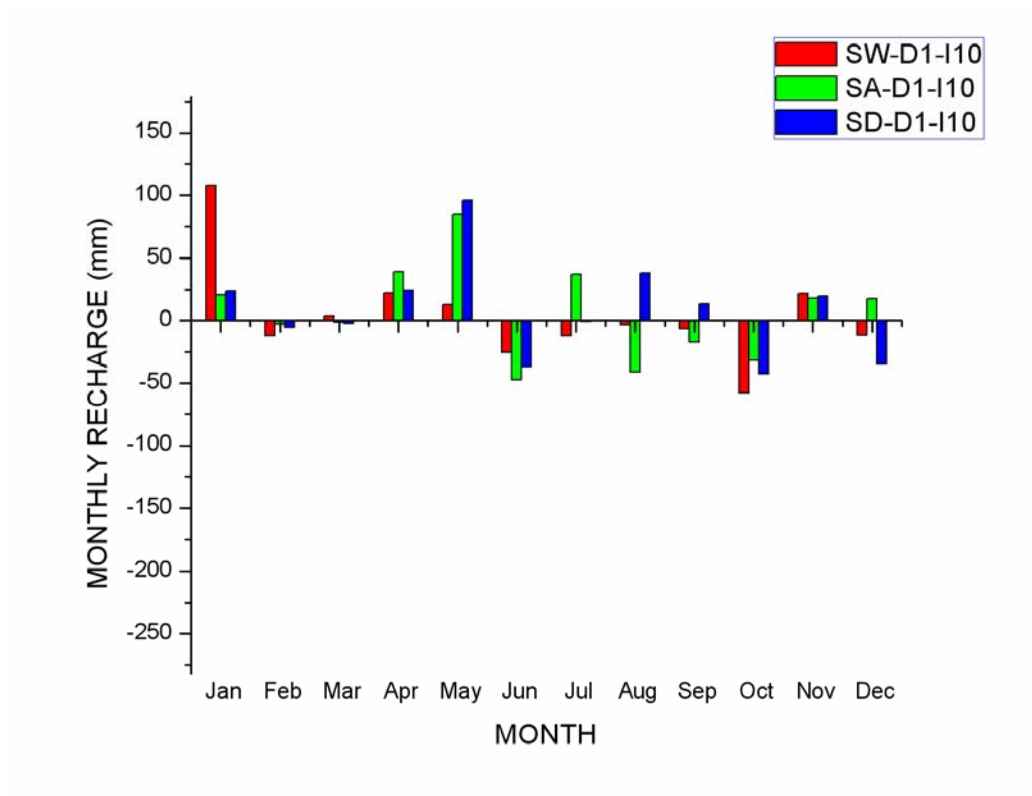

Figure 6.7: Monthly Recharge/Discharge with 10 ML/ha-annum Irrigation and 1 m deep Drains in Wet, Average and Dry Climate.

Figure 6.7 shows recharge (positive) and discharge (negative) for wet, average and dry climate with 1 m deep drains and 10 ML/ha-annum irrigation. We can see that the recharge and discharge values have been modified by the inclusion of 10 ML/ha-annum irrigation and 1 m deep drains. Table 6.2 shows the recharge and discharge during wet, average and dry climate with irrigation and drainage in place.

Table 6.2: Monthly Recharge/Discharge with 10 ML/ha-annum Irrigation and with and without 1 m Deep Drains in Wet, Average and Dry Climates.

MONTH	RECHARGE/DISCHARGE WITH NO IRRIGATION AND DRAINAGE (mm)			RECHARGE/DISCHARGE 1 M DEEP DRAINS AND 10 ML/ha-annum IRRIGARION (mm)		
	WET CLIMATE	AVERAGE CLIMATE	DRY CLIMATE	WET CLIMATE	AVERAGE CLIMATE	DRY CLIMATE
JAN	98	-66	-64	108	21	24
FEB	-62	-43	-44	-13	-3	-6
MAR	-55	-38	-37	4	-1	-2
APR	-25	-18	-26	22	39	25
MAY	5	115	94	13	85	96
JUN	158	84	16	-25	-47	-37
JUL	122	213	41	-12	37	-1
AUG	1	-8	90	-3	-41	38
SEP	-8	-33	37	-6	-17	13
OCT	-71	-36	-53	-58	-32	-42
NOV	-91	-82	-32	22	18	19
DEC	-69	-44	-94	-12	17	-35

Table 6.2 shows that the recharge during the month of Jan for wet, average and dry climate was 108, 21 and 24 mm respectively. In Table 6.1 the recharge for wet, average and dry climate for the same month was 98, -66 and -64 mm respectively. In January, 150 mm of irrigation was applied (Appendix 6). This indicates that with the application of 150 mm of irrigation and 1 m deep drains, the recharge and discharge component were modified. For wet climate, the recharge was slightly increased from 98 to 108 mm. For average and dry climate without irrigation there was discharge from the unsaturated zone. With 150 mm of irrigation, this was changed from discharge to recharge. Instead of 66 and 64 mm of discharge, it was modified to 21 and 24 mm of recharge respectively.

For the month of July, the recharge with 0 mm of irrigation (Appendix 6) in wet, average and dry climate was -12, 37 and -1 mm with 1 m deep drains. It should be kept in mind that no irrigation was applied during winter rainfall season especially in July and August (Appendix 6) for 10 ML/ha-annum irrigation scenarios. If we compare these values with the scenarios in previous section (no irrigation and drainage), there was recharge of 122, 213 and 41 mm in wet, average and dry climate respectively in the moth of July. This shows that with the inclusion of 1 m deep drains the recharge of 122 mm was modified to discharge of 12 mm in wet climate. For average and dry climate, 213 and 41 mm of recharge was modified into 37 mm recharge and 1 mm discharge respectively.

The impact of 1 m deep drains and 10 ML/ha-annum irrigation can be easily seen by comparing Table 6.1 and 6.2 and Figure 6.4 and 6.7 for any month and climate.

We can see the impact of 10 ML/ha-annum irrigation and 1 m deep drains on overland flow in Table 6.3. It can be noticed that the overland flow for the month of January was 7.09, 7.08 and 10.62 mm for wet, average and dry climate respectively. Without irrigation and drainage these values were 0.01, 0 and 0 mm respectively. This reveals that how overland flow was modified in January for wet, average and dry climate with and without irrigation and drainage. Table 6.1 and 6.2 can be compared to see the modification of recharge, discharge and overland flow with and without irrigation for all three climates in each month.

6.3 RECHARGE WITH 1 M DEEP DRAINS AND 16 ML/HA-ANNUM IRRIGATION

Figure 6.8 shows the impact of 16 ML/ha-annum irrigation with 1 m deep drains for wet, average and dry climate. It can be noticed that the pattern of recharge was same in this case as compare to pattern of recharge with 10 ML/ha-annum irrigation. Specifically the recharge in average and dry climate during summer and winter was nearly same.

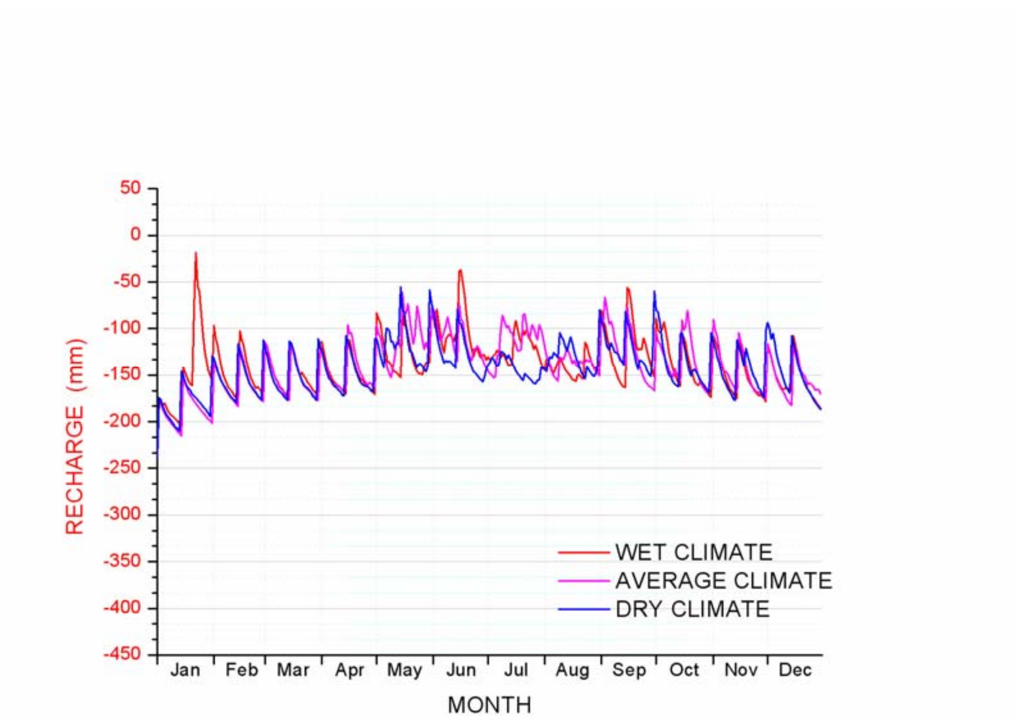

Figure 6.8: Daily Recharge with 1 m Deep Drains and 16 ML/ha-annum

Irrigation in Wet, Average and Dry Climate.

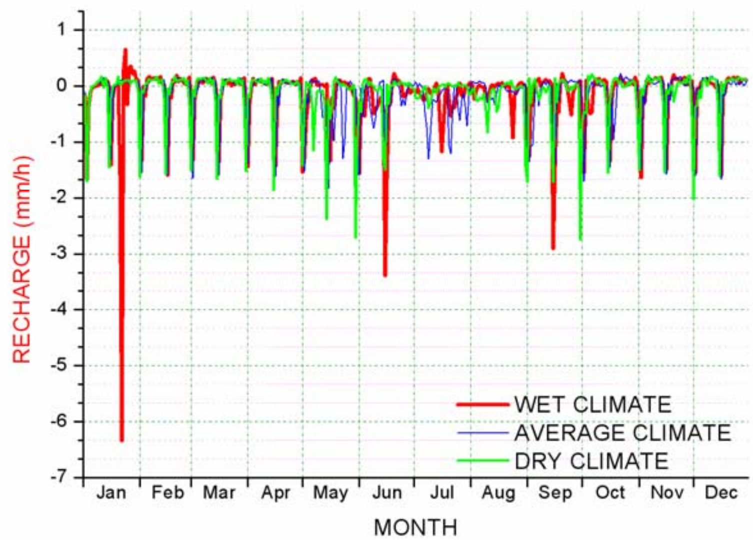

Figure 6.9: Daily Rate of Recharge with 1 m Deep Drains and 16 ML/ha-annum Irrigation in Wet, Average and Dry Climate.

The rate of recharge was higher in wet climate with 16 ML/ha-annum irrigation as compare to 10 ML/ha-annum irrigation. The interesting point to note in Figure 6.9 is the rate of recharge in average and dry climate. The rate of recharge in dry climate is more than average climate with 16 ML/ha-annum irrigation. The reason for this is the higher flux of irrigation water was moving with the high gradient generated by 1 m deep drains due to the discharge from the saturated zone. In previous section the irrigation flux was less than the 16 ML/ha-annum irrigation flux.

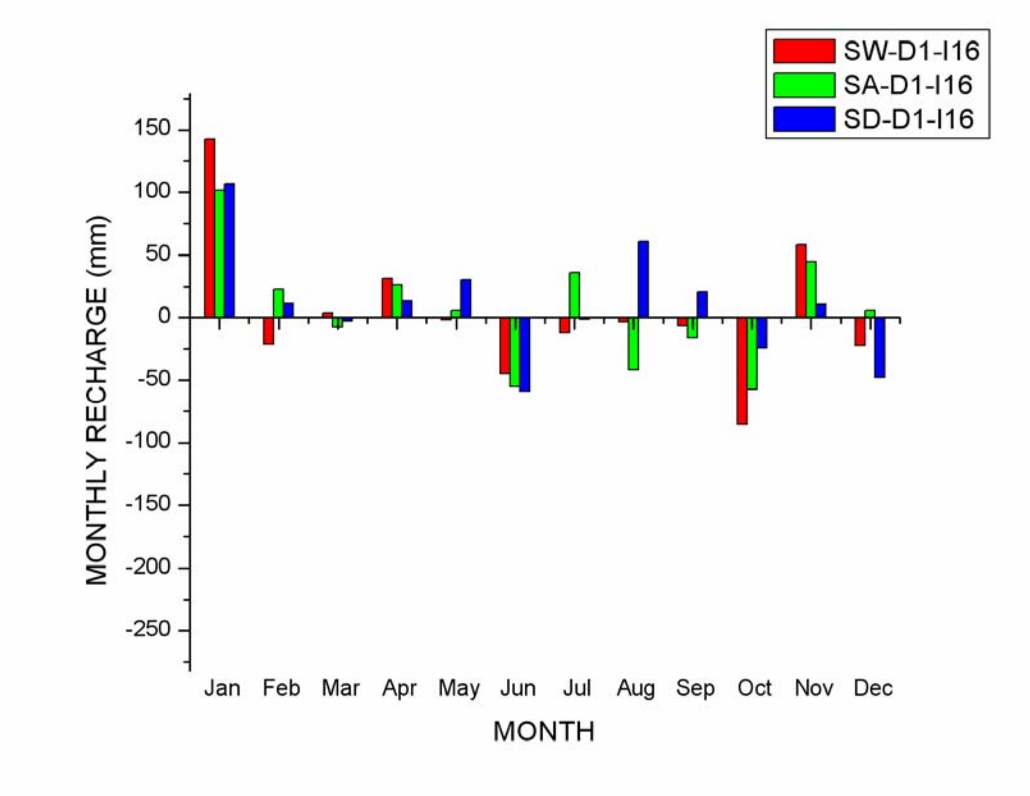

Figure 6.10: Monthly Recharge/Discharge with 16 ML/ha-annum Irrigation and 1 m deep Drains in Wet, Average and Dry Climate.

Figure 6.10 shows the monthly recharge and discharge with 16 ML/ha-annum irrigation and 1 m deep drains in wet, average and dry climate. It can be seen by comparing Figure 6.7 and 6.10 that the monthly recharge and discharge were modified with the increase in irrigation from 10 to 16 ML/ha-annum. Many comparisons can be made to see the change in recharge/discharge during winter and summer season with and without 10 and 16 ML/ha-annum irrigation and with and without 1 m deep drains from Figure 6.4, 6.7 and 6.10.

The comparison of monthly recharge and discharge with 16 ML/ha-annum irrigation for wet, average and dry climate with and without 1 m deep drains is given in Table 6.3.

Table 6.3: Monthly Recharge/Discharge with 16 ML/ha-annum Irrigation and with and without 1 m Deep Drains in Wet, Average and Dry Climates.

MONTH	RECHARGE/DISCHARGE WITH NO IRRIGATION AND DRAINAGE (mm)			RECHARGE/DISCHARGE 1 M DEEP DRAINS AND 16 ML/ha-annum IRRIGARION (mm)		
	WET CLIMATE	AVERAGE CLIMATE	DRY CLIMATE	WET CLIMATE	AVERAGE CLIMATE	DRY CLIMATE

JAN	245	101	110	143	102	107
FEB	-7	39	42	-21	23	11
MAR	3	33	30	4	-7	-3
APR	8	67	56	31	26	13
MAY	-4	7	6	-2	6	30
JUN	-3	-8	-4	-45	-55	-59
JUL	-1	10	-1	-12	36	-2
AUG	1	-9	10	-3	-42	61
SEP	-8	-24	5	-7	-16	20
OCT	-57	-44	-3	-85	-57	-24
NOV	45	33	-1	58	45	11
DEC	86	112	75	-22	6	-48

For the month of January, the discharge was 245, 101 and 110 mm for wet, average and dry climate, respectively, with 16 ML/ha-annum irrigation and without drainage. With 1 m deep drains this was modified to 143, 102 and 107 mm in wet, average and dry climate respectively. This indicates that 1 m deep drains had reduced recharge in wet and dry climate whereas in average climate it was same. We should keep in mind that in the January which is hot month of summer, 240 mm of irrigation was applied under the 16 ML/ha-annum irrigation rate (Appendix 6). Therefore, the total flux of water applied by irrigation and rainfall was 240 mm higher incase of 16 ML/ha-annum irrigation rate as compare to non-irrigated scenario.

In the month of July (winter season) no irrigation was applied under 16 ML/ha-annum irrigation rate. The recharge without irrigation and drains for this month was -1, 10 and -1 mm for wet, average and dry climate respectively. With 1 m deep drains it was-12, 36 and -2 mm respectively. The higher recharge with 1 m deep drains in case of average climate may be due to the discharge of water by the drains from the saturated zone. If saturated zone is discharged by the drains, then there would be flux movement from unsaturated zone to saturated zone. Its mean water flux would move from unsaturated zone toward the saturated zone. In other words unsaturated zone would recharge saturated zone in this particular hydrologic condition.

6.4 RECHARGE WITH 2 M DEEP DRAINS AND 10 ML/HA-ANNUM IRRIGATION

Figure 6.11 shows the impact of 2 m deep drains with 10 ML/ha-annum irrigation on groundwater recharge. It can be noticed that 2 m deep drains were discharging excessive water and unsaturated zone deficit was higher due to this reason. The recharge pattern in wet, average and dry was closer to each other. 10 ML/ha-annum irrigation in the presence of 2 m deep drains were recharging less water into the groundwater table as compare to 1 m deep drains.

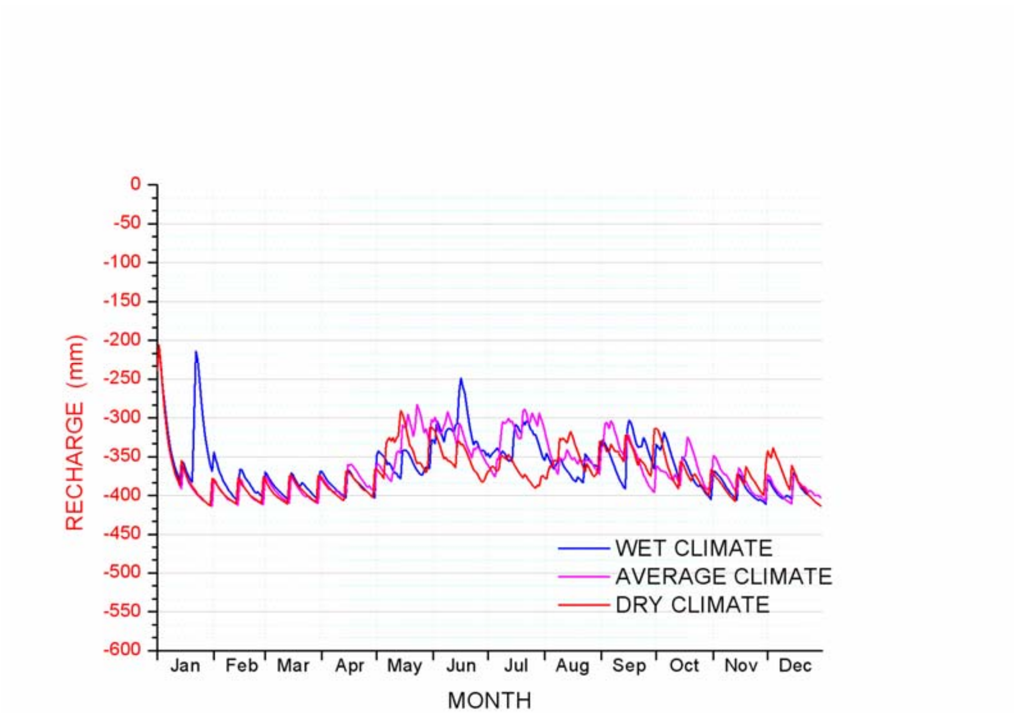

Figure 6.11: Rate of Recharge with 2 m Deep Drains and 10 ML/ha-annum Irrigation in Wet, Average and Dry Climate.

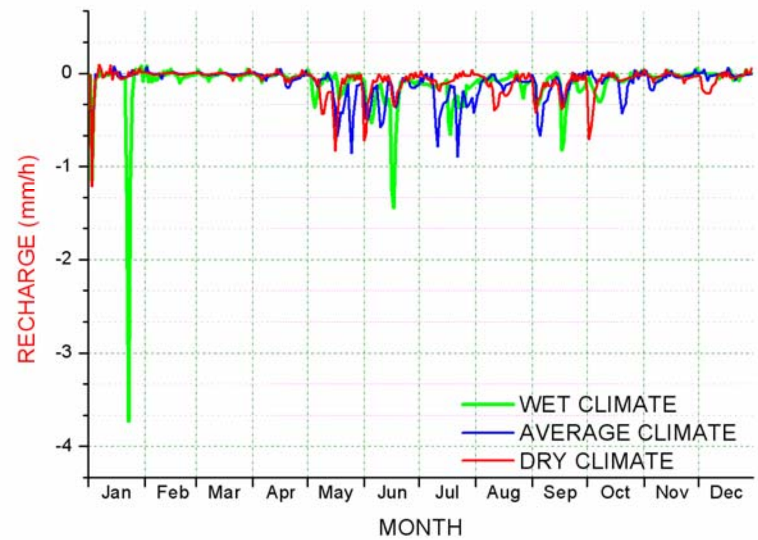

Figure 6.12: Rate of Recharge with 2 m Deep Drains and 10 ML/ha-annum Irrigation in Wet, Average and Dry Climate.

Figure 6.12 shows the rate of recharge with 2 m deep drains and 10 ML/ha-annum irrigation. The maximum rate of recharge during summer season in wet climate after 90 mm rainfall event was 3.75 mm/h as compare to 5.7 mm/h with 1 m deep drains. The rate of recharge was less with 2 m deep drains as compare to 1 m deep drains. In dry and average climate the rate of recharge was also less with 2 m deep drains as compare to 1 m deep drains. Table 6.4 shows the monthly recharge and discharge with 10 ML/ha-annum irrigation and with and without 2 m deep drains in wet average and dry climate.

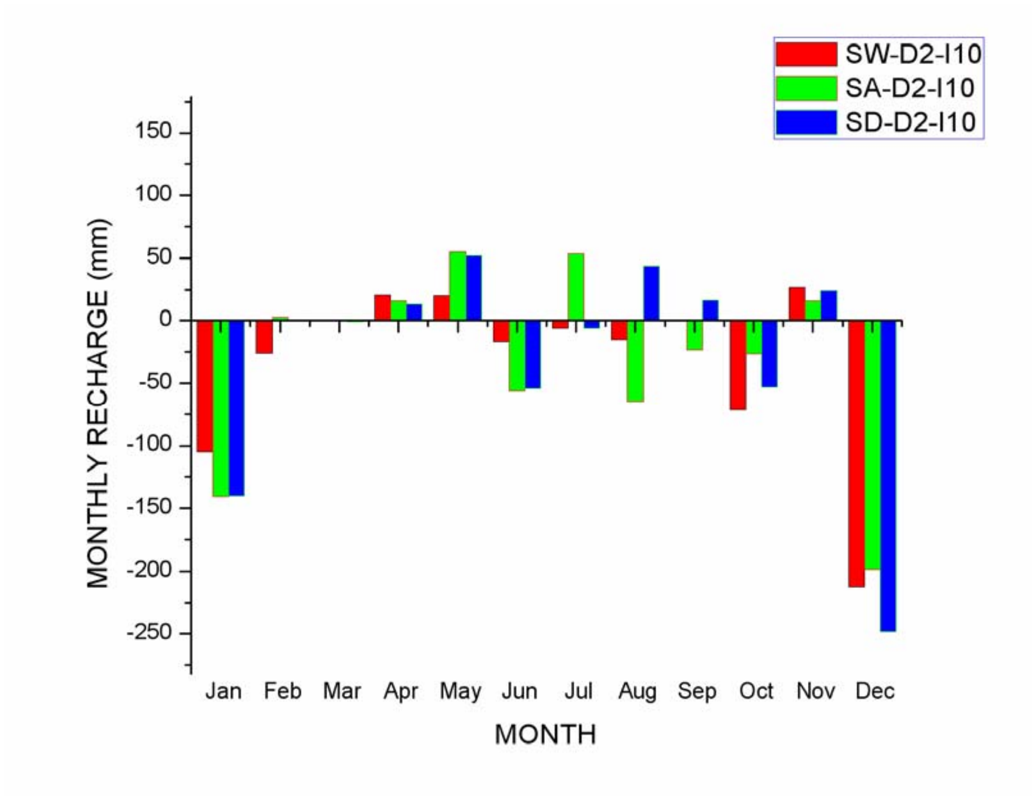

Figure 6.13: Monthly Recharge/Discharge with 10 ML/ha-annum Irrigation and 2 m deep Drains in Wet, Average and Dry Climate.

Figure 6.13 shows monthly recharge and discharge with 10 ML/ha-annum irrigation and 2 m deep drains. Table 6.4 shows the monthly recharge and discharge with 10 ML/Y irrigation and with and without 2 m deep drains.

Table 6.4: Monthly Recharge/Discharge with 10 ML/ha-annum Irrigation and with and without 2 m Deep Drains in Wet, Average and Dry Climates.

MONTH	RECHARGE/DISCHARGE WITH NO IRRIGATION AND DRAINAGE (mm)			RECHARGE/DISCHARGE 1 M DEEP DRAINS AND 10 ML/ha-annum IRRIGARION (mm)		
	WET CLIMATE	AVERAGE CLIMATE	DRY CLIMATE	WET CLIMATE	AVERAGE CLIMATE	DRY CLIMATE
JAN	98	-66	-64	-140	-189	-188
FEB	-62	-43	-44	-50	-25	-25
MAR	-55	-38	-37	-24	-22	-24
APR	-25	-18	-26	-3	-13	-16
MAY	5	115	94	6	118	93
JUN	158	84	16	103	1	17
JUL	122	213	41	-4	61	8
AUG	1	-8	90	-15	-64	3
SEP	-8	-33	37	-4	-35	7
OCT	-71	-36	-53	-42	5	-53
NOV	-91	-82	-32	-28	-31	-1
DEC	-69	-44	-94	-253	-232	-251

Table 6.4 shows that in January the recharge was modified into the discharge due to the presence of 2 m deep drains. It was 140, 189 and 188 mm for wet, average and dry climate respectively. This indicates that 2 m deep drains were discharging water from the saturated zone and there was not enough flux of water to refill the saturated zone from the unsaturated zone. Due to this reason, water table depth and unsaturated zone deficit was increased.

In July there was no irrigation was applied and recharge was reduced from 122, 213 and 41 mm to -4, 61 and 8 mm for wet, average and dry climate respectively without and with 2 m deep drains respectively. This shows that 2 m deep drains discharge 126, 217 and 205 mm of water in wet, average and dry climate respectively.

6.5 RECHARGE WITH 2 M DEEP DRAINS AND 16 ML/HA-ANNUM IRRIGATION

Figure 6.14 shows the daily recharge with 2 m deep drains and 16 ML/ha-annum irrigation in wet, average and dry climate. It can be seen that the net amount of recharge was higher with 16 ML/ha-annum irrigation as compare to 10 ML/ha-annum irrigation.

In both cases drains depth was 2 m deep. The higher rate of irrigation resulted in higher flux to recharge the groundwater table. Appendix 2 shows the daily discharge for 10 and 16 ML/ha-annum irrigation with 2 m deep drains. If we compare the daily rainfall data and fortnightly irrigation application rate in appendix 6 with recharge data in appendix 2, it is easy to understand the jump in recharge on any particular day. The increase in recharge to the groundwater was directly related to the amount of rainfall and irrigation ion a particular day. Similarly any drop in the recharge curve was directly related to the depth of drain, evapotranspiration by crop, direct evaporation from ground surface and unsaturated zone.

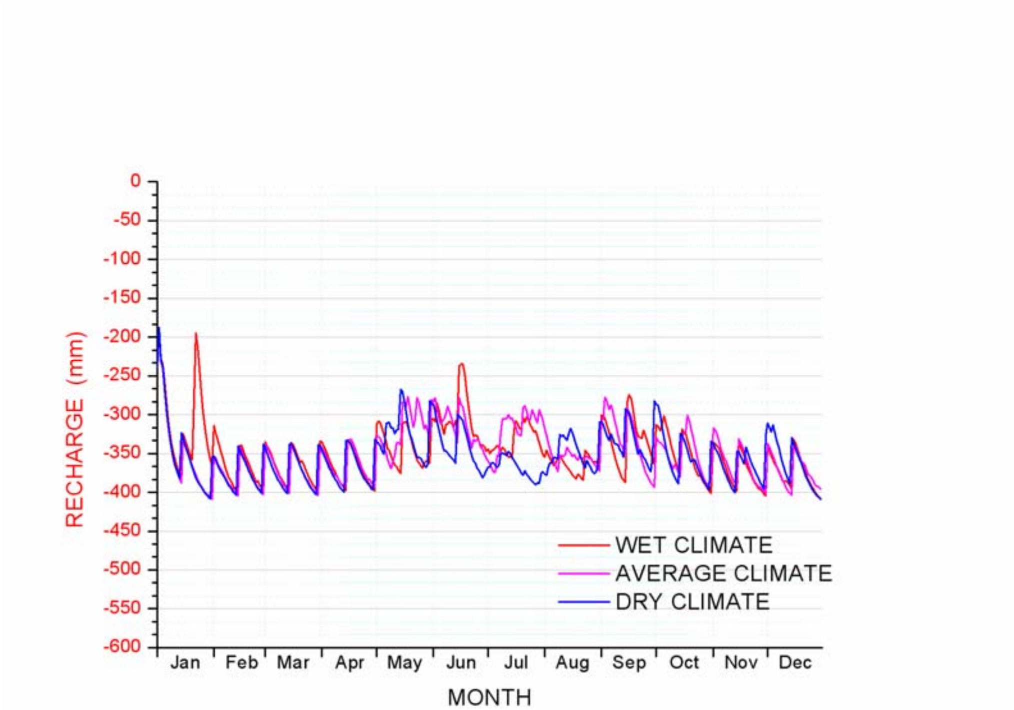

Figure 6.14: Daily Rate of Recharge with 2 m Deep Drains and 10 ML/ha-annum Irrigation in Wet, Average and Dry Climate.

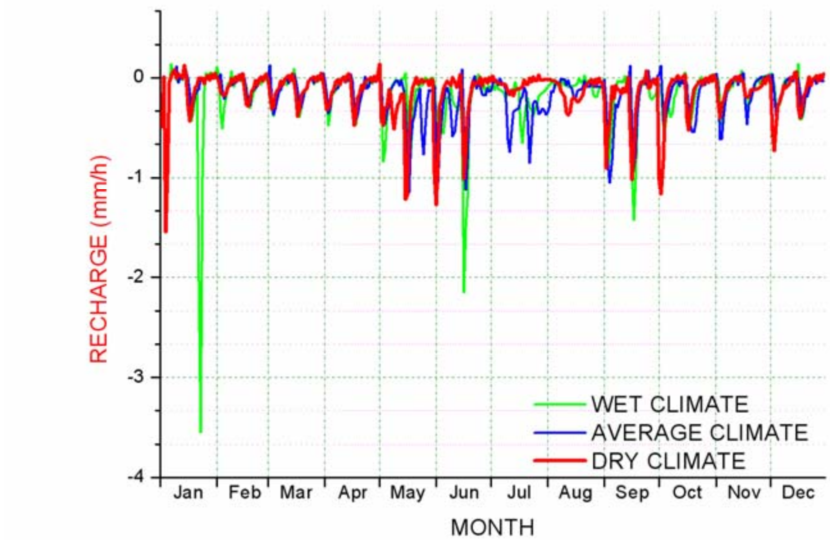

Figure 6.15: Daily Rate of Recharge with 2 m Deep Drains and 16 ML/ha-annum Irrigation in Wet, Average and Dry Climate.

Figure 6.15 show the daily rate of recharge with 2 m deep drains and 16 ML/ha-annum irrigation. If we compare Figure 6.9 with 6.11, we can conclude that the rate of recharge was slightly higher for 16 ML/ha-annum irrigation as compare to 10 ML/ha-annum with 2 m deep drains during summer season in wet climate. For dry and average climate it was significantly lower. During winter season the maximum rate of recharge with 10 and 16 ML/ha-annum was nearly same for all three climates. This shows that 2 m deep drains were nearly equally affected for 10 and 16 ML/ha-annum irrigation in winter season.

Figure 6.16 shows the monthly recharge and discharge with 16 ML/ha-annum irrigation and with 2 m deep drains. Table 6.5 shows the monthly rate of recharge with and without 2 m deep drains and 16 ML/ha-annum irrigation.

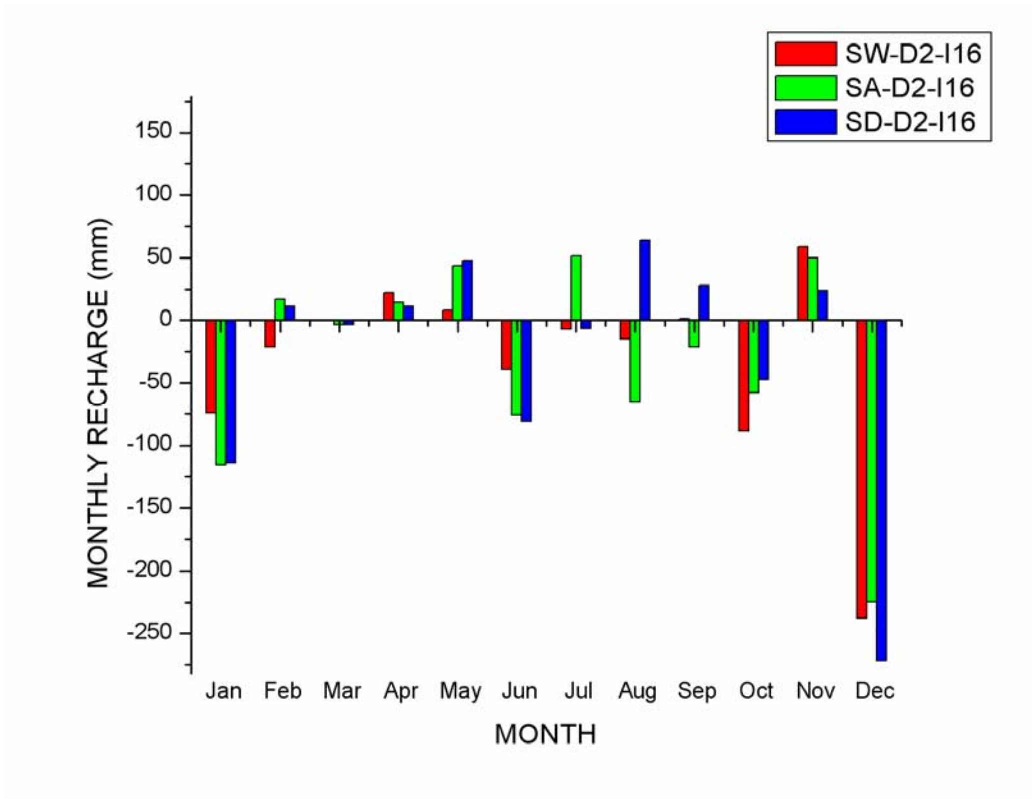

Figure 6.16: Monthly Recharge/Discharge with 16 ML/ha-annum Irrigation and 2 m deep Drains in Wet, Average and Dry Climate.

Table 6.5: Monthly Recharge/Discharge with 16 ML/ha-annum Irrigation and with and without 2 m Deep Drains in Wet, Average and Dry Climates.

	RECHARGE/DISCHARGE WITH NO IRRIGATION AND DRAINAGE (mm)			RECHARGE/DIS/CHARGE WITH 1 M DEEP DRAINS AND 16 ML/ha-annum IRRIGARION (mm)		
MONTH	WET CLIMATE	AVERAGE CLIMATE	DRY CLIMATE	WET CLIMATE	AVERAGE CLIMATE	DRY CLIMATE
JAN	245	101	110	-75	-116	-114
FEB	-7	39	42	-21	17	11
MAR	3	33	30	0	-3	-3
APR	8	67	56	22	15	11
MAY	-4	7	6	8	43	48
JUN	-3	-8	-4	-39	-76	-81
JUL	-1	10	-1	-7	52	-7
AUG	1	-9	10	-15	-65	64
SEP	-8	-24	5	2	-21	28
OCT	-57	-44	-3	-89	-58	-47
NOV	45	33	-1	59	50	24
DEC	86	112	75	-238	-225	-272

The comparison of Figure 6.16 and Table 6.5 reveals that how the recharge and discharge were modified with the inclusion of 2 m deep drains during wet, average and dry climate scenarios. In January the discharge by 2 m deep drains was 75, 114 and 116 mm for wet, average and dry climate respectively with 16 ML/ha-annum irrigation. Without 2 m deep drains and with 16 ML/ha-annum irrigation there was 245, 101 and 110 mm of recharge into the groundwater table during wet, average and dry climate respectively. This reveals that 2 m deep drains had a total discharge of 320, 215 and 226 mm in wet, average and dry climate respectively.

In July, 2 m deep drains discharged 7mm from groundwater table in wet and dry climate, whereas there was a recharge of 52 mm during average climate. It is important to note that no irrigation was applied during the month of July for any scenarios because of winter season.

6.6 CHAPTER'S SUMMARY

- The impact of 1 m deep drains in managing the recharge was very significant with 10 and 16 ML/ha-annum irrigation rates.
- Two metres deep drains excessively discharged groundwater table and the rate of recharge was higher in 10 ML/ha-annum irrigation rate as compare to 16 ML/ha-annum irrigation rate.
- The recharge to the groundwater was directly related to the amount of rainfall and irrigation water applied on a particular day as well as with the drain depth.
- One metre deep drains discharged more water from unsaturated zone whereas 2 m deep drains discharged more water from the saturated zone.
- Rate of recharge were higher during heavy rainfall events with and without 1 and 2 m deep drains.
- The drains performance was not effective in dry climate as compare to wet climate.
- Two metres deep drains were not discharging water during dry climate and therefore it can be concluded that 2 m deep drains are not required for dry climate with similar land use and hydrological condition.

CHAPTER 7

SIMULATED RESULTS OF OVERLAND FLOW

7.1 DAILY OVERLAND FLOW AND FLOODING RISK

Temporal distribution of daily overland flow throughout wet, average and dry climate was used as an indication of the effectiveness of the drains in reducing overland flow and/or waterlogging and flooding. For this purpose the data for all twenty seven scenarios was extracted from Appendix 4 and plotted in a logical manner so that the impact of drains under same irrigation application rate and climate can be estimated.

7.1.1 Daily Overland flow in Wet Climate without Irrigation

The risk of overland flow and flooding is most common during wet climate in winter rainfall in SWIA. Therefore, the impact of drains in controlling overland flow and flooding was estimated by comparing the scenarios with and without 1 and 2 m deep drains. Figure 7.1 shows the daily overland flow with and without 1 and 2 m deep drains during wet climate without irrigation application.

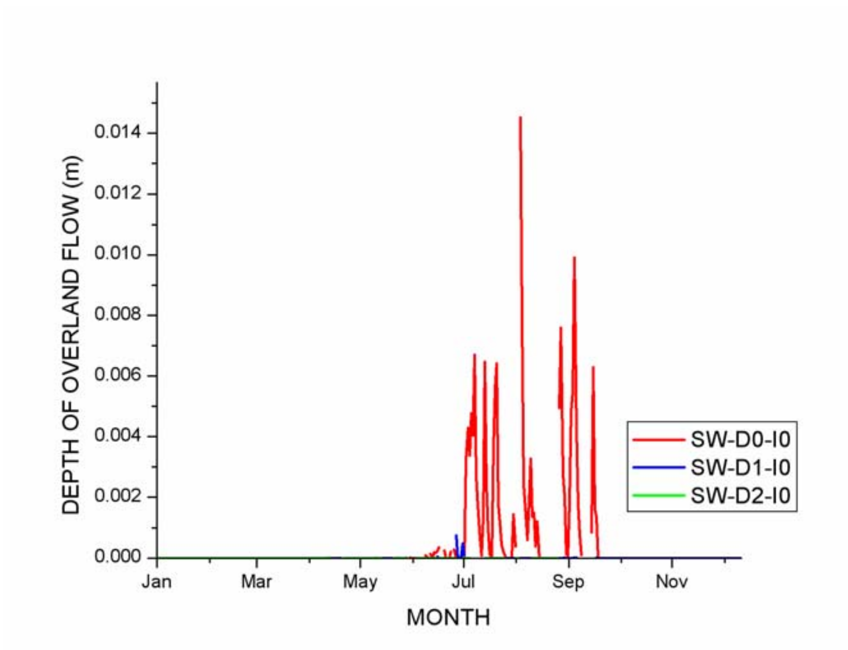

Figure 7.1: Impact of 1 and 2 m Deep Drains on Daily Overland Flow in Wet Climate.

Figure 7.1 shows that overland flow was generated during winter rainfall varied from 6 to 14 mm in the absence of 1 and 2 m deep drains. For the scenario SW-D1-I0, 1 m deep drains were installed; the overland flow was generated only for two days. The depth of overland flow for those days was about 0.5 mm. In scenario SW-D2-I0, drains depth was increased to 2 m, no overland flow was observed though out the winter season. This shows that during winter rainfall in wet climate 1 m deep drain were as effective as 2 m deep drains.

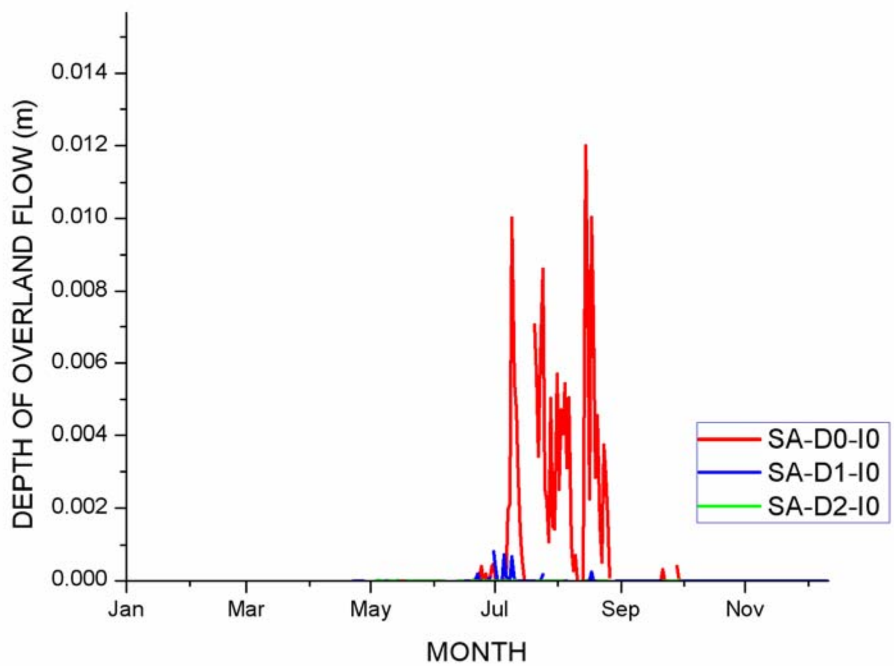

Figure 7.2: Impact of 1 and 2 m Deep Drains on Daily Overland Flow in Average Climate.

7.1.2 Daily Overland flow in Average Climate without Irrigation

Figure 7.2 compares the overland flow with and without 1 and 2 m deep drains for average climate. It can be seen that the maximum depth of overland flow was 12 mm with out drains. It can also be seen that the duration of overland flow in average climate was less than the wet climate.

With 1 m deep drains the maximum depth of overland flow was about 0.7mm. The overland flow also occurred for seven days with 1 m deep drains. In case of wet climate, it occurred only for three days. The depths of overland flow during wet and average climate are dependent on the rainfall amount, duration and intensity. Therefore, we can conclude that the rainfall amount, duration and intensity during winter season were higher in average climates as compared to wet climate.

No overland flow was observed with 2 m deep drains. The comparison of overland flow generated by 1 and 2 m deep drains during winter season in average climate reveals that 1 m deep drains were as effective as 2 m deep drains in controlling overland flow.

The depth of overland flow is a clear indication of flooding. It may reveal that the unsaturated zone is fully saturated (in case of Saturation Excess hydrological process) and water is standing on the ground surface and is ready to flow toward the lower slope. Therefore, Figure 7.1 and 7.2 shows the potential risk of flooding once the overland flow depth is over two millimeter in depth at any particular day. We can conclude that by having 1 and 2 m deep drains in wet and average climate the risk of flooding due to overland flow was reduced considerably.

7.1.3 Daily Overland flow in Dry Climate without Irrigation

No overland flow generated in dry climate for all three scenarios simulated for drain depth D0, D1 and D2. It is important to mention here the two different hydrological processes which generate overland flow. The first hydrological process (Infiltration Excess) generates overland flow when infiltration rate is less then irrigation rate or rainfall intensity. The second hydrological process (Saturation Excess) generates overland flow when the unsaturated zone is fully saturated; any rainfall or irrigation water applied will result in overland flow. Waterlogging is dependent on the unsaturated zone moisture deficit. For example if unsaturated zone's moisture deficit is only 5%, it would not have any overland flow but it might be waterlogged. The reason is that the water table will be very close to ground surface and unsaturated zone is 95% filled with water.

7.1.4 Daily Overland flow with 10 ML/ha-annum Irrigation in Wet Climate

Most of the farmers in SWIA apply irrigation at a rate of 10 ML/ha-annum using flood irrigation method. Figure 7.3, 7.4 and 7.5 shows the temporal impact of 10 ML/ha-annum irrigation with and without 1 and 2 m deep drains in wet, average and dry climate respectively.

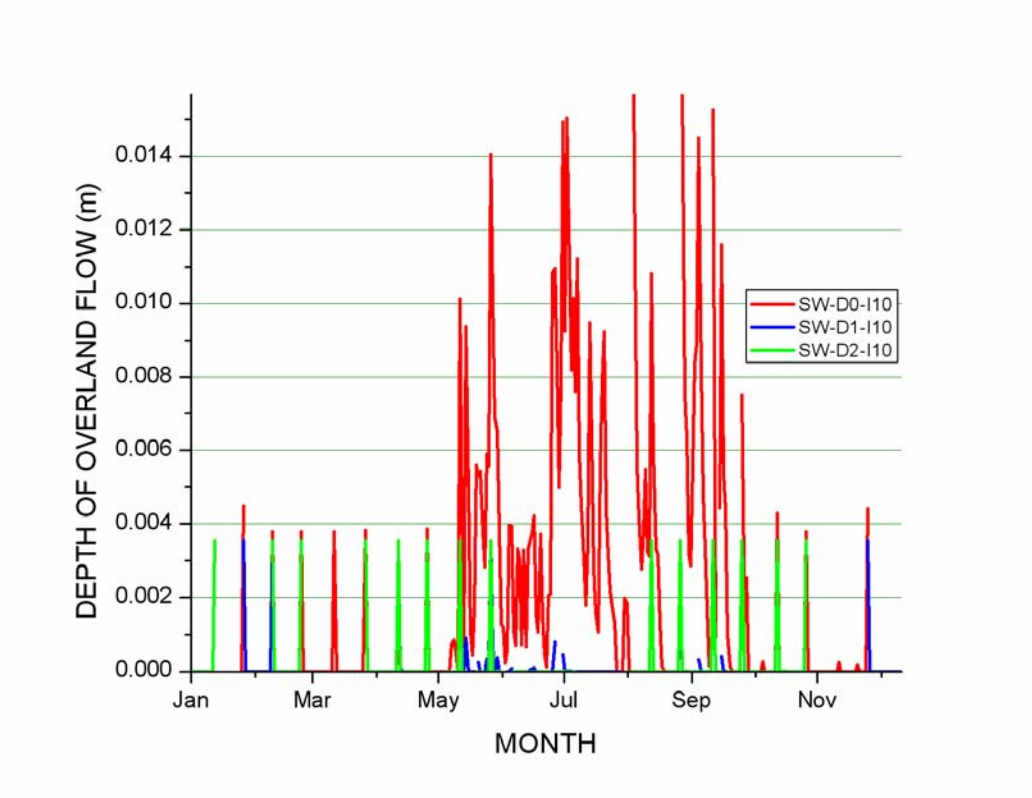

Figure 7.3: Impact of 1 and 2 m Deep Drains on Daily Overland Flow in Wet Climate and 10 ML/ha-annum Irrigation.

Figure 7.3 shows a sharp jump in the overland flow in winter season with 10 ML/ha-annum irrigation with no drains. If we compare the result of overland flow without irrigation for same climate we see the overland flow was less. The Maximum overland flow in SW-D0-I10 was 16 millimeter. There was reasonable overland flow under 1 and 2 m deep drain scenario with 10 ML/ha-annum irrigation. Important outcome in Figure 7.3 is that with 1 and 2 m deep drains the overland flow was nearly same throughout the irrigation application time. The amount of overland flow in case of SW-D1-I10 and SW-D2-I10 was about 3 millimeters. These results indicate that the irrigation rates were higher and unsaturated zone was fully saturated. This would have resulted in excessive wastage of irrigation water. The optimum rate of irrigation would have been somewhere between 6 to 8 ML/Y per hectare instead of 10 ML/ha-annum. The overland flow is generated when either the unsaturated zone is fully saturated or the rainfall or irrigation application is higher than the infiltration rate. Excessive irrigation was resulted in overland flow as well as excessive recharge to the water table. Therefore waterlogging was observed after irrigation which would have impacted the crop productivity.

7.1.5 Daily Overland flow with 10 ML/ha-annum Irrigation in Average Climate

Figure 7.4 shows the depth of daily overland flow for average climate under un-drained and 1 and 2 m deep drain. The pattern of overland flow for wet and average climate is nearly same except the scenarios SW-D0-I0 and SW-D0-I10. The maximum depth of overland flow in SW-D0-I0 and SA-D0-I10 was 16 and 9.5 millimeters respectively. This shows the difference of 6.5 millimeter of overland flow in both scenarios mentioned above. This increase in the overland flow depth is the effect of wet climate.

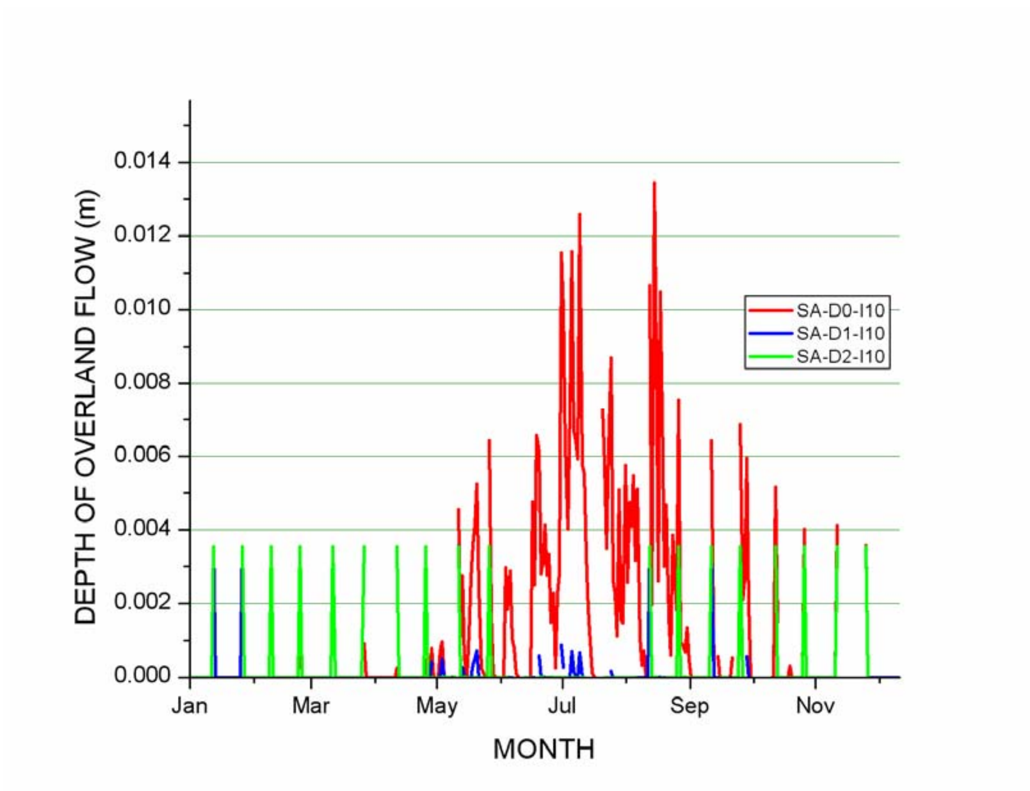

Figure 7.4: Impact of 1 and 2 m Deep Drains on Daily Overland Flow in Average Climate and 10 ML/ha-annum Irrigation.

7.1.6 Daily Overland flow with 10 ML/ha-annum Irrigation in Average Climate

Figure 7.5 shows the impact of un-drained and one and 2 m deep drains performance during dry climate with 10 ML/ha-annum irrigation rate. It can be seen that due to the irrigation applications, the maximum overland flow with un-drained scenarios was about 6.5 millimeters. With 1 and 2 m deep drains the maximum overland flow depth was about 5.5 and 3.5 millimeters respectively. There was no overland flow during dry climate when no irrigation was applied.

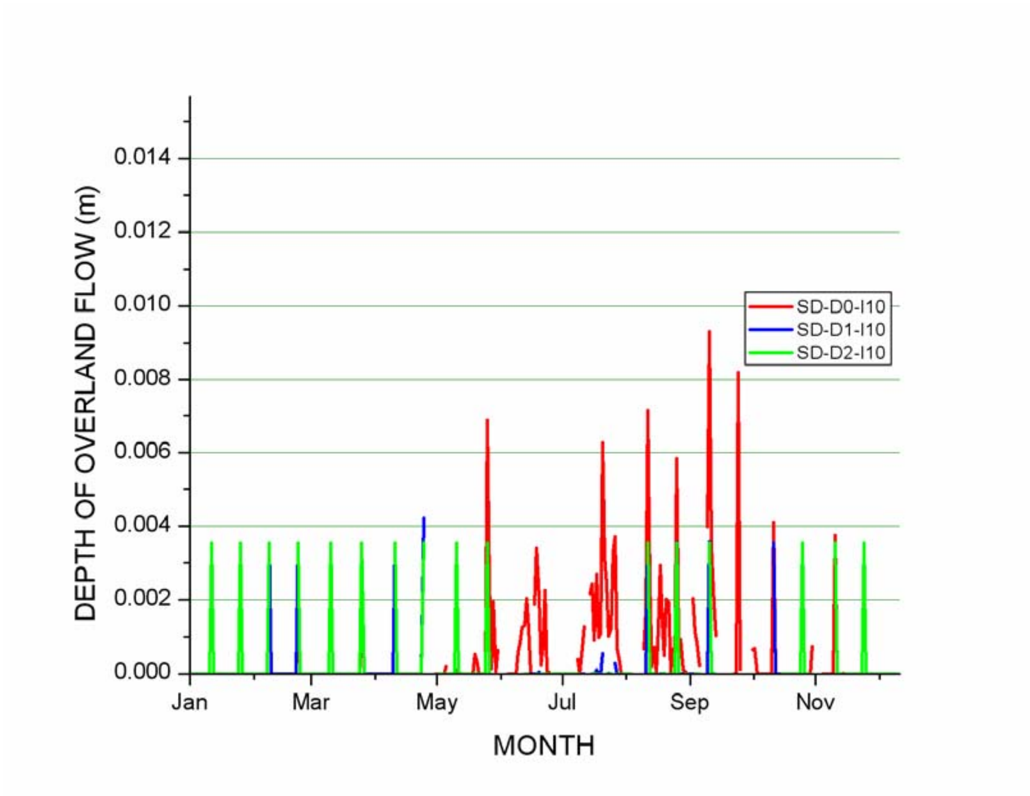

Figure 7.5: Impact of 1 and 2 m Deep Drains on Daily Overland Flow in Dry Climate and 10 ML/ha-annum Irrigation.

7.1.7 Daily Overland flow with 16 ML/ha-annum Irrigation in Wet Climate

Few farmers apply irrigation water to the pasture crop at a rate of 16 ML/ha-annum in the SWIA using flood irrigation method.

Figure 7.6, 7.7 and 7.8 shows the performance of 1 and 2 m deep drain as compare to un-drained scenario with 16 ML/ha-annum irrigation in wet, average and dry climates respectively.

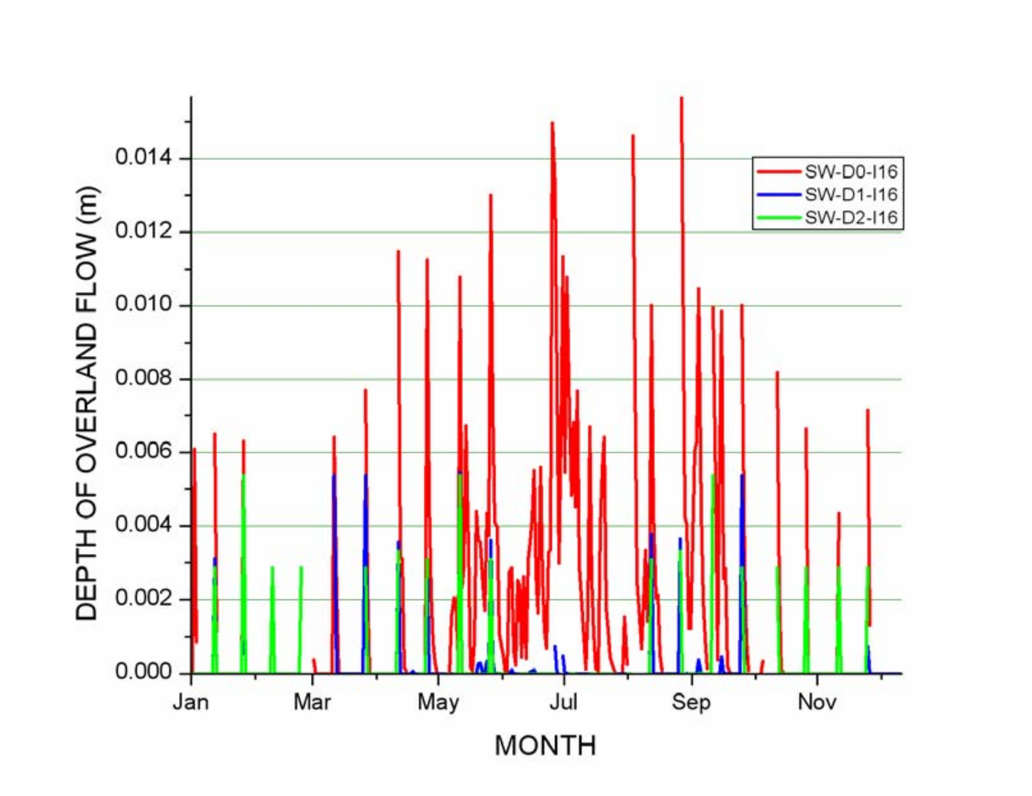

Figure 7.6: Impact of 1 and 2 m Deep Drains on Daily Overland Flow in Wet Climate and 16 ML/ha-annum Irrigation.

Figure 7.6 show that the maximum depth of overland flow with 16 ML/ha-annum irrigation was 17 millimeters in un-drained scenario. The maximum overland flow in case of 1 and 2 m deep drains scenarios was 5.7 and 4.6 millimeter respectively. These results infer that the 16 ML/ha-annum irrigation always generated overland flow. The amount of overland flow generated by 16 ML/ha-annum irrigation was more than 10 ML/ha-annum irrigation rate. With 16 ML/ha-annum irrigation resulted in the wastage of water resource and poor crop productivity. Waterlogging would also be more with 16 ML/ha-annum irrigation than 10 ML/ha-annum irrigation rate.

7.1.8 Daily Overland flow with 16 ML/ha-annum Irrigation in Average Climate

Figure 7.7 shows the impact of 16 ML/ha-annum irrigation on the drains performance in average climate. If we compare the results shown in Figure 7.2 with Figure 6.12, we can conclude that 16 ML/ha-annum irrigation had generated significant overland flow. The overland flow was maximum during winter time in average climate. The duration of overland flow was more in case of 16 ML/ha-annum irrigation as compare to the scenario in which no irrigation was applied.

Overland flow was also observed with 1 and 2 m deep drains. The reason for this is the amount of irrigation applied at a particular day when overland flow took place. For example on 15th of February 80mm of irrigation water was applied in average climate. This irrigation resulted in 5.5 mm of overland flow on that particular day. Therefore it can be concluded that over irrigation will result in overland flow.

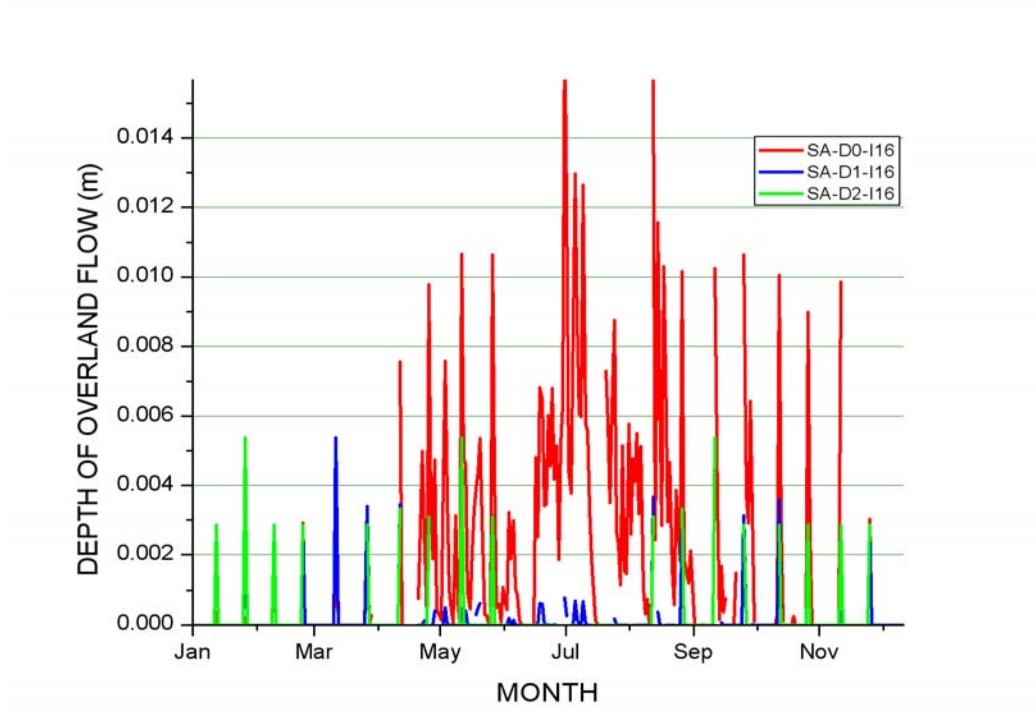

Figure 7.7: Impact of 1 and 2 m Deep Drains on Daily Overland Flow in Average Climate and 16 ML/ha-annum Irrigation.

7.1.10 Daily Overland flow with 16 ML/ha-annum Irrigation in Dry Climate

Figure 7.8 shows the daily overland flow with 16 ML/ha-annum irrigation for dry climate. Without irrigation no overland flow was observed. The maximum overland flow was occurred during winter rainfall. It can be noticed that the duration and amount of overland flow was less as compare to the wet and average climate.

The impact of one and 2 m deep drains was similar in dry climate as it was in wet and average climate. The only difference was the amount of overland flow. In dry climate, the overland flow was less as compare to wet and average climate.

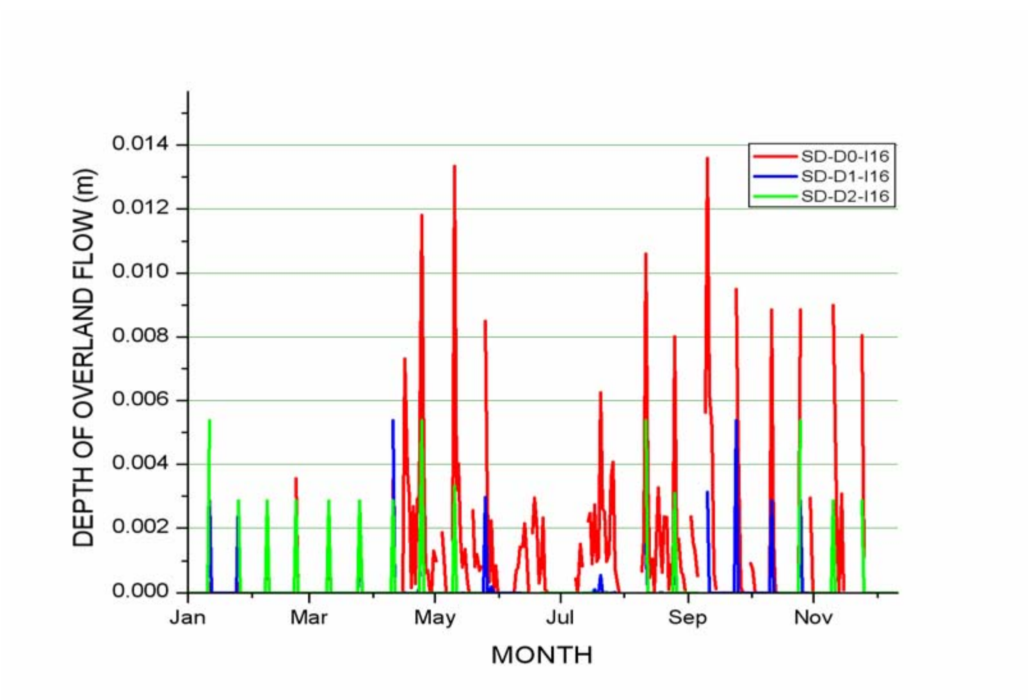

Figure 7.8: Impact of 1 and 2 m Deep Drains on Daily Overland Flow in Dry Climate and 16 ML/ha-annum Irrigation.

7.2 MONTHLY AND ANNUAL VOLUMES OF OVER LAND FLOW

Drains are constructed in waterlogged and saline areas to reclaim the affected agricultural land for optimum productivity. During winter seasons and irrigation drains usually remove a considerable amount of water. In previous sections of this chapter it was concluded that the moisture in the presence of drain in unsaturated zone was less as compare to un-drained scenarios. The implications of less moisture content in unsaturated zone on overland flow are negative. The presence of 1 or 2 m deep drains resulted in less overland flow. Therefore, less runoff would generate. This would reduce the amount of water flowing into the stream and river which would reduce the flooding and environmental risk in the down stream areas. But on the other hand the increased amount of drained volumes during rainfall and irrigation will increase the risk of flooding in the downstream environment.

The combined quantity and quality of overland and drained flow will determine the risk of flooding in the downstream areas. In this section we will analyse the annual volumes of overland flow from Appendix 4.

7.2.1 Monthly and Annual Overland Flows without Drains

Figure 7.9 and 7.10 show monthly depth and annual volume of overland flow for nine sets of un-drained scenarios respectively with and without 10 and 16 ML/ha-annum irrigation applications.

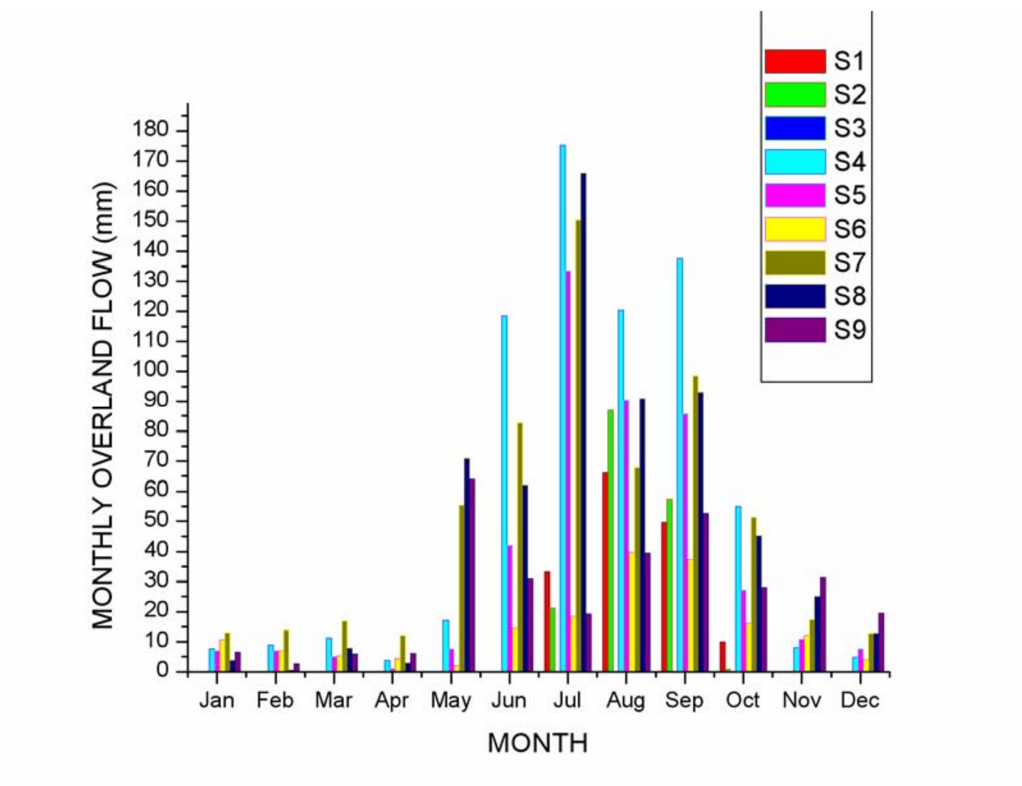

Figure 7.9: Monthly Volumes of Overland Flow Un-drained Scenarios.

From Figure 7.9 and Table 7.1, it can be seen that for the first three scenarios SW-D0-I0, SA-DO-I0 and SD-D0-10, without irrigation and drainage, monthly overland flow was negligible as compare to the scenarios in which 10 and 16 ML/Y irrigation was applied.

Table 7.1: Monthly Overland Flow for Un-drained scenarios.

MONTH	OVERLAND FLOW IN SCENARIOS WITHOUT DRAINS (mm)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
JAN	0.01	0.00	0.00	7.63	7.07	10.61	13.13	3.85	6.49
FEB	0.02	0.00	0.00	8.92	7.08	7.08	13.94	0.57	2.64
MAR	0.02	0.00	0.00	11.38	5.08	5.20	16.93	7.96	5.88
APR	0.02	0.00	0.00	3.83	0.91	4.44	12.25	2.92	6.17
MAY	0.03	0.02	0.01	17.19	7.74	2.17	55.47	70.99	63.93
JUN	0.15	0.01	0.02	118.44	41.97	14.48	82.77	62.01	30.81
JUL	33.28	21.23	0.01	175.18	133.38	18.35	150.39	166.01	19.37
AUG	66.13	86.93	0.02	120.31	90.42	39.63	67.81	90.97	39.46
SEP	49.49	57.35	0.02	137.63	85.68	37.43	98.44	93.03	52.65
OCT	10.13	0.73	0.00	54.97	27.25	16.05	51.23	45.30	28.01
NOV	0.00	0.00	0.00	8.07	10.96	12.14	17.28	25.09	31.35
DEC	0.00	0.00	0.00	4.84	7.71	3.91	12.80	12.89	19.41

Table 7.1 shows that more overland flow was generated during winter rainfall and with scenarios S4 to S9 in which 10 and 16 ML/ha-annum irrigation was applied. This shows that during winter rainfall and with irrigation applications, more overland flow may cause risk of flooding as compare to non-irrigated scenarios. Therefore, the role of drains is important to reduce the overland flow. This is discussed in detail in next section.

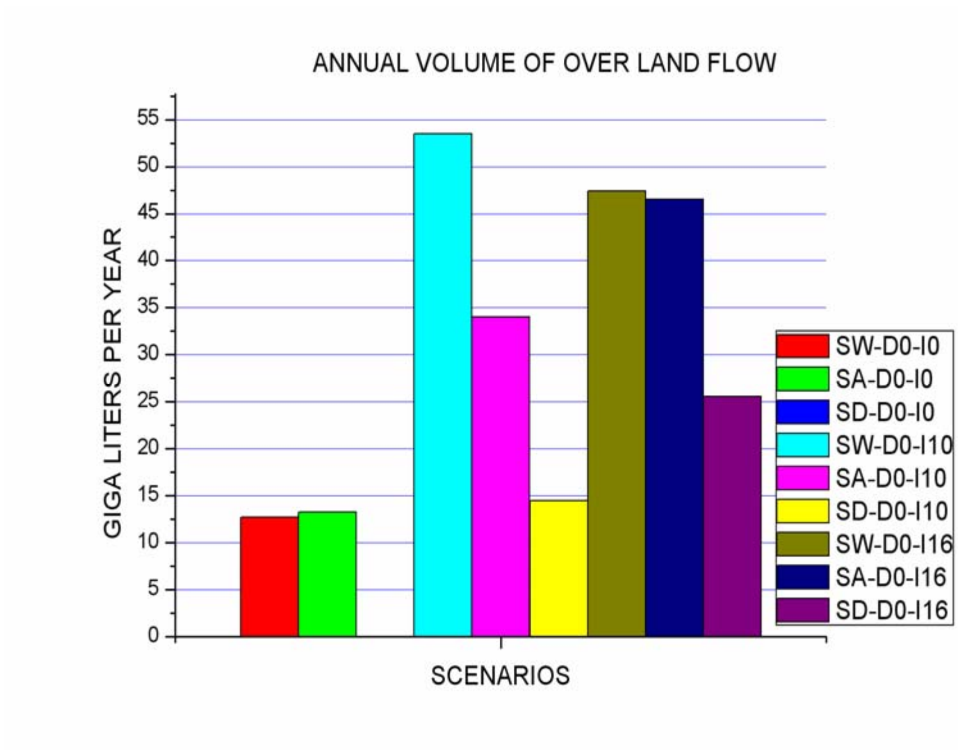

Figure 7.10: Annual Volumes of Overland Flow for Un-Drained Scenarios.

Figure 7.10 shows the annual volume of overland flow in Giga litres (GL) calculated by multiplying the depth of overland flow with the area. It can be seen that 54 GL of water can flow on the land surface annually during 10 ML/ha-annum irrigation applications. Without 10 ML/ha-annum irrigation rate it is only 8 GL during wet climate. In dry climate there was no overland flow. With 16 ML/Y irrigation application rate the overland flow was about 48 GL during wet climate. The reason for less overland flow with 16 ML/Y irrigation rate as compare to 10 ML/Y irrigation is not clear. MIKE SHE probably could not handle some of the heavy flux of water during 16 ML/Y irrigation rate along with heavy rainfall events. This could be verified by running Water Balance Module of MIKE SHE to see the water balance errors during the days when irrigation and rainfall events were happening simultaneously.

7.2.2 Monthly and Annual Overland Flows with 1 m Deep Drains

Figure 7.10 and 7.11 shows the monthly depth and annual volume of overland flow for the 1 m deep drains scenarios respectively. The comparison of Figure 7.9 and 7.11 without drains and with drains reveal that there was significant decrease in overland flow depths in irrigated and non-irrigated scenarios. It can be seen that the monthly overland flow in January with and without 1 m deep drains was same (7mm) in wet climate. In July, it was 1.49 and 174.00mm with and without 1 m deep drains respectively. This indicates very strong influence of 1 m deep drains in managing overland flow and local flooding/waterlogging risk.

Table 7.2: Monthly Overland Flow for 1 m Deep Drained Scenarios.

MONTH	OVERLAND FLOW IN SCENARIOS WITH ONE METER DEEP DRAINS (mm)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
JAN	0.01	0.00	0.00	7.09	7.08	10.62	5.97	5.97	8.84
FEB	0.02	0.00	0.00	7.08	7.08	7.08	6.21	5.74	5.74
MAR	0.02	0.00	0.00	10.62	10.62	7.09	16.11	11.11	5.74
APR	0.02	0.00	0.00	3.54	3.54	7.09	5.37	3.40	6.47
MAY	0.03	0.02	0.01	10.71	11.54	7.77	12.18	8.04	6.53
JUN	0.02	0.00	0.02	6.44	5.31	3.61	5.23	5.24	3.15
JUL	1.28	2.98	0.01	1.49	3.28	0.05	1.43	3.81	0.04
AUG	0.01	0.17	0.02	0.01	0.17	0.93	0.01	0.17	0.66
SEP	0.02	0.26	0.02	5.92	7.07	7.11	7.79	7.02	2.98
OCT	0.01	0.01	0.00	7.50	7.66	3.54	8.18	3.95	5.38
NOV	0.00	0.00	0.00	7.08	7.08	10.62	5.74	6.47	8.61
DEC	0.00	0.00	0.00	7.08	7.09	3.54	3.62	3.25	2.87

Table 7.2 clearly indicates that 1 m deep drains performed efficiently in managing overland flow hence localized waterlogging and flooding for wet, average and dry climates with and without 10 and 16 ML/ha-annum irrigation application rates.

Table 7.2 shows that there was no overland flow for scenarios S10 (SW-D1-I0), S11 (SA-D1-I0) and S12 (SD-D1-I0) in the month of January. In July the overland flow was 1.28, 2.98 and 0.01 mm for scenarios S10 (SW-D1-I0), S11 (SA-D1-I0) and S12 (SD-D1-I0) respectively. This result indicates that there was nearly no overland flow after the installation of 1 m deep drains.

For the scenarios in which 10 and 16 ML/ha-annum irrigation was applied, overland flow was varying from 0.04 to 16.11 mm for wet average and dry climate. This reveals that 1 m deep drains were equally efficient in managing overland flow/waterlogging and flooding in wet, average and dry climate with 10 and 16 ML/ha-annum irrigation application rate.

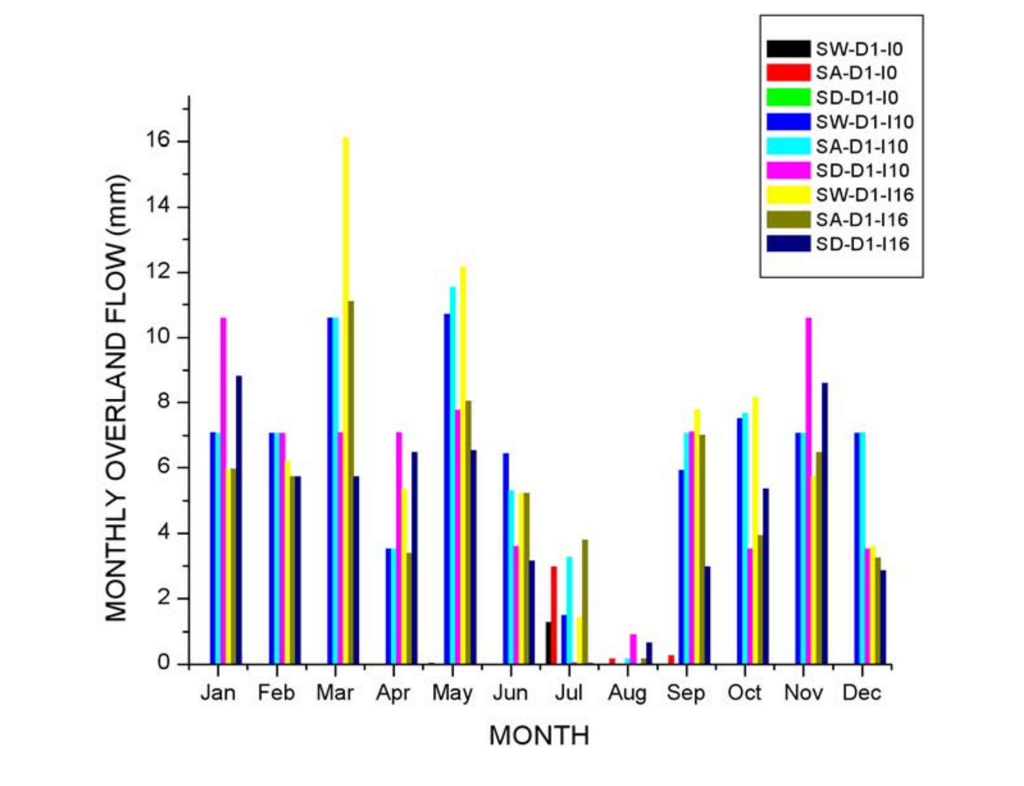

Figure 7.10: Monthly Volumes of Overland Flow for 1 m Deep Drained Scenarios.

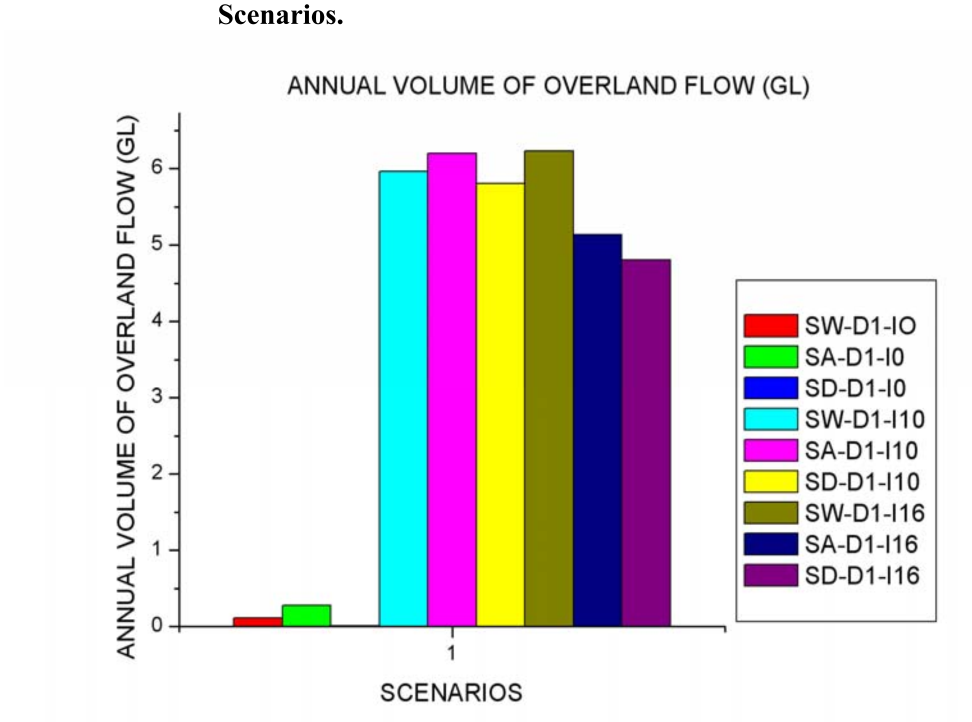

Figure 7.11: Annual Volumes of Overland Flow for 1 m Deep Drained Scenarios.

7.2.3 Monthly and Annual Overland Flows with 2 m Deep Drains

Figure 7.12 and 7.13 shows the monthly depth and annual volume of overland flow with 2 m deep drains and with and without 10 and 16 ML/ha-annum irrigation applications.

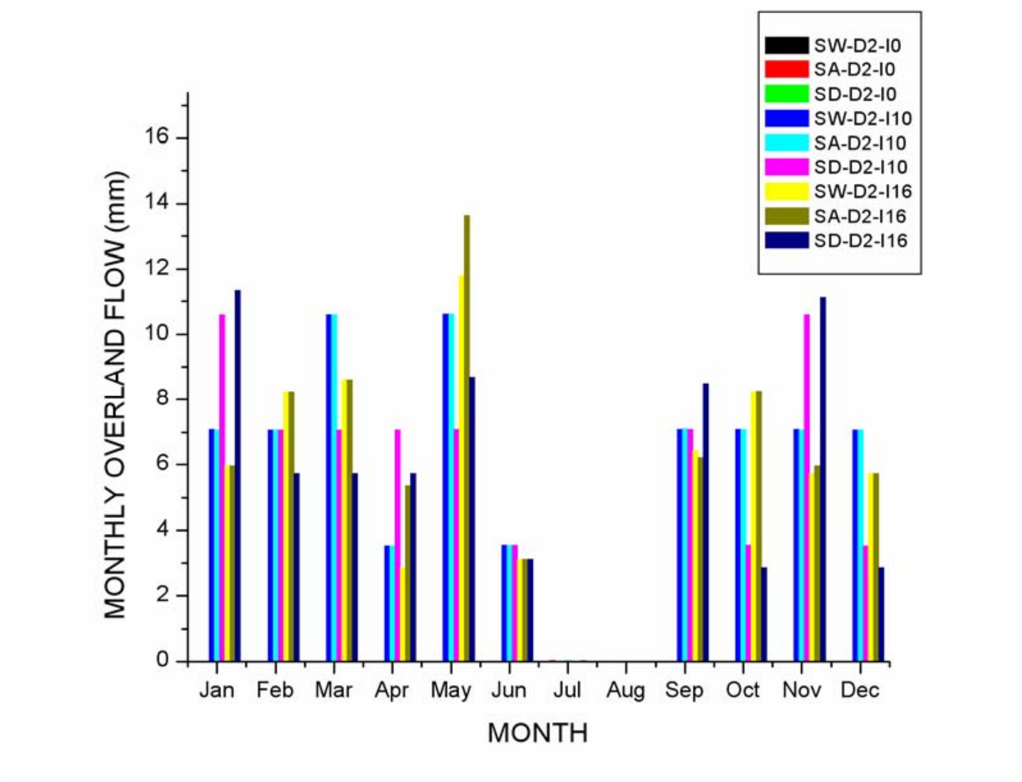

Figure 7.12: Monthly Volumes of Overland Flow for 2 m Deep Drained Scenarios.

Figure 7.12 shows the depth of overland flow with 2 m deep drains with and without 10 and 16 ML/ha-annum irrigation application rate. It can be noticed that the depth of overland flow was much less than the un-drained scenarios (Figure 7.9). There is not much difference in the overland flow depth with 1 and 2 m deep drains (Figure 7.11 and 7.13). Therefore, it can be conclude that 1 m deep drains were sufficient to manage the overland flow with and without irrigation application in SWIA.

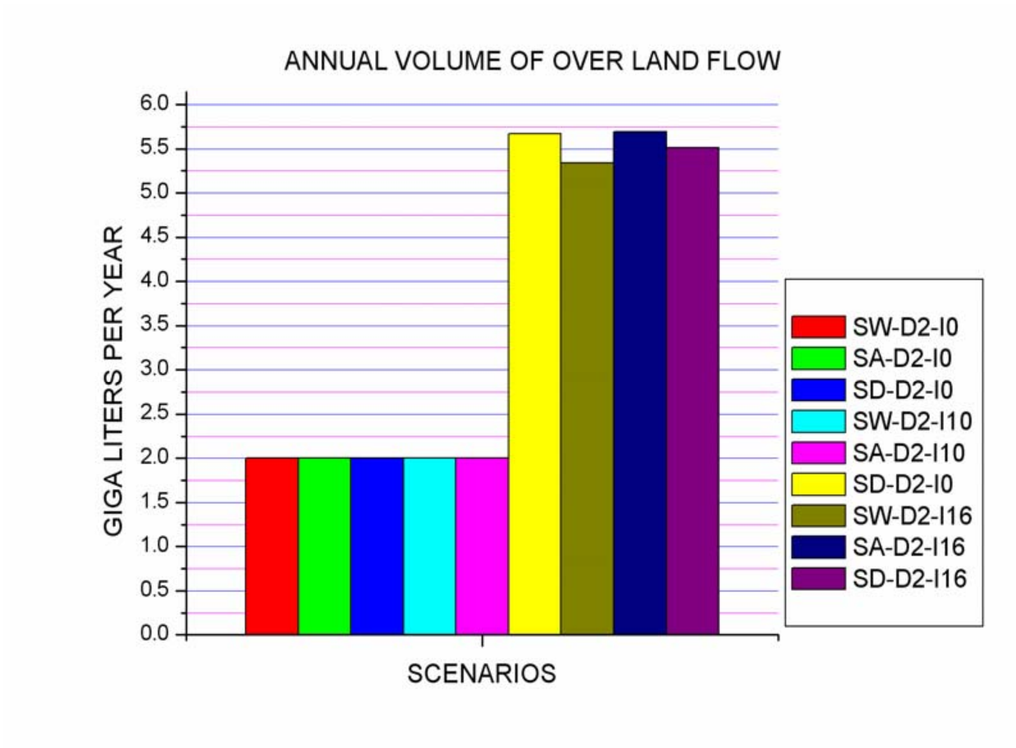

Figure 7.13: Annual Volumes of Overland Flow for 2 m Deep Drained Scenarios.

Similarly, the comparison of Figure 7.11 and 7.13 for the annual overland flow volumes reveals that the performance of 1 and 2 m deep drains was nearly similar. Specifically during wet and average climate with 10 and 16 ML/ha-annum irrigation, the annual overland flow volume was same for 1 and 2 m deep drains.

Table 7.3: Monthly Overland Flow for 1 m Deep drained scenarios.

MONTH	OVERLAND FLOW IN SCENARIOS WITH TWO METER DEEP DRAINS (mm)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
JAN	0.00	0.00	0.00	7.10	7.08	10.62	5.97	5.97	11.34
FEB	0.01	0.00	0.00	7.08	7.08	7.08	8.24	8.24	5.74
MAR	0.01	0.00	0.00	10.62	10.62	7.08	8.61	8.61	5.74
APR	0.01	0.00	0.00	3.54	3.54	7.08	2.87	5.38	5.74
MAY	0.02	0.01	0.01	10.63	10.64	7.10	11.80	13.63	8.70
JUN	0.02	0.01	0.01	3.56	3.55	3.55	3.11	3.12	3.11
JUL	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02
AUG	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.01
SEP	0.01	0.01	0.02	7.09	7.11	7.10	6.43	6.22	8.49
OCT	0.00	0.01	0.01	7.09	7.09	3.55	8.24	8.25	2.87
NOV	0.00	0.00	0.01	7.09	7.08	10.62	5.75	5.97	11.12
DEC	0.00	0.00	0.00	7.08	7.08	3.54	5.74	5.74	2.87

Table 7.3 shows the monthly depth of overland flow for 2 m deep drains with and without 10 and 16 ML/Y irrigation application rate. If we compare the values in Table

7.2 and 7.3, we conclude that the performance of one and tow metre deep drains in controlling overland flow was nearly similar.

Table 7.4 shows the annual volumes of overland flow for all twenty seven scenarios for wet, average and dry climate with zero, ten and sixteen mega litres per year per hectare irrigation application.

Table 7.4 Annual Volumes of Overland Flow for all Twenty Seven Scenarios.

IRRIGATION (ML/Y/H)	ANNUAL VOLUME OF OVERLAND FLOWS (GL)								
	WET CLIMATE			AVERAGE CLIMATE			DRY CLIMATE		
	NO DRAIN	1 M DRAIN	2 M DRAIN	NO DRAIN	1 M DRAIN	2 M DRAIN	NO DRAIN	1 M DRAIN	2 M DRAIN
0	12.74	0.11	0.1	13.3	0.28	0.01	0.01	10.52	0.01
10	53.47	5.96	5.67	34.02	6.2	5.67	14.46	5.81	5.67
16	47.4	6.23	5.51	46.54	5.14	5.69	25.58	4.81	5.51

Table 7.4 reveals very interesting results for the effectiveness of the surface water management for overland flow and downstream flooding. It can be seen in Table 7.4 and confirmed from Figure 7.8 to 7.11 that the difference in 1 and 2 m deep drains in removing overland flow during wet, average and dry climate is not significant. This shows that if waterlogging and overland flooding is the problem in poor land productivity and downstream flooding, 1 m deep drains are one of the option to address the problem.

The annual volume of overland flow depends on the rainfall intensity and duration as well as use of irrigation water during wet, average and dry climates. Higher rainfall intensity and duration during winter time in any climate would generate more overland flow as compare to less intense and short rainfall events. The overland flow is generated by two different phenomena of infiltration and saturation excess. If unsaturated zone deficit is more and rainfall intensity is less, the volume of overland flow will also be less. The opposite is true for the generation of more overland flow. Therefore the pattern, intensity and duration of rainfall in all three climates are also important to understand the potential of overland flow volume generated in a particular climate.

These results reveal that if the rainfall pattern, intensity and duration were supposed to be similar, in all three climates, the effectiveness of 1 m deep drains was more than the 2 m deep drains in controlling the flooding and waterlogging as compare to 2 m deep drains during wet and average climate. By increasing drains depth up to 2 m, a negligible difference was observed. Therefore, it is recommended that the depth of drain should be decided very carefully according to the problem nature and severity. It should be examined carefully in which climate they are going to be designed. In wet and irrigated areas we definitely need drains and in dry and non irrigated area we may live without drains.

7.3 AMOUNT OF WATER DRAINED

Increased drain flow from the drained area can also provide a viable water resource if its water quality is suitable for domestic, agricultural or industrial use. The amount of the drained water from a given area can easily be estimated by using the Water Balance Module of the MIKE SHE family. A comprehensive procedure for using the Water Balance Module is given in MIKE SHE Reference Guide and Technical Manual. In this study, the Water Balance Module has not been used for all twenty seven scenarios as it is out of the scope of this study. However, Water Balance Modules was run for calibration and validation of MIKE SHE for checking the water balance errors. The water balance errors of a particular simulation represent the accuracy of the MIKE SHE results. If the accumulated water balance errors were more than one percent, the simulations results were not accepted and a new simulation was run by adjusting the soils hydraulic properties parameters.

Water Balance Module was also used for SW-D1-I0, SD-D1-I0, SW-D1-I16, SW-D2-I16, SD-D1-I16 and SD-D2-I16 scenarios to check the water balance outputs and errors produces by MIKE SHE simulations during the second phase of the study. The outputs of Water Balance Module for above mentioned scenarios are very large. Therefore, the results of Water Balance Module have been burnt on a DVD and are available from the Civil Engineering Department of Curtin University, WA, Australia.

Water Balance results were analysed for above mentioned scenarios to extract drain outflow from the area. The drain outflows of theses scenarios from the area were compared with each other in a sequential way to understand the possibility that how much water would be harvested and what would be flooding risk in the downstream environment under each scenario. The next section describes the importance of these results in assessing flooding risks.

Scenarios SW-D0-I0 and SD-D0-I0 were selected as a base line to compare the drain outflow with 1 and 2 m deep drains during wet and dry climate. It has been mentioned above that scenarios SW-D0-I0 and SD-D0-I0 had no drainage, therefore would have zero drain outflow. The results of drain outflow from the Water Balance Module of MIKE SHE were extracted for SW-D1-I0, SD-D1-I0, SW-D1-I16, SW-D2-I16, SD-D1-I16 and SD-D2-I16 and analysed.

The comparison of the above mentioned scenario analysis was used to estimate drains outflow generated by 1 and 2 m deep drain during wet and dry climate with and without 16 ML/ha-annum irrigation. The comparison is shown in Table 7.5.

Table 7.5: Drain outflow (Discharge) from the area (mm).

Irrigation rate ML/Y/H	Drain Depth			
	1 metre		2 metres	
	Wet	Dry	Wet	Dry
0	298	59	623	337
16	566	312	886	596

Table 7.5 revealed very interesting results about the effectiveness of the 1 and 2 m deep drains in wet and dry climate with and without 16 ML/ha-annum irrigation application. The depth of drained water in wet and dry year without irrigation for 1 m deep drain was 298 and 59mm respectively. This indicates that the 1 m deep drain removed nearly five times more water from the area during wet climate as compare to the dry climate. On other hand when 16 ML/ha-annum irrigation was applied, the 1 m deep drains removed 312mm of water during dry climate.

This is very important conclusion, which shows that even in dry climate; drains would be working effectively under 16 ML/ha-annum irrigation. The 16 ML/ha-annum irrigation is considered as heavy/excessive irrigation. Therefore, in over irrigated area, 1 m deep drain would be required to remove excessive water even in dry climate. Another interesting result can be seen in Table 7.5 is the amount of water removed by 2 m deep drain without any irrigation application in wet and dry climates. This was 623 and 337 mm in wet and dry climates respectively. This result indicates that 2 m deep drains were removing water from the area even in dry climate.

The amount of water removed by 1 and 2 m deep drains during dry climate without irrigation application was 59 and 337 mm. Its mean by increasing the depth of drain from 1 to 2 m the amount of water removed was nearly five and a half times more during dry climate. Most of this water was coming from the saturated zone. This shows that the 2 m deep drains lower the water table in the dry climate.

CHAPTER 8

CONCLUSIONS

8.1 INTRODUCTION

MIKE SHE was calibrated on a set of four observation wells and stream flow data from the SWIA catchment. The calibrated MIKE SHE was validated on a set of two observations well data. The correlation between simulated and observed water table data was varying from 0.7 to 0.87.

The calibrated MIKE SHE was used to simulate twenty seven scenarios with different drains depth, irrigation application and climates. The effectiveness of the 1 and 2 m deep drains was compared with un-drained scenarios. The results of simulation for water table depth, unsaturated zone deficit, exchange between unsaturated and saturated zones, drain outflow and overland flow were used to analyse the performance of 1 and 2 m deep drains.

8.2 PERFORMANCE OF DRAINAGE WITH OR WITHOUT IRRIGATION

Overall performance of 2 m deep drains was better than 1 m deep drains during winter rainfall season. The 1 m deep drains were more effective in wet and average climate as compare to dry climate.

The recharge in case of un-drained scenarios was very high as compare to the 1 and 2 m deep drains scenarios. The recharge in case of 1 m deep drains was higher than 2 m deep drains. Recharge in case of un-drained, 1 and 2 m deep drains scenarios during dry climate and in summer season was almost same. This indicated that the performance of one and 2 m deep drains during dry climate and summer season was negligible.

The extent of waterlogging in un-drained scenarios was consistently observed during wet and average scenarios in winter rainfall season. In wet climate the duration of water logging was higher than the average climate in winter season. There was no waterlogging during winter rainfall for dry climate. The water table during winter season for wet and average climate was on ground level. For dry climate, during winter rainfall water table was about 0.9 metre deep.

One and 2 m deep drains were more effective during 10 and 16 ML/ha-annum irrigation applications in wet, average and dry years. One metre deep drains performed better with 10 ML/ha-annum than 16ML/Y per hectare irrigation application. Two metres deep drains excessively removed water from the unsaturated zone and water deficit was higher as compare to 1 m deep drain during summer season. In winter season, 2 m deep drains didn't resulted in unsaturated zone deficit as compare to summer season. Therefore, it can be concluded that the performance of the 2 m deep drains was better during winter season in wet climate.

In nutshell, the performance of 1 and 2 m deep drains depends on the dynamic of recharge. If there is excessive recharge because of heavy irrigation or rainfall, 2 m deep drains will perform better. The recharge is a dynamic process and existence of deep drains during no recharge and lower water table will affect the unsaturated zone. The unsaturated zone deficit would increase and crops productivity would be affected. Therefore, before deciding and designing any drainage project a careful analysis is required to estimate the amount of recharge supposed to be removed by the drains. It has been mentioned that recharge is not a constant parameter instead it is dynamic in nature so this is a great challenge to estimate its value for correct drain depth.

8.3 SUGGESTION FOR FUTURE RESEARCH

MIKE SHE is an advance integrated model. It was out of the scope of this study to use all of the capabilities of MIKE SHE integrations. Therefore, there are many suggestions for future research, some of them are listed below:

1. MIKE SHE can be integrated with river network by using MIKE 11. The linkage between MIKE SHE and MIKE 11 will include the river network for better estimation of over bank flooding.
2. Unsaturated zone modelling in this study has been accomplished by using Richard Equation. There are two other options available in MIKE SHE i.e. Gravity and Two Layer Unsaturated Zone models. For future study it is

suggested that either of these methods may be used and the difference in the simulation results may be analysed.

3. The spatial distribution of the soil properties is very challenging. In this study a uniform soil properties were used for modelling MIKE SHE. It is suggested that for future study spatial distributions of the soil properties may be considered if data is available.
4. In this study the lenses of soil were also not taken into account. For future study it is suggested that if data is available on lenses of soil it should be included in the modelling.
5. In this study Finite Difference Method was used for ground water modelling. Linear Reservoir method is also available as an alternate and may be considered for future study.

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APPENDIX 1
(WATER TABLE DEPTHS IN METRE)

DATE	WATER TABLE DEPTHS (m)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
01-01	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
02-01	-1.39871	-1.39872	-1.39871	-1.39788	-1.39807	-1.39799	-1.38116	-1.38839	-1.38099
03-01	-1.39682	-1.39686	-1.39681	-1.34146	-1.35262	-1.3434	-1.19633	-1.20763	-1.19236
04-01	-1.39578	-1.39608	-1.39588	-1.29344	-1.3076	-1.3035	-1.15686	-1.16504	-1.15319
05-01	-1.38949	-1.39643	-1.39595	-1.27168	-1.29402	-1.28279	-1.14493	-1.15416	-1.1423
06-01	-1.39	-1.39777	-1.39697	-1.2681	-1.29163	-1.28098	-1.14278	-1.1539	-1.14232
07-01	-1.39055	-1.39993	-1.39891	-1.26002	-1.29148	-1.28095	-1.1422	-1.1557	-1.14432
08-01	-1.39142	-1.40274	-1.40155	-1.25994	-1.29293	-1.28247	-1.14299	-1.15903	-1.1477
09-01	-1.39279	-1.41243	-1.4047	-1.26081	-1.29557	-1.28515	-1.14496	-1.16943	-1.15763
10-01	-1.40106	-1.41566	-1.41436	-1.26251	-1.299	-1.29477	-1.14783	-1.17407	-1.16824
11-01	-1.40304	-1.4253	-1.42433	-1.27182	-1.30867	-1.2983	-1.15122	-1.18465	-1.18791
12-01	-1.40564	-1.42897	-1.42762	-1.27352	-1.3129	-1.30826	-1.16086	-1.20163	-1.18417
13-01	-1.41472	-1.43889	-1.43756	-1.27678	-1.32353	-1.31258	-1.16517	-1.20621	-1.20097
14-01	-1.41786	-1.44887	-1.44123	-1.2864	-1.34122	-1.32277	-1.1764	-1.21758	-1.19996
15-01	-1.42735	-1.45251	-1.45091	-1.29621	-1.3441	-1.31663	-1.17484	-1.22029	-1.02828
16-01	-1.43778	-1.46222	-1.45475	-1.28028	-1.34116	-1.29272	-1.0143	-1.09981	-1.01123
17-01	-1.44073	-1.46627	-1.46434	-1.24853	-1.31934	-1.28175	-0.99761	-1.07374	-1.01082
18-01	-1.45051	-1.47659	-1.47503	-1.24378	-1.30827	-1.28047	-0.99686	-1.07246	-1.01328
19-01	-1.45428	-1.47987	-1.47837	-1.23632	-1.30708	-1.281	-0.99867	-1.07412	-1.01729
20-01	-1.46408	-1.49644	-1.49476	-1.23693	-1.30772	-1.28277	-1.002	-1.07755	-1.02839
21-01	-1.46715	-1.5001	-1.49772	-1.1885	-1.30981	-1.2855	-0.82486	-1.088	-1.04608
22-01	-1.03383	-1.51081	-1.5012	-0.55848	-1.31299	-1.2952	0.00309	-1.09919	-1.0502
23-01	-0.82033	-1.5141	-1.51116	-0.46319	-1.32304	-1.29849	0.00137	-1.11074	-1.06201
24-01	-0.80919	-1.52377	-1.51436	-0.46574	-1.32693	-1.30829	-0.00557	-1.12215	-1.06655
25-01	-0.81038	-1.52719	-1.524	-0.48485	-1.34317	-1.31216	-0.16505	-1.12697	-1.07728
26-01	-0.82055	-1.53684	-1.52712	-0.51916	-1.34668	-1.32232	-0.22401	-1.13832	-1.08801
27-01	-0.83314	-1.54019	-1.53662	-0.54244	-1.35048	-1.32639	-0.27557	-1.14844	-1.09895
28-01	-0.84553	-1.54956	-1.53972	-0.56521	-1.36004	-1.34265	-0.31545	-1.15225	-1.11067
29-01	-0.85796	-1.5526	-1.54904	-0.59849	-1.37067	-1.34637	-0.35551	-1.16343	-1.12239
30-01	-0.87171	-1.56194	-1.55219	-0.62138	-1.37339	-1.35784	-0.38692	-1.17499	-1.12696
31-01	-0.89184	-1.56508	-1.56169	-0.64471	-1.38341	-1.36068	-0.42848	-1.19281	-1.11565
01-02	-0.89792	-1.57446	-1.56499	-0.59178	-1.38695	-1.35708	0.00547	-1.17919	-0.93484
02-02	-0.91756	-1.57763	-1.57423	-0.52703	-1.39079	-1.33303	0.0014	-1.00196	-0.92078
03-02	-0.93144	-1.5867	-1.58413	-0.53241	-1.3669	-1.32039	-0.01622	-0.99247	-0.92067
04-02	-0.94435	-1.58995	-1.58642	-0.55511	-1.35423	-1.31153	-0.20976	-0.98553	-0.92316
05-02	-0.95765	-1.59881	-1.59628	-0.59281	-1.35157	-1.31124	-0.25907	-0.98721	-0.93452
06-02	-0.97034	-1.60206	-1.59862	-0.61487	-1.35002	-1.31229	-0.30002	-0.99731	-0.93888
07-02	-0.98307	-1.61091	-1.60199	-0.638	-1.3504	-1.31436	-0.34101	-1.00115	-0.9504
08-02	-0.99504	-1.61421	-1.61107	-0.66097	-1.35195	-1.31713	-0.38141	-1.01266	-0.96195
09-02	-1.00749	-1.62398	-1.61438	-0.67786	-1.35451	-1.32662	-0.41308	-1.02535	-0.97389
10-02	-1.02032	-1.62716	-1.62403	-0.70133	-1.35777	-1.33014	-0.4541	-1.04423	-0.98585
11-02	-1.02646	-1.64347	-1.62715	-0.71888	-1.36773	-1.34619	-0.48876	-1.05008	-0.99823
12-02	-1.04465	-1.64564	-1.64339	-0.7408	-1.37874	-1.34992	-0.51257	-1.06228	-1.01052
13-02	-1.05769	-1.64863	-1.64544	-0.76117	-1.38169	-1.36143	-0.54489	-1.07444	-1.0233
14-02	-1.06083	-1.6518	-1.64831	-0.77258	-1.39161	-1.36423	-0.54951	-1.08638	-0.97825
15-02	-1.06344	-1.66118	-1.65136	-0.70478	-1.39537	-1.36163	-0.01334	-1.06558	-0.81015
16-02	-1.06621	-1.66415	-1.66091	-0.60813	-1.40037	-1.34578	-0.01338	-0.88549	-0.8083
17-02	-1.06949	-1.67323	-1.66372	-0.60803	-1.37901	-1.32813	-0.15603	-0.88163	-0.81055
18-02	-1.07961	-1.67609	-1.67295	-0.61349	-1.36706	-1.32608	-0.21463	-0.88349	-0.81464
19-02	-1.08378	-1.68506	-1.67567	-0.63284	-1.36519	-1.32566	-0.25312	-0.88811	-0.82647
20-02	-1.09432	-1.68791	-1.68491	-0.64738	-1.36488	-1.32642	-0.2835	-0.90643	-0.83929
21-02	-1.1052	-1.69695	-1.68747	-0.66909	-1.36595	-1.32819	-0.32434	-0.9196	-0.85279
22-02	-1.11643	-1.69977	-1.69675	-0.68554	-1.36811	-1.33075	-0.36549	-0.93209	-0.87306
23-02	-1.12764	-1.70929	-1.69907	-0.70791	-1.37105	-1.34692	-0.40583	-0.94468	-0.87918

DATE	WATER TABLE DEPTHS (m)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
24-02	-1.13944	-1.71205	-1.70184	-0.73711	-1.38073	-1.34983	-0.43778	-0.95766	-0.89746
25-02	-1.14305	-1.72108	-1.71082	-0.74193	-1.39108	-1.35327	-0.45384	-0.96938	-0.90904
26-02	-1.15172	-1.72377	-1.71355	-0.75959	-1.3936	-1.36343	-0.47287	-0.98073	-0.92146
27-02	-1.1547	-1.73297	-1.72237	-0.78114	-1.40363	-1.36684	-0.50586	-0.99203	-0.93368
28-02	-1.16494	-1.73535	-1.725	-0.78716	-1.40692	-1.37668	-0.52872	-1.00354	-0.85577
01-03	-1.1695	-1.73817	-1.73397	-0.76262	-1.41663	-1.37356	-0.12893	-0.95601	-0.69944
02-03	-1.1803	-1.74662	-1.73643	-0.67695	-1.4143	-1.35071	-0.11392	-0.78442	-0.69986
03-03	-1.19735	-1.74931	-1.7392	-0.67613	-1.38977	-1.33231	-0.16651	-0.77427	-0.71127
04-03	-1.20132	-1.75802	-1.74763	-0.67919	-1.37631	-1.33042	-0.21337	-0.77593	-0.72578
05-03	-1.21308	-1.7605	-1.75039	-0.69088	-1.36631	-1.33029	-0.24329	-0.78658	-0.74682
06-03	-1.21627	-1.76319	-1.75923	-0.70388	-1.36508	-1.33158	-0.28136	-0.79862	-0.76796
07-03	-1.22658	-1.77215	-1.76179	-0.71715	-1.36512	-1.33443	-0.30965	-0.81152	-0.78255
08-03	-1.23729	-1.77476	-1.76469	-0.73712	-1.36618	-1.34963	-0.33894	-0.82436	-0.79562
09-03	-1.24098	-1.7774	-1.77377	-0.74445	-1.36809	-1.35256	-0.36882	-0.83742	-0.8084
10-03	-1.25144	-1.7953	-1.7765	-0.76441	-1.37069	-1.35593	-0.39809	-0.85114	-0.82184
11-03	-1.26206	-1.7956	-1.77868	-0.77866	-1.37982	-1.36586	-0.42809	-0.86467	-0.83528
12-03	-1.26603	-1.7978	-1.79454	-0.80028	-1.38307	-1.36937	-0.45796	-0.87854	-0.84854
13-03	-1.27659	-1.80019	-1.79666	-0.81425	-1.39278	-1.3794	-0.49	-0.89758	-0.86809
14-03	-1.28696	-1.80264	-1.79904	-0.82772	-1.40379	-1.38357	-0.51018	-0.91127	-0.75923
15-03	-1.29108	-1.8113	-1.80149	-0.80252	-1.40643	-1.37098	-0.02126	-0.82343	-0.60152
16-03	-1.301	-1.81356	-1.80398	-0.7105	-1.40403	-1.34255	-0.08002	-0.68115	-0.59903
17-03	-1.31093	-1.8225	-1.80645	-0.7092	-1.38	-1.32085	-0.16434	-0.67402	-0.60203
18-03	-1.31506	-1.82438	-1.81495	-0.71273	-1.36686	-1.31652	-0.21361	-0.68558	-0.62112
19-03	-1.32568	-1.82671	-1.81716	-0.71933	-1.36397	-1.31483	-0.26348	-0.69799	-0.62807
20-03	-1.34446	-1.83514	-1.82598	-0.73796	-1.35611	-1.31465	-0.27906	-0.71295	-0.64798
21-03	-1.34562	-1.83733	-1.82771	-0.74119	-1.357	-1.31552	-0.26814	-0.73398	-0.66864
22-03	-1.34804	-1.83972	-1.82986	-0.74224	-1.3586	-1.31724	-0.26555	-0.75486	-0.67638
23-03	-1.34977	-1.84803	-1.83839	-0.75798	-1.36727	-1.31972	-0.2835	-0.76243	-0.69046
24-03	-1.3513	-1.85029	-1.84026	-0.76101	-1.36984	-1.32277	-0.31174	-0.77545	-0.70405
25-03	-1.35301	-1.85902	-1.8424	-0.76596	-1.37277	-1.32612	-0.34064	-0.78678	-0.71722
26-03	-1.36163	-1.86098	-1.8511	-0.77862	-1.37574	-1.34182	-0.36935	-0.79944	-0.73005
27-03	-1.36374	-1.86315	-1.85292	-0.7917	-1.38548	-1.34472	-0.39772	-0.81195	-0.74935
28-03	-1.36658	-1.87132	-1.85504	-0.80504	-1.38829	-1.3482	-0.42618	-0.8248	-0.76925
29-03	-1.37583	-1.87321	-1.86344	-0.82552	-1.39798	-1.35842	-0.44624	-0.83754	-0.78311
30-03	-1.38606	-1.87529	-1.86536	-0.83802	-1.40126	-1.36187	-0.47401	-0.85025	-0.62375
31-03	-1.38836	-1.88333	-1.86747	-0.8112	-1.41099	-1.35735	0.00499	-0.73441	-0.50601
01-04	-1.39825	-1.88516	-1.87581	-0.70802	-1.40844	-1.33207	0.00255	-0.59067	-0.5083
02-04	-1.40108	-1.88722	-1.87778	-0.70514	-1.38442	-1.31814	5.64E-04	-0.59107	-0.52636
03-04	-1.4108	-1.89558	-1.87996	-0.70683	-1.37122	-1.30919	-0.01304	-0.59482	-0.54615
04-04	-1.4138	-1.8972	-1.88799	-0.71103	-1.36118	-1.30839	-0.16921	-0.61324	-0.5669
05-04	-1.42349	-1.89928	-1.88996	-0.72313	-1.35998	-1.30881	-0.20515	-0.6329	-0.58638
06-04	-1.42661	-1.90144	-1.89214	-0.74323	-1.35973	-1.31016	-0.22185	-0.64048	-0.60589
07-04	-1.43599	-1.90929	-1.90027	-0.74614	-1.36032	-1.31211	-0.24859	-0.66091	-0.61209
08-04	-1.43913	-1.91134	-1.90217	-0.76594	-1.36167	-1.31449	-0.27484	-0.67532	-0.63111
09-04	-1.44824	-1.91351	-1.9043	-0.76865	-1.36364	-1.32365	-0.30099	-0.68659	-0.65212
10-04	-1.45137	-1.92211	-1.91258	-0.77368	-1.36568	-1.32641	-0.3174	-0.69018	-0.65649
11-04	-1.46044	-1.92395	-1.91425	-0.78473	-1.36762	-1.32951	-0.33312	-0.70116	-0.67611
12-04	-1.46342	-1.92595	-1.91633	-0.79573	-1.37622	-1.34505	-0.34968	-0.71328	-0.68348
13-04	-1.47352	-1.92782	-1.91847	-0.81335	-1.37797	-1.34819	-0.37562	-0.72616	-0.69676
14-04	-1.47609	-1.93659	-1.92066	-0.81779	-1.38037	-1.35134	-0.39196	-0.72945	-0.44293
15-04	-1.47895	-1.938	-1.92289	-0.77857	-1.38175	-1.32718	0.00576	-0.44893	-0.34792
16-04	-1.49446	-1.93961	-1.92512	-0.67803	-1.34538	-1.28925	0.00299	-0.36316	-0.35146
17-04	-1.49677	-1.94123	-1.93462	-0.6762	-1.2986	-1.27389	6.65E-04	-0.35771	-0.36734
18-04	-1.49954	-1.94917	-1.9359	-0.67877	-1.28106	-1.26417	-0.01304	-0.35824	-0.38349

DATE	WATER TABLE DEPTHS (m)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
19-04	-1.50252	-1.95035	-1.93768	-0.68357	-1.26968	-1.26281	-0.15919	-0.3742	-0.40946
20-04	-1.51204	-1.95156	-1.93954	-0.69505	-1.26092	-1.2626	-0.18375	-0.39088	-0.42679
21-04	-1.51486	-1.95274	-1.948	-0.70643	-1.26038	-1.26318	-0.20916	-0.41721	-0.44508
22-04	-1.52401	-1.95389	-1.94962	-0.71786	-1.2606	-1.26447	-0.23479	-0.43409	-0.4735
23-04	-1.52664	-1.96127	-1.95137	-0.72279	-1.26144	-1.26645	-0.24979	-0.45042	-0.49223
24-04	-1.53557	-1.96216	-1.95967	-0.73946	-1.26278	-1.26892	-0.26495	-0.46807	-0.50953
25-04	-1.53796	-1.9632	-1.96108	-0.74367	-1.26457	-1.27167	-0.29009	-0.48595	-0.51367
26-04	-1.54778	-1.96433	-1.96279	-0.7606	-1.27304	-1.2745	-0.30608	-0.50441	-0.52864
27-04	-1.54926	-1.96555	-1.96455	-0.76488	-1.27524	-1.27733	-0.32291	-0.50755	-0.53373
28-04	-1.55179	-1.96683	-1.96635	-0.77663	-1.27744	-1.28612	-0.35004	-0.50933	-0.55095
29-04	-1.56058	-1.97408	-1.97539	-0.78879	-1.27935	-1.28906	-0.37745	-0.52413	-0.56921
30-04	-1.56309	-1.9752	-1.9759	-0.79331	-1.2813	-1.29753	-0.39333	-0.5289	-0.19378
01-05	-1.57236	-1.9764	-1.97749	-0.64154	-1.28858	-1.27085	0.00903	-0.06037	-0.08509
02-05	-1.57433	-1.97763	-1.97918	-0.5229	-1.24949	-1.23551	0.00554	-0.00169	-0.13316
03-05	-1.57582	-1.97889	-1.98719	-0.50255	-1.20728	-1.22223	0.00359	-0.10246	-0.15328
04-05	-1.57609	-1.98607	-1.98849	-0.50167	-1.1883	-1.21964	0.00202	-0.14433	-0.18821
05-05	-1.57558	-1.98716	-1.9901	-0.50381	-1.18622	-1.2124	0.00105	-0.17756	-0.21452
06-05	-1.57485	-1.98837	-1.99178	-0.50793	-1.1857	-1.20878	-0.00187	-0.20414	0.0065
07-05	-1.5742	-1.98964	-1.9994	-0.5244	-1.18606	-1.10004	-0.12135	-0.23999	0.00469
08-05	-1.57374	-1.99097	-2.0002	-0.52424	-1.18704	-1.04029	-0.04162	-0.25702	0.0041
09-05	-1.57344	-1.99826	-1.99833	-0.52195	-1.18857	-1.01523	-0.01242	-0.28272	0.00221
10-05	-1.57315	-1.9995	-1.98598	-0.52336	-1.19022	-1.00265	-0.09979	-0.21512	0.00299
11-05	-1.57285	-2.00089	-1.97164	-0.52561	-1.18901	-0.98918	-0.10144	-0.03306	0.00172
12-05	-1.57259	-2.00232	-1.95708	-0.52639	-1.16133	-0.97561	-0.10062	-1.06E-04	0.00316
13-05	-1.57239	-2.01024	-1.93473	-0.52808	-1.09456	-0.93377	-0.12971	-1.64E-04	0.00346
14-05	-1.57223	-2.01015	-1.91959	-0.54281	-1.06655	-0.82129	-0.16081	-1.58E-04	0.01145
15-05	-1.57213	-2.00808	-1.89666	-0.36858	-1.01222	-0.69833	0.01043	0.00705	0.00619
16-05	-1.57213	-1.99741	-1.88042	-0.28262	-0.8778	-0.68777	0.00611	0.00402	0.00368
17-05	-1.57225	-1.98594	-1.85907	-0.26786	-0.86282	-0.68754	0.00446	0.0031	0.00232
18-05	-1.57244	-1.97461	-1.8469	-0.27032	-0.83384	-0.68921	0.00284	0.00539	0.00117
19-05	-1.57266	-1.97039	-1.83528	-0.27586	-0.75286	-0.69201	0.00167	0.00313	7.78E-05
20-05	-1.57289	-1.95752	-1.83283	-0.30061	-0.75058	-0.69306	4.85E-04	0.00182	0.00119
21-05	-1.57316	-1.93455	-1.823	-0.31552	-0.75028	-0.6911	-0.005	0.00101	0.00107
22-05	-1.57352	-1.92078	-1.8221	-0.33024	-0.73551	-0.69041	-0.1139	0.00369	-1.64E-04
23-05	-1.57401	-1.90738	-1.82049	-0.34466	-0.54556	-0.69173	-0.14027	0.00753	-0.1048
24-05	-1.57465	-1.86112	-1.81907	-0.34549	-0.46025	-0.6916	-0.14035	0.00473	-0.03234
25-05	-1.57543	-1.77728	-1.81098	-0.34401	-0.4553	-0.68686	-0.13888	0.00306	9.72E-04
26-05	-1.57627	-1.72311	-1.81043	-0.34255	-0.44452	-0.6822	-0.13792	0.00187	4.49E-04
27-05	-1.57709	-1.69655	-1.8093	-0.31524	-0.45657	-0.67448	0.00145	8.76E-04	-0.00279
28-05	-1.57777	-1.68085	-1.80795	-0.26782	-0.42453	-0.6753	0.0022	0.00328	-0.09741
29-05	-1.57787	-1.66773	-1.80654	-0.22801	-0.38352	-0.67283	0.00216	0.00209	0.00156
30-05	-1.57662	-1.64009	-1.79834	-0.22116	-0.38433	-0.37126	0.00134	0.0011	0.01282
31-05	-1.56779	-1.63315	-1.79673	0.00862	0.00227	-0.28197	0.01052	0.01033	0.00679
01-06	-1.56534	-1.62079	-1.77912	0.0054	0.00138	-0.2818	0.00542	0.00603	0.00465
02-06	-1.56305	-1.61075	-1.77345	0.00325	0.00293	-0.26934	0.00333	0.00584	0.00337
03-06	-1.5549	-1.6071	-1.76051	0.00897	0.0018	-0.27131	0.00687	0.00367	0.00221
04-06	-1.54155	-1.59649	-1.74794	0.00587	6.02E-04	-0.27041	0.00415	0.00222	0.00186
05-06	-1.50586	-1.5858	-1.74384	0.00371	0.00117	-0.27148	0.00235	0.00236	0.00121
06-06	-1.48243	-1.58206	-1.73387	0.00222	0.00284	-0.28475	0.00101	0.0037	5.13E-04
07-06	-1.46927	-1.57114	-1.7308	0.00197	0.0041	-0.28815	9.41E-04	0.00463	-0.00158
08-06	-1.45901	-1.54572	-1.72218	0.00566	0.00494	-0.27264	0.0039	0.00528	-1.50E-04
09-06	-1.44393	-1.48259	-1.72031	0.00594	0.00536	-0.24995	0.00401	0.00577	6.99E-04
10-06	-1.39937	-1.40586	-1.71843	0.00608	0.00322	-0.22959	0.0042	0.00362	0.00117
11-06	-1.36117	-1.36719	-1.70988	0.00518	0.00186	-0.21951	0.00353	0.00212	9.33E-04

DATE	WATER TABLE DEPTHS (m)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
12-06	-1.32625	-1.34481	-1.70768	0.0042	0.00104	-0.21815	0.00278	0.00128	8.64E-04
13-06	-1.30054	-1.32676	-1.70512	0.00631	4.15E-04	-0.22323	0.00418	6.63E-04	-1.74E-04
14-06	-1.24943	-1.32438	-1.69645	0.00627	-9.65E-04	0.00584	0.00401	1.20E-04	0.00538
15-06	-1.20247	-1.32282	-1.69431	0.01357	0.00372	0.00334	0.01262	0.00975	0.00336
16-06	-1.15377	-1.32203	-1.68527	0.01189	0.00226	0.00183	0.009	0.00561	0.00198
17-06	-1.08327	-1.32173	-1.68504	0.00811	0.00114	0.00217	0.00514	0.00332	0.0024
18-06	-1.0421	-1.32178	-1.68411	0.00701	1.66E-04	9.97E-04	0.00468	0.00211	0.00125
19-06	-1.01665	-1.32214	-1.68331	0.00473	-0.00626	7.95E-04	0.00311	0.00109	0.00107
20-06	-1.00365	-1.32276	-1.68262	0.00321	-0.082	-6.84E-04	0.00209	0.00117	2.05E-04
21-06	-1.00097	-1.32349	-1.68202	0.00233	-0.08134	-0.10426	0.00138	9.57E-04	-0.00779
22-06	-0.9998	-1.32417	-1.68152	0.00137	-0.08225	-0.13856	5.18E-04	7.16E-04	-0.1168
23-06	-0.99956	-1.32461	-1.68114	0.001	0.00297	-0.16185	2.46E-04	0.00335	-0.13703
24-06	-0.99169	-1.32104	-1.67459	0.00386	0.00254	-0.15804	0.00272	0.00277	-0.13401
25-06	-0.96712	-1.30652	-1.67487	0.00427	0.00325	-0.16371	0.00321	0.00341	-0.14915
26-06	-0.94281	-1.2827	-1.675	0.00286	0.00227	-0.18741	0.00206	0.00238	-0.16466
27-06	-0.93935	-1.25968	-1.67517	0.0019	0.00161	-0.21217	0.00124	0.0017	-0.18883
28-06	-0.93598	-1.24769	-1.67541	0.00336	9.12E-04	-0.22719	0.0026	9.88E-04	-0.2134
29-06	-0.92105	-1.24492	-1.67573	0.0033	2.89E-04	-0.20629	0.00268	3.73E-04	-0.18749
30-06	-0.90155	-1.24321	-1.67613	0.00216	-0.00278	-0.1082	0.00169	-0.00195	-0.06318
01-07	-0.89654	-1.23607	-1.6765	0.00337	-0.0859	0.00119	0.00279	-0.05214	0.00135
02-07	-0.87667	-1.23606	-1.67637	0.00216	-0.08775	0.00139	0.00174	-0.08633	0.00155
03-07	-0.87082	-1.23606	-1.67502	0.0034	-0.11418	0.00216	0.00292	-0.11273	0.00229
04-07	-0.85748	-1.23621	-1.67201	0.00381	-0.14857	0.00174	0.00381	-0.14721	0.00185
05-07	-0.83454	-1.23656	-1.66102	0.00408	-0.15012	7.33E-04	0.00449	-0.14881	8.59E-04
06-07	-0.80698	-1.2362	-1.64931	0.00459	0.00428	-0.00241	0.00569	0.00431	-0.00124
07-07	-0.77267	-1.21069	-1.63048	0.00328	0.00301	-0.00332	0.00442	0.00303	-0.00325
08-07	-0.76886	-1.16335	-1.62946	0.0023	0.00654	0.00285	0.00323	0.00677	0.00295
09-07	-0.7605	-1.02273	-1.62457	0.0038	0.00666	0.00241	0.0055	0.0069	0.00259
10-07	-0.73685	-0.94843	-1.60219	0.0028	0.00418	0.00139	0.00427	0.00458	0.00154
11-07	-0.72586	-0.92243	-1.58623	0.00175	0.00366	0.00107	0.00292	0.00394	0.00121
12-07	-0.72593	-0.88499	-1.57242	0.00101	0.00424	0.00234	0.00195	0.00585	0.00245
13-07	-0.72479	-0.84396	-1.55269	0.00201	0.00329	0.00124	0.00319	0.00508	0.00134
14-07	-0.72035	-0.82387	-1.54088	0.00219	0.00385	5.92E-04	0.00345	0.00672	7.18E-04
15-07	-0.60326	-0.77888	-1.53615	0.01	0.00285	-0.00139	0.01341	0.00571	-3.21E-04
16-07	-0.45676	-0.77	-1.52636	0.01111	0.00271	-0.08794	0.01363	0.00559	-0.04735
17-07	-0.40966	-0.75122	-1.52384	0.00928	0.00161	-0.1211	0.00947	0.00399	-0.11398
18-07	-0.39933	-0.74623	-1.51588	0.00745	0.00238	-0.14906	0.00668	0.00523	-0.14168
19-07	-0.39415	-0.73091	-1.51495	0.00802	0.00309	-0.17432	0.00684	0.00646	-0.16445
20-07	-0.27681	-0.55959	-1.51441	0.0145	0.01025	-0.19862	0.01144	0.01644	-0.18805
21-07	-0.20237	-0.43725	-1.5142	0.01238	0.01053	-0.1341	0.00895	0.0138	-0.1246
22-07	0.0027	-0.40606	-1.51413	0.01525	0.00746	-0.1374	0.01124	0.0098	-0.12673
23-07	0.00425	-0.40639	-1.51399	0.01366	0.00509	-0.15801	0.00959	0.00724	-0.14886
24-07	0.00394	-0.38694	-1.51379	0.0114	0.00738	-0.18215	0.00763	0.00903	-0.17949
25-07	0.0048	-0.19611	-1.51364	0.01102	0.01177	-0.20747	0.00745	0.01252	-0.20483
26-07	0.00454	-0.10795	-1.5136	0.00965	0.00971	-0.23261	0.00626	0.01002	-0.22035
27-07	0.00665	-0.00309	-1.51371	0.01135	0.00845	-0.24774	0.00787	0.00844	-0.24499
28-07	0.00495	0.00164	-1.51401	0.00904	0.00749	-0.23416	0.00575	0.00751	-0.22661
29-07	0.00356	0.00914	-1.51442	0.0071	0.01273	-0.22874	0.00419	0.01278	-0.21966
30-07	0.00229	0.00765	-1.51479	0.00537	0.00981	-0.08298	0.00279	0.00984	-0.0498
31-07	0.00117	0.00647	-1.51451	0.00382	0.00807	-0.00368	0.00159	0.0081	7.66E-04
01-08	0.00136	0.00491	-1.50445	0.0037	0.00604	-0.00384	0.00173	0.00607	-6.48E-04
02-08	0.00597	0.00337	-1.50214	0.00862	0.00423	-0.10211	0.00622	0.00425	-0.09487
03-08	0.00445	0.00214	-1.48478	0.00717	0.00282	0.00211	0.00464	0.00283	0.00217
04-08	0.00294	9.92E-04	-1.48313	0.00528	0.00158	0.0027	0.00309	0.0016	0.00275

DATE	WATER TABLE DEPTHS (m)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
05-08	0.00166	-0.00153	-1.46989	0.00368	3.85E-04	0.00189	0.00178	3.98E-04	0.00194
06-08	7.67E-04	-0.10673	-1.45459	0.00254	-0.00642	0.00295	8.99E-04	-0.00632	0.003
07-08	0.00329	-0.1427	-1.43831	0.0052	-0.13076	0.00206	0.00338	-0.13068	0.00211
08-08	0.00548	-0.17562	-1.41559	0.00762	-0.16268	0.00163	0.00557	-0.1626	0.00168
09-08	0.00657	0.00612	-1.40126	0.00919	0.00632	0.00615	0.00665	0.00633	0.00615
10-08	0.00448	0.00609	-1.33583	0.00714	0.00623	0.00379	0.00453	0.00625	0.00362
11-08	0.00305	0.00499	-1.28673	0.00543	0.00509	0.00332	0.00307	0.00511	0.00327
12-08	0.0019	0.00618	-1.26072	0.00403	0.00626	0.0023	0.00192	0.00628	0.00226
13-08	0.00114	0.00867	-1.24642	0.003	0.00875	0.00184	0.00115	0.0088	0.00183
14-08	6.63E-04	0.00603	-1.2345	0.00228	0.00611	0.00363	6.71E-04	0.00616	0.00335
15-08	-0.00326	0.00438	-1.19328	0.00117	0.00446	0.00437	-0.00319	0.0045	0.00423
16-08	-0.12215	0.00294	-1.15326	-0.0017	0.00301	0.00275	-0.12209	0.00305	0.00269
17-08	-0.14257	0.00491	-1.13608	-0.10388	0.00496	0.00169	-0.14236	0.00501	0.00165
18-08	-0.14512	0.00343	-1.12574	-0.10558	0.00348	7.31E-04	-0.14508	0.00352	6.89E-04
19-08	-0.0484	0.00257	-1.12398	0.00171	0.00262	-2.30E-04	-0.04986	0.00264	-5.25E-04
20-08	3.37E-04	0.00544	-1.11724	0.00185	0.00548	-0.09478	2.25E-04	0.00551	-0.0948
21-08	-0.00731	0.00421	-1.11761	5.71E-04	0.00425	-0.13018	-0.00832	0.00428	-0.13581
22-08	-0.11442	0.00481	-1.1183	-0.00159	0.00485	-0.15824	-0.11531	0.00487	-0.15778
23-08	0.01254	0.00455	-1.11936	0.01524	0.0046	-0.18076	0.01263	0.00461	-0.18016
24-08	0.00887	0.0055	-1.12024	0.01237	0.00555	-0.01315	0.00901	0.00557	-0.01343
25-08	0.00608	0.0045	-1.11745	0.00946	0.00456	-0.00147	0.0062	0.00458	-0.00143
26-08	0.00418	0.00517	-1.11434	0.00718	0.00522	-0.10114	0.00428	0.00523	-0.1011
27-08	0.00261	0.00335	-1.11295	0.00527	0.0034	-0.13591	0.0027	0.00342	-0.13583
28-08	0.00231	0.002	-1.11265	0.00468	0.00204	-0.16574	0.00238	0.00205	-0.16566
29-08	0.00323	0.00144	-1.11284	0.00547	0.00148	-0.13351	0.0033	0.00149	-0.133
30-08	0.00243	7.00E-04	-1.11205	0.00453	7.33E-04	0.0016	0.00249	7.40E-04	0.00159
31-08	0.00203	-0.00126	-1.10125	0.00395	-0.00101	0.00618	0.00209	-9.51E-04	0.00898
01-09	0.00131	-0.09693	-1.09165	0.01125	-5.31E-04	0.00352	0.01133	-5.25E-04	0.00508
02-09	0.00128	-0.09423	-1.0901	0.009	0.00171	0.00203	0.00837	0.00215	0.00303
03-09	2.10E-04	0.0103	-1.08954	0.00657	0.01204	0.00145	0.00567	0.01072	0.00219
04-09	-0.00152	0.00868	-1.08948	0.00512	0.00983	2.98E-04	0.00417	0.00904	9.69E-04
05-09	-0.10348	0.00589	-1.08968	0.00346	0.0067	0.00114	0.00257	0.00636	0.00165
06-09	-0.14635	0.00999	-1.08789	0.00195	0.01056	0.0031	0.00111	0.0103	0.00355
07-09	-0.17883	0.00892	-1.06477	6.07E-04	0.00929	0.00239	-0.00176	0.00915	0.00274
08-09	-0.20432	0.0063	-1.03739	-0.00537	0.00658	0.00154	-0.11445	0.00648	0.00181
09-09	-0.23213	0.00563	-1.03359	-0.14026	0.00584	0.00218	-0.16189	0.00578	0.00249
10-09	-0.26015	0.00386	-1.02142	-0.18519	0.00403	0.00217	-0.19895	0.00398	0.00256
11-09	-0.28692	0.00239	-1.00875	-0.2122	0.00252	9.57E-04	-0.22632	0.00249	0.00135
12-09	-0.31377	0.00367	-1.00654	-0.23972	0.00379	8.19E-04	-0.25368	0.00377	0.00116
13-09	-0.32955	0.00338	-1.00489	-0.26471	0.00344	3.89E-04	-0.27841	0.00343	6.94E-04
14-09	-0.34108	0.00271	-1.00409	-0.26543	0.00276	0.0063	-0.27948	0.00276	0.00933
15-09	0.00358	0.00154	-1.00408	0.01666	0.00841	0.00395	0.01744	0.01159	0.00591
16-09	0.00726	-8.09E-04	-1.0045	0.0175	0.00512	0.00263	0.01551	0.00733	0.00411
17-09	0.00534	-0.12174	-1.00526	0.01322	0.00327	0.00147	0.01065	0.00483	0.00259
18-09	0.00391	-0.13564	-1.00644	0.01033	0.00215	7.61E-04	0.00787	0.00328	0.00169
19-09	0.00197	-0.13528	-1.0079	0.00725	0.00186	-9.62E-04	0.00497	0.00282	7.99E-04
20-09	9.61E-04	-0.14027	-1.00973	0.00537	0.00125	-0.11948	0.00335	0.00208	-0.00616
21-09	0.00172	-0.16542	-1.0122	0.00572	1.57E-04	-0.15657	0.00386	9.34E-04	-0.13292
22-09	0.00457	-0.19111	-1.01412	0.00817	-0.00993	0.00182	0.00597	-0.00358	0.00229
23-09	0.00558	-0.2177	-1.01187	0.00904	-0.13475	0.00156	0.00653	-0.11615	0.00202
24-09	0.00982	-0.25583	-1.00824	0.01412	-0.18694	0.00126	0.01048	-0.16365	0.00174
25-09	0.00745	-0.28314	-1.00535	0.01165	-0.21429	7.72E-04	0.00791	-0.20023	0.00121
26-09	0.00499	-0.29963	-1.00385	0.0087	-0.24048	-0.00891	0.00535	-0.22635	-0.00505
27-09	0.00313	-0.32509	-1.00389	0.00638	-0.25704	-0.13236	0.00343	-0.25208	-0.12312

DATE	WATER TABLE DEPTHS (m)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
28-09	0.00156	-0.34124	-1.00474	0.00434	-0.28241	-0.15229	0.00182	-0.26862	-0.14316
29-09	-0.00536	-0.35693	-0.99665	0.00212	-0.2979	0.00328	-0.00314	-0.29342	0.00431
30-09	-0.15947	-0.37198	-0.95848	-0.00219	-0.32274	0.00916	-0.15898	-0.30855	0.01326
01-10	-0.18537	-0.38801	-0.9342	-0.00434	0.0016	0.00515	0.01049	0.0092	0.00871
02-10	-0.21146	-0.41448	-0.92318	8.26E-04	6.29E-04	0.00312	0.00608	0.00486	0.00626
03-10	-0.23548	-0.43195	-0.92136	-7.12E-04	-0.01101	0.00134	0.00355	0.00222	0.00379
04-10	-0.12009	-0.43543	-0.92151	0.00373	-0.10381	-0.00691	0.00629	0.00206	0.00168
05-10	0.00548	-0.44575	-0.92309	0.01073	-0.10048	-0.15341	0.01014	0.00131	-0.00303
06-10	0.00381	-0.44623	-0.92588	0.00845	-0.10342	-0.18976	0.00687	0.00109	-0.14168
07-10	0.00274	-0.44897	-0.93617	0.00673	-0.12775	-0.22834	0.00515	-7.89E-04	-0.18725
08-10	5.76E-04	-0.46542	-0.9402	0.00421	-0.16675	-0.25337	0.00271	-0.12134	-0.21214
09-10	-0.01414	-0.47023	-0.95065	0.00198	-0.17973	-0.26815	4.73E-04	-0.13419	-0.22669
10-10	-0.16013	-0.48589	-0.96122	4.38E-04	-0.20523	-0.2841	-0.00855	-0.16553	-0.2528
11-10	-0.18523	-0.47991	-0.96461	-0.00781	-0.12236	-0.29912	-0.14014	-0.04825	-0.26778
12-10	-0.22285	-0.46232	-0.96859	-0.13479	-0.13616	-0.31366	-0.1859	-0.03573	-0.28204
13-10	-0.25295	-0.46626	-0.9733	-0.18746	-0.18927	-0.33917	-0.22434	-0.14921	-0.29821
14-10	-0.2907	-0.49723	-0.98393	-0.22573	-0.23954	-0.01708	-0.26292	-0.21404	0.00934
15-10	-0.31964	-0.51711	-0.99489	0.00743	0.00557	1.16E-04	0.00929	0.00992	0.00543
16-10	-0.34913	-0.53531	-0.99825	0.00385	0.00304	-0.0166	0.00458	0.0054	0.00242
17-10	-0.36386	-0.53648	-1.00864	0.00281	0.00307	-0.17177	0.00297	0.0045	4.12E-04
18-10	-0.37963	-0.43894	-1.02009	8.45E-04	0.006	-0.21967	0.00109	0.00687	-0.01703
19-10	-0.40655	-0.39392	-1.02549	-0.01021	0.00306	-0.25834	-0.00806	0.00391	-0.1815
20-10	-0.42545	-0.39937	-1.04314	-0.16972	7.06E-04	-0.27538	-0.1598	0.00131	-0.20704
21-10	-0.45408	-0.42707	-1.04656	-0.21783	-0.01398	-0.25551	-0.2079	-0.00868	-0.158
22-10	-0.48722	-0.45614	-1.04769	-0.25852	-0.18193	-0.21244	-0.25755	-0.17074	-0.09362
23-10	-0.50696	-0.47689	-1.04728	-0.28443	-0.22043	-0.21345	-0.2741	-0.20931	-0.11495
24-10	-0.52404	-0.50977	-1.04716	-0.29814	-0.26115	-0.24142	-0.2874	-0.25871	-0.16743
25-10	-0.52543	-0.53096	-1.04789	-0.29001	-0.29856	-0.27974	-0.28212	-0.28708	-0.21534
26-10	-0.52732	-0.55206	-1.04964	-0.2934	-0.32763	-0.30609	-0.29649	-0.3163	-0.23233
27-10	-0.54391	-0.57321	-1.05848	-0.321	-0.35762	-0.32398	-0.31484	-0.35538	-0.26009
28-10	-0.56283	-0.59471	-1.06146	-0.34787	-0.38592	-0.35241	-0.3414	-0.37466	-0.29764
29-10	-0.57003	-0.61535	-1.07161	-0.3664	-0.41381	-0.38146	-0.36923	-0.4025	-0.32711
30-10	-0.58887	-0.61839	-1.08276	-0.39474	-0.41182	-0.41089	-0.38842	-0.4004	-0.35744
31-10	-0.6107	-0.61709	-1.09439	-0.4251	-0.40231	-0.24477	-0.42778	-0.39231	0.00646
01-11	-0.63148	-0.61418	-1.09901	-0.22809	0.00376	-0.19387	0.00595	0.00769	0.00293
02-11	-0.64466	-0.61297	-1.11078	-0.15068	0.0019	-0.24305	0.00313	0.00411	9.86E-06
03-11	-0.6636	-0.6157	-1.12283	-0.18645	-0.00175	-0.27023	0.00128	0.00165	-0.01295
04-11	-0.66907	-0.6344	-1.12837	-0.20108	-0.15893	-0.28391	3.31E-04	-0.0086	-0.12839
05-11	-0.68068	-0.64259	-1.1338	-0.22522	-0.2165	-0.31119	-0.00556	-0.18389	-0.17717
06-11	-0.69269	-0.66285	-1.14531	-0.25343	-0.23266	-0.34038	-0.14648	-0.19769	-0.22525
07-11	-0.70572	-0.67522	-1.15672	-0.28189	-0.24496	-0.37027	-0.19231	-0.20974	-0.26537
08-11	-0.71942	-0.67808	-1.16879	-0.32127	-0.24158	-0.39996	-0.23247	-0.20589	-0.30464
09-11	-0.74089	-0.68751	-1.17417	-0.35369	-0.24527	-0.4302	-0.28341	-0.21034	-0.33596
10-11	-0.76278	-0.69035	-1.19201	-0.40463	-0.27374	-0.46083	-0.33521	-0.24829	-0.37676
11-11	-0.77094	-0.70198	-1.19726	-0.43454	-0.31107	-0.49532	-0.3651	-0.27701	-0.40814
12-11	-0.79146	-0.71486	-1.20902	-0.45342	-0.33991	-0.53021	-0.39347	-0.31482	-0.4493
13-11	-0.81146	-0.7347	-1.22091	-0.48585	-0.37042	-0.55452	-0.42285	-0.34546	-0.48527
14-11	-0.81885	-0.75593	-1.23259	-0.50725	-0.40132	-0.47243	-0.44315	-0.37715	-0.01428
15-11	-0.83932	-0.76398	-1.24371	-0.37647	-0.23568	-0.41268	0.00518	0.00673	-0.02724
16-11	-0.85255	-0.78431	-1.25515	-0.31656	-0.18348	-0.41792	0.00183	0.00337	-0.14242
17-11	-0.86655	-0.79868	-1.26653	-0.34824	-0.23229	-0.4361	-0.01181	5.20E-04	-0.18755
18-11	-0.88711	-0.81891	-1.27079	-0.39031	-0.27314	-0.46665	-0.19921	-0.0209	-0.23675
19-11	-0.9084	-0.8331	-1.28105	-0.43246	-0.30197	-0.40592	-0.25806	-0.19035	0.00292
20-11	-0.91587	-0.84639	-1.28113	-0.46656	-0.34204	-0.36917	-0.29947	-0.23068	9.29E-04

DATE	WATER TABLE DEPTHS (m)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
21-11	-0.93663	-0.86063	-1.27783	-0.48794	-0.38326	-0.37661	-0.32769	-0.28192	-0.01136
22-11	-0.94937	-0.87548	-1.27571	-0.50735	-0.41515	-0.4048	-0.34547	-0.32339	-0.17114
23-11	-0.95391	-0.89568	-1.27499	-0.5258	-0.44617	-0.4328	-0.37146	-0.36394	-0.20797
24-11	-0.96514	-0.9156	-1.27516	-0.545	-0.47721	-0.45007	-0.38921	-0.39392	-0.23366
25-11	-0.97663	-0.91328	-1.27572	-0.56532	-0.49652	-0.47037	-0.41704	-0.41089	-0.27403
26-11	-0.98821	-0.92045	-1.27708	-0.58376	-0.51384	-0.50329	-0.43495	-0.42612	-0.31444
27-11	-0.99328	-0.92029	-1.27893	-0.6012	-0.53065	-0.53853	-0.4481	-0.43931	-0.35645
28-11	-0.99777	-0.92531	-1.28272	-0.60565	-0.53423	-0.56155	-0.4645	-0.45314	-0.3889
29-11	-1.00868	-0.9377	-1.29349	-0.62472	-0.5514	-0.5841	-0.48361	-0.47042	-0.42991
30-11	-1.01385	-0.94956	-1.2983	-0.64469	-0.55848	-0.47664	-0.50514	-0.48809	0.00643
01-12	-1.02638	-0.96135	-1.30771	-0.56992	-0.47236	-0.32158	-0.0642	-0.00721	0.00601
02-12	-1.04506	-0.97332	-1.30915	-0.49883	-0.4042	-0.30161	-0.10842	-0.02033	0.00261
03-12	-1.05817	-0.98561	-1.30927	-0.50426	-0.42089	-0.31932	-0.18777	-0.15752	9.65E-04
04-12	-1.07086	-0.9983	-1.30906	-0.53665	-0.45064	-0.24375	-0.23707	-0.21658	0.00323
05-12	-1.08279	-1.01144	-1.30564	-0.55802	-0.48521	-0.23455	-0.27807	-0.26808	0.00106
06-12	-1.09534	-1.02501	-1.29444	-0.579	-0.52078	-0.27245	-0.31746	-0.31937	-0.00831
07-12	-1.10758	-1.04437	-1.29197	-0.60184	-0.54381	-0.30077	-0.34953	-0.35112	-0.16011
08-12	-1.11986	-1.05765	-1.29089	-0.62388	-0.56588	-0.33158	-0.38815	-0.39045	-0.20898
09-12	-1.13207	-1.07015	-1.29105	-0.64412	-0.59928	-0.3715	-0.40718	-0.42079	-0.2584
10-12	-1.13699	-1.0822	-1.29242	-0.66457	-0.62243	-0.4018	-0.42149	-0.4524	-0.29893
11-12	-1.13982	-1.09443	-1.29501	-0.6647	-0.64589	-0.43339	-0.42069	-0.48796	-0.34013
12-12	-1.14096	-1.10716	-1.29868	-0.66615	-0.66927	-0.47601	-0.42249	-0.52287	-0.37257
13-12	-1.14146	-1.11941	-1.30869	-0.66942	-0.68603	-0.49954	-0.43735	-0.54515	-0.41309
14-12	-1.14292	-1.13149	-1.32003	-0.68082	-0.70137	-0.42047	-0.45489	-0.56585	0.00584
15-12	-1.15234	-1.13653	-1.32461	-0.61362	-0.64891	-0.35769	0.0049	-0.23959	0.00214
16-12	-1.16321	-1.14469	-1.34191	-0.53659	-0.56602	-0.38763	0.00199	-0.15064	-0.01055
17-12	-1.16827	-1.14786	-1.34619	-0.53992	-0.56642	-0.41874	-0.01099	-0.21055	-0.18932
18-12	-1.17979	-1.15991	-1.35764	-0.56105	-0.58421	-0.44902	-0.1983	-0.26126	-0.22621
19-12	-1.19734	-1.17239	-1.36173	-0.58383	-0.60572	-0.47647	-0.2491	-0.30077	-0.24095
20-12	-1.20288	-1.17818	-1.36588	-0.62054	-0.61212	-0.49561	-0.29917	-0.31447	-0.2707
21-12	-1.21484	-1.18172	-1.37632	-0.64326	-0.62888	-0.51573	-0.32948	-0.31722	-0.30869
22-12	-1.22649	-1.19769	-1.3801	-0.65139	-0.63417	-0.53707	-0.35782	-0.34486	-0.33865
23-12	-1.23769	-1.20031	-1.39029	-0.67242	-0.65407	-0.55938	-0.3869	-0.37488	-0.3787
24-12	-1.24905	-1.20378	-1.40093	-0.6871	-0.66663	-0.59539	-0.41401	-0.38881	-0.4092
25-12	-1.26093	-1.20572	-1.40476	-0.70114	-0.67024	-0.61666	-0.43359	-0.39238	-0.43973
26-12	-1.2646	-1.20719	-1.41507	-0.72879	-0.68203	-0.63953	-0.46281	-0.41887	-0.47198
27-12	-1.27561	-1.21602	-1.42557	-0.73742	-0.69556	-0.66256	-0.49762	-0.44814	-0.50627
28-12	-1.28685	-1.21903	-1.42954	-0.75885	-0.70792	-0.67158	-0.53208	-0.4667	-0.52836
29-12	-1.29775	-1.22684	-1.43957	-0.77977	-0.71906	-0.69383	-0.55443	-0.47167	-0.54978
30-12	-1.30247	-1.22825	-1.44995	-0.79438	-0.73931	-0.70887	-0.57599	-0.50299	-0.57112
	-1.31338	-1.23156	-1.45371	-0.80854	-0.74491	-0.72516	-0.59764	-0.52532	-0.60426

	WATER TABLE DEPTHS (m)								
DATE	S10	S11	S12	S13	S14	S15	S16	S17	S18
01-01	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
02-01	-1.39871	-1.39872	-1.39871	-1.39804	-1.39807	-1.39799	-1.38116	-1.38839	-1.38099
03-01	-1.39682	-1.39686	-1.39681	-1.34452	-1.35262	-1.3434	-1.19633	-1.20763	-1.19236
04-01	-1.39578	-1.39608	-1.39588	-1.30432	-1.3076	-1.3035	-1.15686	-1.16504	-1.15319
05-01	-1.38949	-1.39643	-1.39595	-1.28948	-1.29402	-1.28279	-1.14493	-1.15416	-1.1423
06-01	-1.39	-1.39777	-1.39697	-1.27975	-1.29163	-1.28098	-1.14278	-1.1539	-1.14232
07-01	-1.39055	-1.39993	-1.39891	-1.278	-1.29148	-1.28095	-1.1422	-1.1557	-1.14432
08-01	-1.39142	-1.40274	-1.40155	-1.2776	-1.29293	-1.28247	-1.14299	-1.15903	-1.1477
09-01	-1.39279	-1.41243	-1.4047	-1.27829	-1.29557	-1.28515	-1.14496	-1.16943	-1.15763
10-01	-1.40106	-1.41566	-1.41436	-1.27986	-1.299	-1.29477	-1.14783	-1.17407	-1.16824
11-01	-1.40304	-1.4253	-1.42433	-1.28208	-1.30867	-1.2983	-1.15122	-1.18465	-1.18791
12-01	-1.40564	-1.42897	-1.42762	-1.28488	-1.3129	-1.30826	-1.16086	-1.20163	-1.18417
13-01	-1.41472	-1.43889	-1.43756	-1.29407	-1.32353	-1.31258	-1.16517	-1.20621	-1.20097
14-01	-1.41786	-1.44887	-1.44123	-1.2977	-1.34122	-1.32277	-1.1764	-1.21758	-1.20039
15-01	-1.42735	-1.45251	-1.45091	-1.30736	-1.3441	-1.31663	-1.17516	-1.21871	-1.03914
16-01	-1.43778	-1.46222	-1.45475	-1.30116	-1.34116	-1.29272	-1.01924	-1.0727	-1.01531
17-01	-1.44073	-1.46627	-1.46434	-1.27823	-1.31934	-1.28175	-0.99809	-1.04776	-1.01467
18-01	-1.45051	-1.47659	-1.47503	-1.26714	-1.30827	-1.28047	-0.99781	-1.04662	-1.01704
19-01	-1.45428	-1.47987	-1.47837	-1.26583	-1.30708	-1.281	-0.99941	-1.04864	-1.02104
20-01	-1.46408	-1.49644	-1.49476	-1.26614	-1.30772	-1.28277	-1.00275	-1.05241	-1.04048
21-01	-1.46715	-1.5001	-1.49772	-1.22467	-1.30981	-1.2855	-0.85902	-1.06357	-1.04304
22-01	-1.03383	-1.51081	-1.5012	-0.65684	-1.313	-1.2952	-0.29278	-1.07535	-1.04796
23-01	-0.85316	-1.5141	-1.51116	-0.62749	-1.32304	-1.29849	-0.45415	-1.08708	-1.05947
24-01	-0.85137	-1.52377	-1.51436	-0.72188	-1.32693	-1.30828	-0.61399	-1.0986	-1.07063
25-01	-0.88168	-1.52719	-1.524	-0.75129	-1.34317	-1.31216	-0.65488	-1.10998	-1.08172
26-01	-0.9165	-1.53684	-1.52712	-0.81771	-1.34668	-1.32232	-0.74876	-1.11478	-1.09249
27-01	-0.93935	-1.54019	-1.53662	-0.87488	-1.35049	-1.32638	-0.82735	-1.125	-1.09697
28-01	-0.96533	-1.54956	-1.53972	-0.9107	-1.36004	-1.34265	-0.87889	-1.13488	-1.1083
29-01	-0.97891	-1.5526	-1.54904	-0.94897	-1.37066	-1.34637	-0.92543	-1.14701	-1.11949
30-01	-0.99563	-1.56194	-1.55219	-0.97095	-1.37339	-1.35784	-0.94852	-1.15159	-1.13095
31-01	-1.00775	-1.56508	-1.56169	-0.98409	-1.38341	-1.36068	-0.96801	-1.1627	-1.11966
01-02	-1.02034	-1.57446	-1.56499	-0.99676	-1.38695	-1.35708	-0.93018	-1.16024	-0.94945
02-02	-1.03297	-1.57763	-1.57423	-0.95233	-1.39078	-1.33303	-0.82275	-0.99048	-0.95227
03-02	-1.05101	-1.5867	-1.58413	-0.94789	-1.3669	-1.32039	-0.8555	-0.97849	-0.95061
04-02	-1.06384	-1.58995	-1.58642	-0.95805	-1.35423	-1.31153	-0.86546	-0.97434	-0.96191
05-02	-1.07627	-1.59881	-1.59628	-0.96998	-1.35157	-1.31124	-0.90202	-0.98304	-0.97415
06-02	-1.0879	-1.60206	-1.59862	-0.98734	-1.35002	-1.31229	-0.93589	-0.99261	-0.99083
07-02	-1.09267	-1.61091	-1.60199	-0.99862	-1.3504	-1.31436	-0.96135	-1.00328	-1.0016
08-02	-1.10449	-1.61421	-1.61107	-1.01006	-1.35196	-1.31713	-0.97967	-1.01547	-1.01346
09-02	-1.11599	-1.62398	-1.61438	-1.02195	-1.35451	-1.32662	-0.9975	-1.02797	-1.02544
10-02	-1.12738	-1.62716	-1.62403	-1.03386	-1.35777	-1.33014	-1.01025	-1.04735	-1.04433
11-02	-1.1391	-1.64347	-1.62715	-1.05197	-1.36773	-1.34618	-1.02272	-1.05184	-1.04911
12-02	-1.1506	-1.64564	-1.64339	-1.05752	-1.37874	-1.34992	-1.04199	-1.06423	-1.06141
13-02	-1.16232	-1.64863	-1.64544	-1.0691	-1.38169	-1.36141	-1.04651	-1.07616	-1.07369
14-02	-1.16647	-1.6518	-1.64831	-1.07335	-1.39161	-1.36421	-1.05062	-1.08816	-1.04976
15-02	-1.16877	-1.66118	-1.65136	-1.0714	-1.39537	-1.36161	-0.97921	-1.06611	-0.89818
16-02	-1.1704	-1.66415	-1.66091	-0.9929	-1.40037	-1.34577	-0.83867	-0.90896	-0.91356
17-02	-1.17913	-1.67323	-1.66372	-0.97949	-1.37794	-1.32812	-0.86367	-0.92256	-0.91559
18-02	-1.1822	-1.67609	-1.67295	-0.97504	-1.37316	-1.32608	-0.86932	-0.92393	-0.93615
19-02	-1.1983	-1.68506	-1.67567	-0.98355	-1.3645	-1.32565	-0.9046	-0.94433	-0.95531
20-02	-1.20185	-1.68791	-1.68491	-0.98766	-1.36422	-1.32641	-0.92798	-0.96967	-0.97931
21-02	-1.20594	-1.69695	-1.68747	-0.99767	-1.36531	-1.32818	-0.9592	-0.98812	-0.99122
22-02	-1.21639	-1.69977	-1.69675	-1.00857	-1.36749	-1.33075	-0.9735	-1.00515	-1.00245
23-02	-1.22698	-1.70929	-1.69907	-1.02005	-1.37756	-1.34692	-0.99096	-1.01815	-1.01569

DATE	WATER TABLE DEPTHS (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
24-02	-1.2381	-1.71205	-1.70184	-1.03221	-1.37991	-1.34983	-1.00309	-1.03091	-1.0275
25-02	-1.24211	-1.72108	-1.71082	-1.03736	-1.38952	-1.35327	-1.00941	-1.04958	-1.04493
26-02	-1.25249	-1.72377	-1.71355	-1.04127	-1.39276	-1.36343	-1.01365	-1.05258	-1.04939
27-02	-1.25446	-1.73297	-1.72237	-1.05776	-1.4026	-1.36685	-1.02446	-1.05741	-1.06135
28-02	-1.26461	-1.73535	-1.725	-1.06221	-1.40605	-1.37668	-1.04238	-1.06881	-1.0236
01-03	-1.26804	-1.73817	-1.73397	-1.0642	-1.41575	-1.37356	-1.0164	-1.04288	-0.88257
02-03	-1.27824	-1.74662	-1.73643	-1.01399	-1.41363	-1.3507	-0.89327	-0.88605	-0.8995
03-03	-1.28928	-1.74931	-1.7392	-0.99897	-1.38996	-1.3323	-0.89124	-0.90072	-0.90165
04-03	-1.29267	-1.75802	-1.74763	-0.99318	-1.37706	-1.33042	-0.91142	-0.90771	-0.92869
05-03	-1.30299	-1.7605	-1.75039	-0.99439	-1.36709	-1.33029	-0.93227	-0.92239	-0.9549
06-03	-1.30704	-1.76319	-1.75923	-0.99692	-1.36619	-1.33158	-0.95605	-0.94837	-0.97413
07-03	-1.31708	-1.77215	-1.76179	-1.00554	-1.36626	-1.33443	-0.96962	-0.96876	-0.9919
08-03	-1.32809	-1.77476	-1.76469	-1.01559	-1.36732	-1.34963	-0.98159	-0.98172	-1.00918
09-03	-1.33143	-1.7774	-1.77377	-1.01995	-1.36922	-1.35256	-0.99742	-0.99823	-1.02262
10-03	-1.34792	-1.7953	-1.7765	-1.03098	-1.37826	-1.35593	-1.00937	-1.01069	-1.02721
11-03	-1.35116	-1.7956	-1.77868	-1.04851	-1.38083	-1.36586	-1.02128	-1.02309	-1.04486
12-03	-1.35496	-1.7978	-1.79454	-1.05326	-1.39042	-1.36937	-1.02658	-1.04178	-1.04997
13-03	-1.36529	-1.80019	-1.79666	-1.06532	-1.39357	-1.3794	-1.04432	-1.04689	-1.06174
14-03	-1.37593	-1.80264	-1.79904	-1.07664	-1.40349	-1.38957	-1.04926	-1.05958	-1.03499
15-03	-1.37876	-1.8113	-1.80149	-1.07771	-1.40714	-1.3861	-1.02479	-1.03519	-0.8786
16-03	-1.38856	-1.81356	-1.80398	-1.01921	-1.4126	-1.35386	-0.89445	-0.88404	-0.88613
17-03	-1.39203	-1.8225	-1.80645	-0.99777	-1.39159	-1.33369	-0.89309	-0.90038	-0.88793
18-03	-1.40184	-1.82438	-1.81495	-0.99739	-1.38579	-1.33013	-0.91086	-0.90809	-0.92097
19-03	-1.41211	-1.82671	-1.81716	-0.99877	-1.37688	-1.32859	-0.93675	-0.92927	-0.93686
20-03	-1.41539	-1.83514	-1.82598	-1.00169	-1.37593	-1.32837	-0.95696	-0.95467	-0.95562
21-03	-1.42515	-1.83733	-1.82771	-1.00457	-1.37623	-1.3291	-0.96914	-0.97375	-0.97354
22-03	-1.4279	-1.83972	-1.82986	-1.01251	-1.37758	-1.33064	-0.98329	-0.99185	-0.99022
23-03	-1.43004	-1.84803	-1.83839	-1.0125	-1.3798	-1.33284	-0.98657	-1.00312	-1.00081
24-03	-1.43743	-1.85029	-1.84026	-1.01414	-1.38263	-1.3503	-0.99459	-1.00933	-1.01146
25-03	-1.43895	-1.85902	-1.8424	-1.01683	-1.38555	-1.35056	-0.99743	-1.01432	-1.02222
26-03	-1.44083	-1.86098	-1.8511	-1.02665	-1.38848	-1.35333	-1.00662	-1.02597	-1.02682
27-03	-1.44918	-1.86315	-1.85292	-1.03058	-1.39745	-1.35649	-1.01816	-1.03077	-1.04377
28-03	-1.45132	-1.87132	-1.85504	-1.0471	-1.40062	-1.3666	-1.02204	-1.04809	-1.04862
29-03	-1.45423	-1.87321	-1.86344	-1.05154	-1.41031	-1.36991	-1.03305	-1.05318	-1.06068
30-03	-1.46307	-1.87529	-1.86536	-1.06283	-1.4201	-1.37956	-1.05059	-1.06477	-1.0222
31-03	-1.46625	-1.88333	-1.86747	-1.06322	-1.42311	-1.37565	-1.01611	-1.05093	-0.88302
01-04	-1.4758	-1.88516	-1.87581	-0.98959	-1.42118	-1.35082	-0.88306	-0.91634	-0.89158
02-04	-1.47867	-1.88722	-1.87778	-0.98236	-1.40359	-1.33147	-0.87655	-0.90698	-0.89351
03-04	-1.48167	-1.89558	-1.87996	-0.97719	-1.38302	-1.32836	-0.89742	-0.92512	-0.92046
04-04	-1.49748	-1.8972	-1.88799	-0.97969	-1.38023	-1.32069	-0.92885	-0.93941	-0.946
05-04	-1.50031	-1.89928	-1.88996	-0.98814	-1.37856	-1.32196	-0.94452	-0.9572	-0.96585
06-04	-1.50336	-1.90144	-1.89214	-0.9966	-1.37144	-1.3233	-0.96225	-0.97432	-0.97857
07-04	-1.51285	-1.90929	-1.90027	-1.00598	-1.37247	-1.32522	-0.97877	-0.99141	-0.98949
08-04	-1.51555	-1.91134	-1.90217	-1.00934	-1.37382	-1.32791	-0.98938	-1.00142	-1.00489
09-04	-1.52492	-1.91351	-1.9043	-1.01918	-1.37567	-1.34271	-0.99871	-1.00625	-1.01
10-04	-1.52744	-1.92211	-1.91258	-1.02283	-1.38319	-1.34502	-1.00872	-1.00941	-1.02062
11-04	-1.5366	-1.92395	-1.91425	-1.04	-1.38459	-1.34788	-1.01269	-1.01287	-1.02527
12-04	-1.53891	-1.92595	-1.91633	-1.04234	-1.38632	-1.35112	-1.02271	-1.02291	-1.04224
13-04	-1.54161	-1.92782	-1.91847	-1.04577	-1.39462	-1.36064	-1.02646	-1.02708	-1.04669
14-04	-1.55043	-1.93659	-1.92066	-1.05617	-1.39663	-1.36383	-1.04265	-1.04313	-1.02026
15-04	-1.55304	-1.938	-1.92289	-1.05487	-1.3983	-1.35573	-1.0034	-0.94591	-0.84671
16-04	-1.56208	-1.93961	-1.92512	-0.98161	-1.36635	-1.31314	-0.87343	-0.81123	-0.87276
17-04	-1.5646	-1.94123	-1.93463	-0.96522	-1.32739	-1.29773	-0.86255	-0.837	-0.8818
18-04	-1.57381	-1.94917	-1.9359	-0.96664	-1.30444	-1.28721	-0.8956	-0.83583	-0.90375

DATE	WATER TABLE DEPTHS (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
19-04	-1.57615	-1.95035	-1.93768	-0.97605	-1.29232	-1.28595	-0.91845	-0.87271	-0.92986
20-04	-1.57895	-1.95156	-1.93954	-0.98548	-1.2897	-1.2856	-0.94327	-0.90837	-0.94883
21-04	-1.58772	-1.95274	-1.948	-0.98914	-1.28862	-1.28606	-0.96198	-0.92976	-0.9663
22-04	-1.59055	-1.95389	-1.94962	-0.99769	-1.28855	-1.28721	-0.97376	-0.95075	-0.98353
23-04	-1.59924	-1.96127	-1.95137	-1.0067	-1.28919	-1.28907	-0.98394	-0.96337	-0.99405
24-04	-1.6019	-1.96216	-1.95967	-1.00991	-1.29038	-1.29147	-0.99306	-0.97964	-1.00401
25-04	-1.6114	-1.9632	-1.96108	-1.01931	-1.29203	-1.29417	-1.00113	-0.99028	-1.00825
26-04	-1.61312	-1.96434	-1.96279	-1.02239	-1.29415	-1.29695	-1.01076	-0.99954	-1.01198
27-04	-1.61572	-1.96555	-1.96455	-1.02598	-1.29664	-1.30589	-1.01401	-1.00375	-1.01573
28-04	-1.62492	-1.96683	-1.96634	-1.04176	-1.29892	-1.30824	-1.02438	-1.00637	-1.02613
29-04	-1.62712	-1.97408	-1.9754	-1.04539	-1.30092	-1.31125	-1.02815	-1.01457	-1.02981
30-04	-1.62959	-1.9752	-1.9759	-1.05692	-1.30903	-1.32001	-1.04482	-1.01704	-0.99587
01-05	-1.64678	-1.9764	-1.97749	-1.0227	-1.30998	-1.29641	-0.88796	-0.9442	-0.86857
02-05	-1.64711	-1.97763	-1.97918	-0.89052	-1.27404	-1.26056	-0.80236	-0.81996	-0.85807
03-05	-1.64864	-1.97889	-1.98719	-0.86803	-1.23739	-1.24759	-0.78518	-0.84187	-0.89152
04-05	-1.64942	-1.98607	-1.98849	-0.88685	-1.22372	-1.24471	-0.79724	-0.84158	-0.91327
05-05	-1.64946	-1.98716	-1.9901	-0.91841	-1.21451	-1.23732	-0.83139	-0.87891	-0.93375
06-05	-1.64913	-1.98838	-1.99178	-0.93268	-1.21399	-1.23328	-0.87338	-0.91184	-0.91116
07-05	-1.64871	-1.98964	-1.9994	-0.9511	-1.21421	-1.12412	-0.90662	-0.9338	-0.82343
08-05	-1.64836	-1.99097	-2.0002	-0.96234	-1.21501	-1.07651	-0.93693	-0.95229	-0.8146
09-05	-1.6481	-1.99826	-1.99833	-0.97135	-1.21634	-1.0382	-0.9493	-0.96959	-0.84033
10-05	-1.64786	-1.9995	-1.98598	-0.97438	-1.21786	-1.03244	-0.95952	-0.9844	-0.86282
11-05	-1.64759	-2.00089	-1.97164	-0.9822	-1.217	-1.0185	-0.96918	-0.97573	-0.88036
12-05	-1.64735	-2.00232	-1.95708	-0.98994	-1.19161	-0.99939	-0.97788	-0.93049	-0.89554
13-05	-1.64714	-2.01024	-1.93473	-0.99133	-1.13142	-0.97656	-0.98075	-0.89241	-0.89186
14-05	-1.64696	-2.01015	-1.91959	-0.99287	-1.0953	-0.89133	-0.98826	-0.88162	-0.67919
15-05	-1.64683	-2.00808	-1.89666	-0.97535	-1.04808	-0.7957	-0.88067	-0.72293	-0.7374
16-05	-1.63178	-1.99741	-1.88042	-0.88979	-0.93593	-0.81389	-0.78649	-0.74465	-0.73329
17-05	-1.646	-1.98594	-1.85907	-0.87996	-0.9227	-0.85193	-0.80727	-0.7475	-0.74935
18-05	-1.6461	-1.97461	-1.8469	-0.89672	-0.9111	-0.88712	-0.80654	-0.70565	-0.80383
19-05	-1.64624	-1.97039	-1.83528	-0.91625	-0.86842	-0.91889	-0.83927	-0.72633	-0.85482
20-05	-1.6464	-1.95751	-1.83283	-0.93566	-0.88066	-0.94269	-0.8754	-0.7805	-0.8899
21-05	-1.6466	-1.93455	-1.823	-0.94837	-0.90182	-0.9534	-0.90821	-0.83166	-0.9144
22-05	-1.64686	-1.92078	-1.8221	-0.96448	-0.9103	-0.96263	-0.93315	-0.85553	-0.93141
23-05	-1.64721	-1.90738	-1.82049	-0.97512	-0.81424	-0.97175	-0.95101	-0.76508	-0.94834
24-05	-1.64768	-1.86112	-1.81906	-0.98442	-0.75473	-0.97493	-0.96735	-0.72224	-0.95948
25-05	-1.64742	-1.77728	-1.81098	-0.9874	-0.78816	-0.98049	-0.9777	-0.77139	-0.96735
26-05	-1.64723	-1.72311	-1.81043	-0.99425	-0.83773	-0.97976	-0.98591	-0.81612	-0.96752
27-05	-1.64788	-1.69655	-1.8093	-0.99494	-0.86848	-0.97996	-0.9872	-0.8578	-0.96891
28-05	-1.64849	-1.68086	-1.80796	-0.99054	-0.89699	-0.98144	-0.98328	-0.88795	-0.97155
29-05	-1.64876	-1.66773	-1.80655	-0.97273	-0.89582	-0.98284	-0.97104	-0.88799	-0.97905
30-05	-1.64809	-1.64009	-1.79834	-0.96289	-0.9129	-0.88079	-0.95734	-0.90482	-0.7166
31-05	-1.63149	-1.63315	-1.79673	-0.91339	-0.88069	-0.7669	-0.84248	-0.82605	-0.6987
01-06	-1.63098	-1.62079	-1.77911	-0.82951	-0.8068	-0.79148	-0.73033	-0.71164	-0.72939
02-06	-1.62918	-1.61075	-1.77344	-0.83922	-0.8097	-0.82887	-0.75775	-0.76162	-0.73749
03-06	-1.62743	-1.60709	-1.76052	-0.83395	-0.82569	-0.86991	-0.7602	-0.75566	-0.78969
04-06	-1.62187	-1.59649	-1.74794	-0.79855	-0.84944	-0.89237	-0.75538	-0.79468	-0.83932
05-06	-1.58812	-1.5858	-1.74384	-0.82145	-0.88323	-0.91737	-0.78844	-0.83823	-0.88002
06-06	-1.56358	-1.58206	-1.73387	-0.85699	-0.89657	-0.93131	-0.83889	-0.86135	-0.90281
07-06	-1.54966	-1.57087	-1.7308	-0.89139	-0.88341	-0.94804	-0.88024	-0.85185	-0.92732
08-06	-1.53842	-1.53834	-1.72218	-0.9049	-0.84772	-0.95827	-0.89385	-0.82858	-0.9438
09-06	-1.52441	-1.47563	-1.72031	-0.87977	-0.80712	-0.97047	-0.86824	-0.79176	-0.95313
10-06	-1.48292	-1.40423	-1.71843	-0.86252	-0.78635	-0.97092	-0.85349	-0.77845	-0.95475
11-06	-1.44951	-1.36518	-1.70988	-0.85667	-0.81617	-0.97027	-0.84914	-0.80979	-0.95567

DATE	WATER TABLE DEPTHS (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
12-06	-1.41303	-1.33483	-1.70768	-0.86065	-0.85371	-0.97059	-0.85486	-0.851	-0.9628
13-06	-1.38811	-1.33167	-1.70512	-0.86564	-0.88816	-0.97182	-0.86453	-0.88564	-0.96501
14-06	-1.33792	-1.32892	-1.69645	-0.85217	-0.92488	-0.9397	-0.85107	-0.91694	-0.83827
15-06	-1.29858	-1.32734	-1.69431	-0.72504	-0.90822	-0.85543	-0.55036	-0.8046	-0.73342
16-06	-1.25068	-1.32075	-1.68527	-0.6172	-0.83313	-0.85762	-0.4839	-0.76314	-0.78589
17-06	-1.16883	-1.32078	-1.68504	-0.64243	-0.84247	-0.88501	-0.54531	-0.77369	-0.79698
18-06	-1.13763	-1.32093	-1.68411	-0.70532	-0.86785	-0.90442	-0.60251	-0.78321	-0.8343
19-06	-1.10419	-1.32134	-1.68331	-0.75471	-0.90051	-0.91841	-0.68279	-0.82988	-0.86624
20-06	-1.0903	-1.32198	-1.68262	-0.8053	-0.92584	-0.93558	-0.76124	-0.87304	-0.89852
21-06	-1.0804	-1.32272	-1.68202	-0.85206	-0.94301	-0.95222	-0.81763	-0.9053	-0.91968
22-06	-1.07913	-1.32341	-1.68152	-0.8866	-0.95441	-0.96357	-0.86133	-0.92651	-0.93825
23-06	-1.07863	-1.32385	-1.68115	-0.91791	-0.95944	-0.97376	-0.89493	-0.93491	-0.9555
24-06	-1.07748	-1.32026	-1.67458	-0.93073	-0.9385	-0.98291	-0.91826	-0.91523	-0.97122
25-06	-1.05542	-1.30524	-1.67487	-0.92653	-0.92254	-0.99111	-0.91547	-0.90981	-0.98062
26-06	-1.0317	-1.28183	-1.675	-0.91842	-0.91274	-0.99308	-0.9138	-0.89543	-0.98936
27-06	-1.02008	-1.25865	-1.67517	-0.9276	-0.91574	-0.99507	-0.91848	-0.90574	-0.99134
28-06	-1.01673	-1.25372	-1.67541	-0.93748	-0.93285	-1.00222	-0.92939	-0.92282	-0.99873
29-06	-1.00355	-1.24416	-1.67573	-0.93768	-0.94432	-1.00434	-0.93062	-0.94051	-1.00035
30-06	-0.99108	-1.24249	-1.67613	-0.93836	-0.9552	-1.00394	-0.93708	-0.95209	-0.99993
01-07	-0.98372	-1.24162	-1.6765	-0.94053	-0.96562	-0.99721	-0.93974	-0.96213	-0.9941
02-07	-0.97455	-1.24125	-1.67637	-0.94112	-0.97438	-0.97879	-0.94042	-0.97648	-0.97592
03-07	-0.9671	-1.24114	-1.67502	-0.94799	-0.98265	-0.96696	-0.94728	-0.98013	-0.95999
04-07	-0.95658	-1.23525	-1.67201	-0.9458	-0.99121	-0.95162	-0.94515	-0.98777	-0.94917
05-07	-0.9458	-1.23576	-1.66102	-0.94099	-0.99271	-0.95067	-0.94042	-0.99026	-0.94885
06-07	-0.93403	-1.23544	-1.64932	-0.9295	-0.9897	-0.95378	-0.92882	-0.98758	-0.95218
07-07	-0.92411	-1.21021	-1.63049	-0.9202	-0.94548	-0.96274	-0.91988	-0.94848	-0.96142
08-07	-0.92656	-1.1616	-1.62947	-0.92291	-0.89271	-0.95974	-0.92268	-0.89129	-0.95852
09-07	-0.93556	-1.02225	-1.62458	-0.92701	-0.79331	-0.93079	-0.93274	-0.79322	-0.92992
10-07	-0.93576	-0.95815	-1.6022	-0.93304	-0.76634	-0.91863	-0.93253	-0.76624	-0.91788
11-07	-0.93853	-0.93483	-1.58625	-0.93647	-0.78805	-0.92795	-0.93554	-0.78807	-0.92702
12-07	-0.94864	-0.92485	-1.57244	-0.94694	-0.8035	-0.93708	-0.94592	-0.80354	-0.93647
13-07	-0.96321	-0.8928	-1.5527	-0.96165	-0.81382	-0.93726	-0.96072	-0.81326	-0.93672
14-07	-0.96569	-0.88842	-1.54088	-0.96428	-0.82975	-0.94042	-0.96347	-0.82927	-0.94527
15-07	-0.91434	-0.88663	-1.53616	-0.91288	-0.84074	-0.95033	-0.91267	-0.84595	-0.95512
16-07	-0.82412	-0.89068	-1.52636	-0.82283	-0.86634	-0.96531	-0.82258	-0.86672	-0.96514
17-07	-0.79569	-0.90663	-1.52385	-0.79447	-0.89062	-0.9753	-0.79426	-0.88609	-0.97469
18-07	-0.81925	-0.92363	-1.51588	-0.81815	-0.9094	-0.9788	-0.81797	-0.90474	-0.97778
19-07	-0.85494	-0.92413	-1.51496	-0.85418	-0.91127	-0.98711	-0.85405	-0.9162	-0.98603
20-07	-0.85976	-0.84806	-1.51442	-0.8592	-0.83589	-0.99528	-0.85907	-0.83477	-0.99418
21-07	-0.83639	-0.76591	-1.5142	-0.83614	-0.75652	-0.99717	-0.83609	-0.7556	-0.99616
22-07	-0.83337	-0.77263	-1.51414	-0.83347	-0.76484	-0.99725	-0.83344	-0.76429	-0.99633
23-07	-0.82925	-0.81104	-1.514	-0.82927	-0.80997	-0.99729	-0.82928	-0.80931	-0.99647
24-07	-0.84269	-0.84498	-1.5138	-0.84188	-0.84428	-0.99787	-0.84267	-0.84335	-0.99714
25-07	-0.86285	-0.83847	-1.51364	-0.86289	-0.83788	-0.99889	-0.86284	-0.8378	-1.00437
26-07	-0.89251	-0.81207	-1.5136	-0.89254	-0.81148	-1.00594	-0.8925	-0.81177	-1.00511
27-07	-0.89624	-0.81842	-1.51372	-0.89628	-0.82165	-1.00799	-0.89623	-0.82247	-1.00695
28-07	-0.89742	-0.84518	-1.51401	-0.89744	-0.84306	-1.00984	-0.89741	-0.84368	-1.00886
29-07	-0.91416	-0.83952	-1.51442	-0.91418	-0.83848	-1.01074	-0.91416	-0.83904	-1.00975
30-07	-0.9279	-0.80491	-1.51479	-0.92803	-0.80408	-1.00966	-0.92791	-0.80458	-1.00867
31-07	-0.94504	-0.82461	-1.51452	-0.94515	-0.82867	-0.99344	-0.94504	-0.82433	-0.993
01-08	-0.96111	-0.85912	-1.50445	-0.96121	-0.85739	-0.98301	-0.96111	-0.85905	-0.98301
02-08	-0.96941	-0.89223	-1.50214	-0.96945	-0.8907	-0.98141	-0.96942	-0.89218	-0.98135
03-08	-0.95339	-0.91762	-1.48479	-0.95343	-0.92188	-0.9806	-0.95339	-0.91764	-0.98054
04-08	-0.95301	-0.93632	-1.48314	-0.95305	-0.93666	-0.9613	-0.95301	-0.93632	-0.96176

DATE	WATER TABLE DEPTHS (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
05-08	-0.96167	-0.95349	-1.46989	-0.96169	-0.95556	-0.94446	-0.96168	-0.9535	-0.94483
06-08	-0.9712	-0.9699	-1.45459	-0.97122	-0.96666	-0.9407	-0.9712	-0.96991	-0.93648
07-08	-0.97444	-0.98009	-1.43831	-0.97446	-0.97732	-0.93034	-0.97445	-0.9801	-0.92695
08-08	-0.97851	-0.98932	-1.4156	-0.97851	-0.98701	-0.93114	-0.97851	-0.98932	-0.92851
09-08	-0.9601	-0.99016	-1.40067	-0.9601	-0.99303	-0.9043	-0.9601	-0.99016	-0.90269
10-08	-0.94887	-0.96491	-1.32833	-0.94887	-0.96274	-0.84489	-0.94887	-0.96491	-0.84594
11-08	-0.94997	-0.94844	-1.28695	-0.94998	-0.94651	-0.85104	-0.94998	-0.94844	-0.85168
12-08	-0.95996	-0.93691	-1.26083	-0.95996	-0.94025	-0.86556	-0.95996	-0.93691	-0.8716
13-08	-0.96942	-0.93011	-1.24649	-0.96942	-0.9332	-0.89612	-0.96942	-0.93011	-0.89147
14-08	-0.97272	-0.91229	-1.23456	-0.97272	-0.91436	-0.90026	-0.97272	-0.91229	-0.90432
15-08	-0.98079	-0.91542	-1.19327	-0.98079	-0.91746	-0.8876	-0.98079	-0.91542	-0.88007
16-08	-0.98909	-0.93276	-1.15325	-0.9891	-0.93002	-0.86967	-0.98909	-0.93276	-0.86726
17-08	-0.99203	-0.94459	-1.13609	-0.99203	-0.94186	-0.87728	-0.99203	-0.94458	-0.88544
18-08	-0.99918	-0.95253	-1.12575	-0.99918	-0.95524	-0.90812	-0.99918	-0.95253	-0.90616
19-08	-1.0009	-0.96134	-1.124	-1.0009	-0.95896	-0.92403	-1.0009	-0.96134	-0.92506
20-08	-1.00037	-0.96362	-1.11726	-1.00037	-0.96639	-0.94183	-1.00037	-0.96362	-0.94279
21-08	-0.99953	-0.96152	-1.11763	-0.99954	-0.96417	-0.9585	-0.99954	-0.96152	-0.95937
22-08	-0.99962	-0.96086	-1.11832	-0.99962	-0.96325	-0.96947	-0.99962	-0.96086	-0.96981
23-08	-0.97094	-0.96007	-1.11938	-0.97094	-0.95678	-0.98419	-0.97094	-0.96007	-0.98449
24-08	-0.89242	-0.95885	-1.12026	-0.89242	-0.95567	-0.98715	-0.89242	-0.95885	-0.98741
25-08	-0.89637	-0.95673	-1.11747	-0.89638	-0.95385	-0.98425	-0.89637	-0.95673	-0.98447
26-08	-0.91028	-0.95097	-1.11436	-0.91029	-0.95375	-0.98302	-0.91028	-0.95096	-0.98323
27-08	-0.92903	-0.95132	-1.11297	-0.92904	-0.95405	-0.98397	-0.92904	-0.95132	-0.98415
28-08	-0.94672	-0.9603	-1.11267	-0.94673	-0.95696	-0.98589	-0.94673	-0.9603	-0.98604
29-08	-0.96251	-0.96383	-1.11286	-0.96251	-0.96679	-0.98789	-0.96251	-0.96383	-0.98803
30-08	-0.97178	-0.97285	-1.11207	-0.97178	-0.97056	-0.98786	-0.97177	-0.97284	-0.98797
31-08	-0.97465	-0.98139	-1.10126	-0.97465	-0.97934	-0.92831	-0.97465	-0.98139	-0.84827
01-09	-0.98198	-0.98949	-1.09166	-0.94816	-0.96262	-0.83965	-0.85372	-0.87844	-0.7193
02-09	-0.98428	-0.99184	-1.09011	-0.85645	-0.87956	-0.84195	-0.77507	-0.78387	-0.78394
03-09	-0.99089	-0.98581	-1.08955	-0.85645	-0.82119	-0.87586	-0.78906	-0.72562	-0.79643
04-09	-0.99266	-0.91977	-1.08949	-0.88354	-0.77662	-0.89887	-0.79687	-0.68167	-0.83714
05-09	-0.99426	-0.91385	-1.08969	-0.91109	-0.80986	-0.92333	-0.84158	-0.7355	-0.87919
06-09	-1.00104	-0.91296	-1.0879	-0.93162	-0.8291	-0.93082	-0.87975	-0.77862	-0.89382
07-09	-1.00343	-0.89248	-1.06479	-0.94939	-0.82877	-0.91956	-0.91487	-0.78729	-0.89117
08-09	-1.01251	-0.89291	-1.03741	-0.96168	-0.8488	-0.92051	-0.93029	-0.82182	-0.89562
09-09	-1.01463	-0.91069	-1.0336	-0.97752	-0.87733	-0.92993	-0.9489	-0.85768	-0.91205
10-09	-1.0184	-0.92397	-1.02143	-0.98811	-0.89889	-0.93163	-0.96662	-0.89082	-0.92495
11-09	-1.02884	-0.94212	-1.00876	-0.9976	-0.92414	-0.93935	-0.98322	-0.91286	-0.92803
12-09	-1.04598	-0.95313	-1.00656	-1.00812	-0.94141	-0.94299	-0.99363	-0.93665	-0.93784
13-09	-1.04935	-0.96221	-1.00491	-1.01276	-0.95616	-0.95291	-1.0046	-0.94776	-0.94831
14-09	-1.05327	-0.96505	-1.00412	-1.01711	-0.95989	-0.92684	-1.00933	-0.95719	-0.85841
15-09	-1.03814	-0.97287	-1.00412	-0.86858	-0.9326	-0.85017	-0.7206	-0.81921	-0.72713
16-09	-0.95991	-0.98136	-1.00454	-0.77931	-0.85042	-0.8517	-0.65495	-0.72729	-0.78951
17-09	-0.92548	-0.98418	-1.00532	-0.76262	-0.85388	-0.88028	-0.68385	-0.7817	-0.80216
18-09	-0.92208	-0.99204	-1.0065	-0.76562	-0.88837	-0.903	-0.69853	-0.79709	-0.84211
19-09	-0.93341	-0.99459	-1.00798	-0.82227	-0.91036	-0.92803	-0.75809	-0.83825	-0.87852
20-09	-0.95028	-1.00124	-1.00981	-0.85998	-0.93448	-0.94575	-0.82318	-0.88004	-0.91116
21-09	-0.96696	-1.00275	-1.01229	-0.9056	-0.94655	-0.96252	-0.86645	-0.90677	-0.93653
22-09	-0.96947	-1.00429	-1.01422	-0.91978	-0.96254	-0.97299	-0.89736	-0.9321	-0.95339
23-09	-0.9663	-1.00645	-1.01198	-0.92082	-0.97335	-0.97244	-0.90968	-0.94994	-0.95449
24-09	-0.93756	-1.01503	-1.00837	-0.91031	-0.98252	-0.9711	-0.9002	-0.96684	-0.95488
25-09	-0.90348	-1.01883	-1.00549	-0.87639	-0.99218	-0.97116	-0.87163	-0.98271	-0.96257
26-09	-0.90669	-1.0293	-1.004	-0.88849	-1.00133	-0.97276	-0.88351	-0.99294	-0.9647
27-09	-0.92512	-1.0463	-1.00406	-0.90893	-1.01163	-0.98135	-0.90418	-1.00266	-0.97325

DATE	WATER TABLE DEPTHS (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
28-09	-0.93868	-1.04927	-1.00492	-0.93539	-1.01564	-0.98372	-0.92491	-1.00701	-0.98215
29-09	-0.96156	-1.05302	-0.99611	-0.94964	-1.02607	-0.98337	-0.9451	-1.01657	-0.98211
30-09	-0.96821	-1.06348	-0.96642	-0.96251	-1.0445	-0.8751	-0.96398	-1.02749	-0.71667
01-10	-0.98489	-1.06678	-0.94942	-0.9665	-1.02737	-0.77788	-0.89293	-0.99227	-0.72622
02-10	-0.99504	-1.0767	-0.94464	-0.90257	-0.96677	-0.78969	-0.77187	-0.83814	-0.7347
03-10	-1.00483	-1.087	-0.9479	-0.89463	-0.95228	-0.83911	-0.82352	-0.86688	-0.73901
04-10	-1.00764	-1.09061	-0.95817	-0.90421	-0.94993	-0.87487	-0.81864	-0.87693	-0.80381
05-10	-0.99902	-1.08745	-0.97359	-0.88936	-0.95919	-0.90822	-0.80672	-0.89831	-0.84942
06-10	-0.9616	-1.09061	-0.98411	-0.8618	-0.96768	-0.93492	-0.79914	-0.92349	-0.89654
07-10	-0.94935	-1.09333	-0.99401	-0.86954	-0.97607	-0.95943	-0.83473	-0.93709	-0.92945
08-10	-0.95208	-1.09607	-1.004	-0.90139	-0.98452	-0.97326	-0.87748	-0.95377	-0.95485
09-10	-0.96261	-1.09916	-1.00834	-0.92337	-0.98714	-0.98448	-0.90161	-0.96941	-0.96842
10-10	-0.978	-1.10262	-1.01787	-0.94251	-0.99469	-0.99479	-0.93284	-0.97921	-0.98457
11-10	-0.98837	-1.11272	-1.02178	-0.9605	-0.99639	-1.00429	-0.95178	-0.98249	-0.99495
12-10	-0.99809	-1.11252	-1.02579	-0.97725	-0.99575	-1.00821	-0.96914	-0.988	-0.99898
13-10	-1.00171	-1.11279	-1.04409	-0.98855	-0.99553	-1.01143	-0.98593	-0.98886	-1.00303
14-10	-1.01262	-1.1137	-1.04565	-1.00461	-0.99671	-1.01529	-0.99668	-0.99079	-0.97316
15-10	-1.02471	-1.11574	-1.04952	-1.00502	-0.99226	-0.93637	-0.96947	-0.91144	-0.83806
16-10	-1.04457	-1.11781	-1.05995	-0.94914	-0.91797	-0.92977	-0.85272	-0.79828	-0.84118
17-10	-1.04579	-1.12465	-1.06384	-0.93692	-0.90536	-0.94064	-0.84929	-0.82546	-0.86758
18-10	-1.04873	-1.12312	-1.07436	-0.9406	-0.87513	-0.95252	-0.8839	-0.77026	-0.90151
19-10	-1.06031	-1.087	-1.08564	-0.95203	-0.83953	-0.96927	-0.90652	-0.76039	-0.93314
20-10	-1.06494	-1.07178	-1.09713	-0.96825	-0.85494	-0.98072	-0.93229	-0.80015	-0.95794
21-10	-1.07636	-1.0635	-1.10065	-0.97978	-0.89	-0.99062	-0.95139	-0.85052	-0.96986
22-10	-1.08824	-1.06392	-1.10214	-0.99091	-0.92239	-0.9972	-0.97596	-0.89816	-0.98307
23-10	-1.10007	-1.06575	-1.10214	-1.00766	-0.94454	-0.99635	-0.98838	-0.92326	-0.98388
24-10	-1.105	-1.0689	-1.10208	-1.01364	-0.9635	-0.99615	-0.99741	-0.94942	-0.98496
25-10	-1.10759	-1.0794	-1.10927	-1.0164	-0.9817	-0.99715	-0.99882	-0.97377	-0.98717
26-10	-1.11526	-1.09039	-1.11017	-1.01822	-0.99839	-0.99914	-1.00635	-0.99051	-0.99532
27-10	-1.11765	-1.10181	-1.11222	-1.02136	-1.01103	-1.00201	-1.00905	-1.00203	-0.9982
28-10	-1.12729	-1.11364	-1.12223	-1.02535	-1.02371	-1.01133	-1.01985	-1.01464	-1.0073
29-10	-1.1306	-1.11853	-1.12484	-1.04172	-1.04227	-1.02265	-1.02322	-1.02721	-1.01827
30-10	-1.14074	-1.12879	-1.1354	-1.046	-1.04589	-1.02759	-1.04083	-1.03135	-1.02327
31-10	-1.15161	-1.13077	-1.14696	-1.05779	-1.04764	-1.02812	-1.04527	-1.03359	-0.98084
01-11	-1.15654	-1.13171	-1.15157	-1.05932	-1.01974	-0.97518	-1.00211	-0.91785	-0.84782
02-11	-1.16726	-1.13199	-1.16314	-0.99861	-0.91688	-0.9703	-0.85347	-0.80431	-0.87186
03-11	-1.17841	-1.13917	-1.17555	-0.97992	-0.90719	-0.97249	-0.87491	-0.82996	-0.88127
04-11	-1.18245	-1.13899	-1.1806	-0.97896	-0.92518	-0.97622	-0.87301	-0.83057	-0.90393
05-11	-1.18485	-1.14089	-1.18508	-0.98085	-0.94548	-0.98486	-0.9056	-0.87432	-0.92996
06-11	-1.20016	-1.1433	-1.20201	-0.9835	-0.95777	-0.99373	-0.9272	-0.90917	-0.96054
07-11	-1.20355	-1.14437	-1.20633	-0.99199	-0.96792	-1.00357	-0.94679	-0.94053	-0.97358
08-11	-1.20817	-1.14475	-1.21761	-0.99539	-0.97693	-1.01522	-0.96466	-0.95852	-0.98523
09-11	-1.21955	-1.14493	-1.22973	-1.00554	-0.98009	-1.02036	-0.98216	-0.96928	-1.00114
10-11	-1.23097	-1.15223	-1.23374	-1.018	-0.98891	-1.03259	-0.99884	-0.97906	-1.014
11-11	-1.24239	-1.15566	-1.24514	-1.03106	-0.99851	-1.05119	-1.01262	-0.98852	-1.02717
12-11	-1.25403	-1.16614	-1.25656	-1.04901	-1.00901	-1.06423	-1.02563	-0.9976	-1.04639
13-11	-1.25863	-1.17861	-1.26819	-1.05453	-1.02101	-1.07729	-1.04419	-1.00771	-1.05294
14-11	-1.26987	-1.18246	-1.2797	-1.0666	-1.03329	-1.08729	-1.04977	-1.01957	-1.02352
15-11	-1.28068	-1.1997	-1.29083	-1.07536	-1.03582	-1.0329	-1.01991	-0.97925	-0.8799
16-11	-1.29174	-1.20473	-1.29552	-1.021	-0.98198	-1.01753	-0.88309	-0.84035	-0.89593
17-11	-1.30308	-1.21652	-1.30635	-1.00626	-0.97627	-1.01008	-0.89274	-0.87424	-0.90242
18-11	-1.30733	-1.22755	-1.3171	-1.00582	-0.97765	-1.01093	-0.89708	-0.87376	-0.91815
19-11	-1.31828	-1.23856	-1.32143	-1.0085	-0.98137	-1.01005	-0.92482	-0.90774	-0.93406
20-11	-1.32982	-1.25069	-1.32838	-1.01368	-0.99113	-0.98531	-0.95702	-0.93447	-0.92128

DATE	WATER TABLE DEPTHS (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
21-11	-1.34833	-1.25465	-1.32574	-1.02584	-1.00154	-0.97217	-0.97608	-0.95997	-0.92484
22-11	-1.35106	-1.26613	-1.31698	-1.04367	-1.01393	-0.97381	-0.99338	-0.97919	-0.94232
23-11	-1.35534	-1.27719	-1.3171	-1.04843	-1.027	-0.98263	-1.00415	-0.99722	-0.95996
24-11	-1.36582	-1.28812	-1.31722	-1.05981	-1.04593	-0.991	-1.01591	-1.01666	-0.97157
25-11	-1.3761	-1.28543	-1.3177	-1.07101	-1.05056	-0.99442	-1.02774	-1.0214	-0.98213
26-11	-1.37955	-1.29196	-1.31891	-1.08307	-1.05206	-1.00234	-1.04557	-1.02247	-0.9962
27-11	-1.3834	-1.30145	-1.3206	-1.08559	-1.05243	-1.01407	-1.04799	-1.02273	-1.00199
28-11	-1.39271	-1.30395	-1.33024	-1.08793	-1.06276	-1.03428	-1.05025	-1.03234	-1.02251
29-11	-1.39573	-1.31301	-1.33379	-1.09777	-1.067	-1.04117	-1.05415	-1.05004	-1.04291
30-11	-1.40503	-1.31687	-1.35203	-1.1089	-1.07829	-1.049	-1.06543	-1.05469	-0.98611
01-12	-1.40837	-1.32702	-1.35348	-1.1117	-1.08626	-0.94447	-1.04218	-1.04864	-0.80511
02-12	-1.418	-1.34557	-1.3551	-1.07357	-1.02286	-0.90052	-0.89345	-0.89324	-0.80719
03-12	-1.42814	-1.347	-1.35551	-1.0523	-1.01408	-0.9156	-0.90943	-0.90918	-0.81247
04-12	-1.43195	-1.35095	-1.3555	-1.05116	-1.01295	-0.91907	-0.91671	-0.92194	-0.84019
05-12	-1.44193	-1.362	-1.35311	-1.05247	-1.01469	-0.91611	-0.93694	-0.93659	-0.85052
06-12	-1.45221	-1.36606	-1.3363	-1.05551	-1.01879	-0.92731	-0.95775	-0.96183	-0.8846
07-12	-1.45596	-1.37674	-1.33395	-1.06601	-1.03932	-0.93981	-0.97654	-0.98077	-0.91882
08-12	-1.46613	-1.38748	-1.33274	-1.0774	-1.04303	-0.95758	-0.99414	-0.99826	-0.93402
09-12	-1.47023	-1.39897	-1.33262	-1.08924	-1.05596	-0.97479	-1.00674	-1.01157	-0.95325
10-12	-1.48056	-1.40225	-1.33358	-1.09424	-1.06817	-0.98719	-1.01325	-1.02495	-0.97725
11-12	-1.48374	-1.41281	-1.33563	-1.09712	-1.08069	-1.00534	-1.01774	-1.04409	-0.99394
12-12	-1.48585	-1.42359	-1.33755	-1.09823	-1.09332	-1.0187	-1.02069	-1.05727	-1.00712
13-12	-1.50071	-1.42754	-1.35411	-1.09875	-1.10585	-1.03197	-1.01733	-1.07015	-1.02081
14-12	-1.50181	-1.43801	-1.35794	-1.10048	-1.11835	-1.0348	-1.02069	-1.08205	-0.99263
15-12	-1.50317	-1.44225	-1.3684	-1.10817	-1.12192	-0.99251	-1.00307	-1.05823	-0.84581
16-12	-1.5051	-1.45161	-1.37258	-1.0597	-1.07909	-0.98287	-0.85652	-0.89765	-0.88148
17-12	-1.5075	-1.45447	-1.38325	-1.03795	-1.05587	-0.97917	-0.88383	-0.90352	-0.89124
18-12	-1.51685	-1.46333	-1.39387	-1.03678	-1.04071	-0.98819	-0.89428	-0.90586	-0.91424
19-12	-1.51957	-1.46688	-1.39811	-1.03867	-1.04178	-0.99718	-0.92364	-0.93207	-0.93959
20-12	-1.52918	-1.47084	-1.40225	-1.04287	-1.04986	-0.99953	-0.95158	-0.95085	-0.95845
21-12	-1.5323	-1.48079	-1.4124	-1.06057	-1.05034	-1.01003	-0.97139	-0.96259	-0.97674
22-12	-1.542	-1.48342	-1.42258	-1.06577	-1.05176	-1.02235	-0.98967	-0.97375	-0.99393
23-12	-1.54529	-1.48577	-1.42605	-1.07728	-1.05505	-1.04275	-1.00744	-0.99123	-1.00624
24-12	-1.55522	-1.50093	-1.43615	-1.08896	-1.05929	-1.04661	-1.02046	-0.995	-1.0191
25-12	-1.5585	-1.50296	-1.44009	-1.10057	-1.06284	-1.05915	-1.03896	-1.00112	-1.03191
26-12	-1.56799	-1.50469	-1.45015	-1.11266	-1.06633	-1.07154	-1.04405	-1.00382	-1.05054
27-12	-1.57129	-1.50635	-1.46053	-1.12497	-1.07715	-1.08381	-1.05674	-1.01455	-1.06336
28-12	-1.58071	-1.50825	-1.46442	-1.13675	-1.0801	-1.09595	-1.06932	-1.01786	-1.07597
29-12	-1.58415	-1.51652	-1.47515	-1.14218	-1.08121	-1.10834	-1.08157	-1.01877	-1.08808
30-12	-1.59335	-1.51775	-1.47896	-1.15441	-1.08978	-1.11994	-1.09406	-1.02809	-1.10048
31-12	-1.6033	-1.51928	-1.49512	-1.16604	-1.10143	-1.13193	-1.10629	-1.04691	-1.1129

DATE	WATER TABLE DEPTHS (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
01-01	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
02-01	-1.50859	-1.50859	-1.50859	-1.50804	-1.50806	-1.508	-1.46618	-1.46626	-1.46565
03-01	-1.52136	-1.52162	-1.52158	-1.49332	-1.49438	-1.48805	-1.58445	-1.58815	-1.59517
04-01	-1.60933	-1.60969	-1.60959	-1.5539	-1.55179	-1.55032	-1.53093	-1.53934	-1.53313
05-01	-1.69051	-1.69647	-1.69602	-1.62943	-1.63302	-1.62555	-1.5273	-1.53666	-1.52811
06-01	-1.75696	-1.76128	-1.76074	-1.69543	-1.69829	-1.69096	-1.60246	-1.61517	-1.60122
07-01	-1.81143	-1.81527	-1.8095	-1.74784	-1.76076	-1.75619	-1.68788	-1.68708	-1.68669
08-01	-1.84565	-1.8471	-1.84456	-1.79642	-1.80888	-1.80521	-1.74996	-1.75007	-1.74551
09-01	-1.8719	-1.87445	-1.87786	-1.83095	-1.83917	-1.83653	-1.79949	-1.79973	-1.80069
10-01	-1.89695	-1.90007	-1.89882	-1.85859	-1.86611	-1.86411	-1.83386	-1.84675	-1.83582
11-01	-1.91392	-1.92033	-1.91784	-1.88414	-1.89211	-1.89055	-1.86128	-1.87047	-1.8636
12-01	-1.93279	-1.93881	-1.93474	-1.90328	-1.91118	-1.90974	-1.88734	-1.89605	-1.89025
13-01	-1.94376	-1.95016	-1.95302	-1.92128	-1.92834	-1.93408	-1.90587	-1.9141	-1.91537
14-01	-1.95417	-1.96013	-1.96273	-1.93722	-1.94123	-1.94018	-1.92989	-1.93304	-1.94388
15-01	-1.96384	-1.96936	-1.96637	-1.94828	-1.95856	-1.95096	-1.94966	-1.95095	-1.94466
16-01	-1.97336	-1.97797	-1.97533	-1.95825	-1.96837	-1.96139	-1.94966	-1.95834	-1.93456
17-01	-1.97557	-1.98078	-1.98346	-1.96701	-1.97068	-1.96878	-1.94124	-1.95196	-1.90217
18-01	-1.98328	-1.98814	-1.98592	-1.96863	-1.97776	-1.96941	-1.91316	-1.92596	-1.88968
19-01	-1.98556	-1.9904	-1.99295	-1.96906	-1.97821	-1.96956	-1.89948	-1.91651	-1.89704
20-01	-1.99271	-1.99721	-1.99476	-1.96933	-1.9783	-1.97001	-1.90072	-1.91664	-1.90707
21-01	-1.9948	-1.99879	-1.99628	-1.97005	-1.97854	-1.9709	-1.91131	-1.91963	-1.91788
22-01	-1.9621	-2.00011	-2.00326	-1.85917	-1.9791	-1.9722	-1.74301	-1.9241	-1.92835
23-01	-1.66768	-2.00805	-2.00486	-1.54681	-1.98003	-1.9788	-1.46841	-1.93867	-1.93926
24-01	-1.60622	-2.00918	-2.00622	-1.52846	-1.98125	-1.98041	-1.47603	-1.94943	-1.94936
25-01	-1.65302	-2.01071	-2.00774	-1.59216	-1.98766	-1.98194	-1.56043	-1.95311	-1.95897
26-01	-1.7044	-2.01241	-2.0156	-1.66521	-1.989	-1.9885	-1.64515	-1.96212	-1.96221
27-01	-1.76074	-2.02084	-2.01705	-1.73098	-1.99022	-1.99003	-1.7108	-1.97093	-1.97022
28-01	-1.79756	-2.022	-2.01863	-1.78183	-1.99158	-1.99135	-1.76818	-1.9739	-1.97849
29-01	-1.83782	-2.02368	-2.02031	-1.82362	-1.99783	-1.99775	-1.81555	-1.98182	-1.98081
30-01	-1.86474	-2.02547	-2.0281	-1.8633	-1.99902	-1.99879	-1.84954	-1.98419	-1.98811
31-01	-1.89024	-2.03346	-2.02967	-1.88023	-1.99992	-1.99968	-1.87666	-1.99094	-1.98982
01-02	-1.9092	-2.03502	-2.03144	-1.90484	-2.00104	-2.00077	-1.91066	-1.99271	-1.99125
02-02	-1.93299	-2.03676	-2.03326	-1.92944	-2.00863	-2.00186	-1.93149	-1.99408	-1.98993
03-02	-1.93901	-2.03857	-2.04099	-1.93385	-2.00935	-2.00226	-1.9122	-1.99809	-1.97817
04-02	-1.94955	-2.04622	-2.04267	-1.94281	-2.00978	-2.00166	-1.88206	-1.98738	-1.96605
05-02	-1.96081	-2.0479	-2.04449	-1.945	-2.00938	-2.00034	-1.87663	-1.97037	-1.95716
06-02	-1.97007	-2.04973	-2.05255	-1.95263	-2.00833	-1.99884	-1.8807	-1.96068	-1.94984
07-02	-1.97858	-2.0583	-2.05389	-1.95446	-2.00699	-1.99777	-1.89757	-1.95915	-1.95022
08-02	-1.98707	-2.05908	-2.05566	-1.95663	-2.0057	-1.99683	-1.90923	-1.9592	-1.95201
09-02	-1.98853	-2.06083	-2.05752	-1.96457	-2.00462	-1.9963	-1.93185	-1.96026	-1.95978
10-02	-1.99033	-2.06269	-2.06535	-1.96719	-1.99797	-1.99613	-1.93588	-1.96207	-1.96231
11-02	-1.997	-2.07055	-2.06688	-1.97498	-1.99807	-1.99626	-1.94621	-1.9644	-1.96985
12-02	-1.99857	-2.07192	-2.06869	-1.97737	-1.99816	-1.99666	-1.95616	-1.972	-1.97232
13-02	-1.99985	-2.07376	-2.07061	-1.98424	-1.99857	-1.99728	-1.96553	-1.97462	-1.97959
14-02	-2.00746	-2.07568	-2.07828	-1.98625	-1.99918	-1.99807	-1.96865	-1.98213	-1.98733
15-02	-2.00873	-2.08349	-2.07996	-1.99296	-1.99992	-1.99896	-1.977	-1.99049	-1.98779
16-02	-2.01009	-2.08503	-2.08177	-1.99435	-2.00091	-1.99977	-1.97917	-1.99103	-1.97768
17-02	-2.01163	-2.08686	-2.08367	-1.99495	-2.00187	-2.00003	-1.97415	-1.9806	-1.95073
18-02	-2.01318	-2.08877	-2.09188	-1.99383	-2.00224	-1.99948	-1.95242	-1.9593	-1.93803
19-02	-2.02094	-2.09792	-2.09351	-1.99121	-2.00177	-1.99858	-1.93379	-1.94153	-1.93027
20-02	-2.02224	-2.0992	-2.09535	-1.98291	-2.00072	-1.99752	-1.9264	-1.93888	-1.93093
21-02	-2.02367	-2.10099	-2.09726	-1.9812	-1.99954	-1.99664	-1.92719	-1.93917	-1.93345
22-02	-2.02514	-2.10272	-2.0992	-1.98033	-1.99869	-1.99602	-1.92991	-1.94114	-1.94216
23-02	-2.03282	-2.10449	-2.10801	-1.98007	-1.99802	-1.99571	-1.93912	-1.94411	-1.95116

DATE	WATER TABLE DEPTHS (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
24-02	-2.03405	-2.11297	-2.10951	-1.98035	-1.99772	-1.9957	-1.94865	-1.95284	-1.9604
25-02	-2.03553	-2.1145	-2.11114	-1.98111	-1.99775	-1.99598	-1.95209	-1.96198	-1.96259
26-02	-2.03712	-2.11614	-2.11993	-1.98222	-1.99807	-1.99648	-1.96085	-1.96506	-1.97068
27-02	-2.04513	-2.12457	-2.12097	-1.98358	-1.99859	-1.99716	-1.96926	-1.97323	-1.97324
28-02	-2.04625	-2.12583	-2.12248	-1.98505	-1.99927	-1.99797	-1.97192	-1.98179	-1.98165
01-03	-2.04777	-2.12737	-2.12407	-1.98657	-2.00006	-1.99887	-1.97975	-1.98323	-1.98205
02-03	-2.04936	-2.12898	-2.13223	-1.99293	-2.00109	-1.99964	-1.99712	-2.00077	-1.97115
03-03	-2.05097	-2.13682	-2.13342	-1.99389	-2.00196	-1.99974	-1.96878	-1.97989	-1.93622
04-03	-2.05834	-2.13812	-2.13487	-1.99364	-2.00202	-1.99898	-1.93976	-1.95013	-1.93077
05-03	-2.05981	-2.13962	-2.13641	-1.99243	-2.00092	-1.99775	-1.92377	-1.93154	-1.92916
06-03	-2.06143	-2.1412	-2.14432	-1.99088	-1.99914	-1.99651	-1.92225	-1.92419	-1.92557
07-03	-2.06312	-2.149	-2.14553	-1.98951	-1.9976	-1.99552	-1.92384	-1.92535	-1.93525
08-03	-2.07071	-2.15032	-2.14703	-1.98331	-1.99613	-1.99492	-1.92702	-1.9283	-1.93811
09-03	-2.07204	-2.15179	-2.1486	-1.98315	-1.99513	-1.99471	-1.93696	-1.93769	-1.94747
10-03	-2.07367	-2.15328	-2.15629	-1.98358	-1.99455	-1.99484	-1.94648	-1.94724	-1.95652
11-03	-2.07538	-2.16079	-2.15745	-1.9843	-1.99436	-1.99526	-1.94978	-1.95633	-1.96521
12-03	-2.07715	-2.16203	-2.1589	-1.98527	-1.99452	-1.99589	-1.95835	-1.95937	-1.96807
13-03	-2.08445	-2.16347	-2.16041	-1.98644	-1.99497	-1.99669	-1.96704	-1.96771	-1.97589
14-03	-2.0861	-2.16499	-2.16835	-1.99273	-1.99565	-1.99762	-1.96992	-1.97609	-1.98521
15-03	-2.08782	-2.1726	-2.16935	-1.99389	-1.9965	-1.99861	-1.98441	-1.98441	-1.98561
16-03	-2.08962	-2.17375	-2.17078	-1.99484	-1.99747	-1.99945	-1.98396	-1.98482	-1.97421
17-03	-2.09827	-2.17517	-2.17228	-1.99562	-1.99835	-1.99942	-1.96634	-1.97537	-1.94301
18-03	-2.09975	-2.17664	-2.17379	-1.99547	-1.99863	-1.99821	-1.9369	-1.95358	-1.92348
19-03	-2.10141	-2.18491	-2.18106	-1.99425	-1.9981	-1.99631	-1.92025	-1.93535	-1.91135
20-03	-2.10308	-2.18532	-2.1824	-1.9926	-1.99707	-1.9944	-1.91917	-1.92816	-1.91298
21-03	-2.11285	-2.18668	-2.18382	-1.99109	-1.99597	-1.98798	-1.92122	-1.929	-1.92191
22-03	-2.11308	-2.18812	-2.18528	-1.99	-1.99507	-1.98715	-1.9249	-1.93174	-1.93149
23-03	-2.11452	-2.18962	-2.19272	-1.98932	-1.99449	-1.98704	-1.93501	-1.94117	-1.94149
24-03	-2.11603	-2.19718	-2.1939	-1.98897	-1.99426	-1.98728	-1.94473	-1.95055	-1.95097
25-03	-2.12439	-2.19848	-2.19526	-1.98398	-1.99435	-1.98782	-1.95369	-1.95989	-1.95428
26-03	-2.12531	-2.19991	-2.19666	-1.98435	-1.99469	-1.98861	-1.95634	-1.96217	-1.96262
27-03	-2.12663	-2.20138	-2.19807	-1.98519	-1.9952	-1.9896	-1.9643	-1.97007	-1.97079
28-03	-2.128	-2.20917	-2.2057	-1.98615	-1.99584	-1.99073	-1.96677	-1.97264	-1.97334
29-03	-2.12939	-2.21025	-2.20692	-1.99295	-1.99658	-1.99198	-1.97415	-1.98001	-1.98062
30-03	-2.13692	-2.21159	-2.20828	-1.99302	-1.99742	-1.99813	-1.97626	-1.98216	-1.98891
31-03	-2.13806	-2.21301	-2.20968	-1.99361	-1.99833	-1.99919	-1.98412	-1.98996	-1.98891
01-04	-2.13929	-2.21445	-2.21753	-1.99441	-1.99928	-1.99979	-1.98377	-1.99015	-1.97195
02-04	-2.14059	-2.22182	-2.21841	-1.99497	-2.00006	-1.99955	-1.96978	-1.97829	-1.94228
03-04	-2.149	-2.22305	-2.21972	-1.99431	-2.00002	-1.99827	-1.93226	-1.94993	-1.92509
04-04	-2.14917	-2.22439	-2.2211	-1.99238	-1.99882	-1.99645	-1.91346	-1.9319	-1.92289
05-04	-2.1504	-2.22578	-2.22252	-1.99002	-1.99733	-1.99472	-1.91269	-1.92932	-1.92421
06-04	-2.15171	-2.22717	-2.22975	-1.98293	-1.99562	-1.98829	-1.91503	-1.92997	-1.92719
07-04	-2.15306	-2.2342	-2.23092	-1.98186	-1.99426	-1.98766	-1.91902	-1.93224	-1.93691
08-04	-2.16054	-2.23546	-2.23226	-1.98157	-1.98828	-1.98769	-1.92858	-1.9355	-1.94052
09-04	-2.16153	-2.23681	-2.23366	-1.98173	-1.98796	-1.988	-1.93876	-1.9447	-1.95009
10-04	-2.1628	-2.23821	-2.23509	-1.98223	-1.98829	-1.98858	-1.94809	-1.95381	-1.95923
11-04	-2.16414	-2.23965	-2.24215	-1.983	-1.98885	-1.98937	-1.95683	-1.96242	-1.96844
12-04	-2.16552	-2.24662	-2.2434	-1.984	-1.98955	-1.99032	-1.96546	-1.96487	-1.9702
13-04	-2.17276	-2.24789	-2.24478	-1.98518	-1.99034	-1.9914	-1.968	-1.97263	-1.97844
14-04	-2.17393	-2.24923	-2.24618	-1.98647	-1.99122	-1.99764	-1.97561	-1.97474	-1.97975
15-04	-2.17524	-2.25059	-2.2476	-1.9927	-1.99218	-1.99845	-1.98336	-1.98262	-1.99703
16-04	-2.17659	-2.25195	-2.24901	-1.99381	-1.99794	-1.99871	-1.98294	-1.9824	-1.95888
17-04	-2.17794	-2.2588	-2.25044	-1.99427	-1.99756	-1.99755	-1.96133	-1.95996	-1.92657
18-04	-2.18506	-2.25993	-2.25187	-1.99338	-1.99399	-1.99483	-1.92629	-1.92917	-1.90762

DATE	WATER TABLE DEPTHS (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
19-04	-2.18626	-2.26117	-2.25331	-1.99119	-1.98302	-1.98657	-1.91365	-1.90968	-1.90154
20-04	-2.18756	-2.26243	-2.26053	-1.98874	-1.97187	-1.9841	-1.90715	-1.90361	-1.90422
21-04	-2.18891	-2.26368	-2.26162	-1.98159	-1.96381	-1.97775	-1.90976	-1.90556	-1.91369
22-04	-2.19672	-2.26491	-2.26296	-1.98042	-1.96259	-1.97717	-1.91942	-1.9147	-1.92423
23-04	-2.19757	-2.27158	-2.26436	-1.98016	-1.96275	-1.97742	-1.9345	-1.93112	-1.93485
24-04	-2.19881	-2.27253	-2.26577	-1.98036	-1.96366	-1.97807	-1.93859	-1.93362	-1.94477
25-04	-2.20013	-2.27356	-2.26718	-1.98091	-1.96505	-1.97904	-1.94779	-1.93733	-1.95398
26-04	-2.20146	-2.2746	-2.26856	-1.98172	-1.96677	-1.98025	-1.95761	-1.94704	-1.95692
27-04	-2.20936	-2.27564	-2.27545	-1.98272	-1.96873	-1.98159	-1.95985	-1.95622	-1.96519
28-04	-2.21013	-2.27669	-2.27663	-1.98389	-1.97591	-1.988	-1.96772	-1.96482	-1.9679
29-04	-2.21135	-2.27778	-2.27795	-1.98517	-1.97783	-1.9892	-1.97026	-1.96724	-1.97517
30-04	-2.21265	-2.28477	-2.27931	-1.98654	-1.98471	-1.99018	-1.97763	-1.97484	-1.98325
01-05	-2.214	-2.28532	-2.28069	-1.99293	-1.98581	-1.99123	-1.98585	-1.98217	-1.98263
02-05	-2.2215	-2.2863	-2.28208	-1.99394	-1.98679	-1.99186	-1.9679	-1.98064	-1.96098
03-05	-2.22247	-2.28735	-2.28958	-1.99012	-1.98695	-1.99096	-1.89777	-1.9427	-1.92363
04-05	-2.2237	-2.28843	-2.29075	-1.96866	-1.98475	-1.98863	-1.8504	-1.91161	-1.90705
05-05	-2.22496	-2.28951	-2.29202	-1.94152	-1.98116	-1.98602	-1.83887	-1.89605	-1.90108
06-05	-2.2262	-2.2906	-2.2933	-1.93131	-1.97248	-1.97787	-1.84903	-1.89207	-1.90388
07-05	-2.23352	-2.2917	-2.29464	-1.93042	-1.96427	-1.97642	-1.86192	-1.901	-1.91023
08-05	-2.23406	-2.29984	-2.29598	-1.93175	-1.96466	-1.95574	-1.88009	-1.91091	-1.88973
09-05	-2.23489	-2.30058	-2.29711	-1.93426	-1.96537	-1.9243	-1.89789	-1.92186	-1.86307
10-05	-2.23567	-2.30145	-2.29737	-1.94289	-1.96648	-1.89948	-1.915	-1.93336	-1.85362
11-05	-2.23639	-2.3024	-2.29589	-1.95221	-1.96795	-1.89078	-1.92593	-1.94315	-1.85518
12-05	-2.23704	-2.3034	-2.29252	-1.95396	-1.97457	-1.89118	-1.93668	-1.94652	-1.86449
13-05	-2.23761	-2.30442	-2.28758	-1.96165	-1.97508	-1.89335	-1.9465	-1.95393	-1.8745
14-05	-2.23812	-2.3054	-2.27588	-1.96353	-1.97167	-1.89458	-1.95584	-1.95128	-1.88242
15-05	-2.23856	-2.31281	-2.26263	-1.96541	-1.95342	-1.8722	-1.9698	-1.93165	-1.78458
16-05	-2.23895	-2.31275	-2.24858	-1.97222	-1.92975	-1.82063	-1.95027	-1.86032	-1.71824
17-05	-2.2393	-2.3118	-2.23438	-1.97008	-1.88156	-1.80692	-1.89611	-1.78227	-1.72451
18-05	-2.2396	-2.30993	-2.21405	-1.95075	-1.85143	-1.81726	-1.85103	-1.76503	-1.75534
19-05	-2.23988	-2.30057	-2.20142	-1.93833	-1.84101	-1.83682	-1.83939	-1.76832	-1.79117
20-05	-2.24012	-2.29742	-2.19013	-1.92925	-1.83143	-1.86171	-1.84911	-1.77656	-1.82462
21-05	-2.24592	-2.28732	-2.18595	-1.92861	-1.83241	-1.87659	-1.86684	-1.7948	-1.85671
22-05	-2.24594	-2.27582	-2.17634	-1.93008	-1.84332	-1.89474	-1.88012	-1.81556	-1.87307
23-05	-2.24604	-2.26376	-2.16692	-1.93267	-1.86131	-1.91268	-1.89796	-1.83969	-1.89177
24-05	-2.24617	-2.24929	-2.16456	-1.94165	-1.8399	-1.92402	-1.90967	-1.81842	-1.90937
25-05	-2.24631	-2.1985	-2.1622	-1.95075	-1.79168	-1.93512	-1.92107	-1.78193	-1.92093
26-05	-2.24647	-2.14236	-2.1539	-1.9533	-1.789	-1.94488	-1.93606	-1.7779	-1.93571
27-05	-2.24665	-2.10004	-2.15215	-1.96104	-1.8016	-1.948	-1.94672	-1.79673	-1.94553
28-05	-2.24685	-2.06561	-2.15033	-1.96342	-1.82673	-1.95593	-1.95015	-1.82284	-1.9484
29-05	-2.24707	-2.04205	-2.14196	-1.97062	-1.84642	-1.95817	-1.95861	-1.8432	-1.95621
30-05	-2.2473	-2.0264	-2.14055	-1.97192	-1.86398	-1.96516	-1.96653	-1.86102	-1.9616
31-05	-2.24748	-2.00371	-2.1389	-1.97228	-1.87998	-1.95495	-1.96726	-1.8786	-1.88225
01-06	-2.24757	-1.99089	-2.13682	-1.97035	-1.88134	-1.89774	-1.94424	-1.84438	-1.78439
02-06	-2.24748	-1.98163	-2.12718	-1.94616	-1.859	-1.85841	-1.86605	-1.77796	-1.74815
03-06	-2.24719	-1.97257	-2.11589	-1.91636	-1.83986	-1.85512	-1.8355	-1.76322	-1.76382
04-06	-2.24671	-1.97065	-2.11137	-1.88996	-1.83139	-1.85864	-1.81948	-1.76736	-1.7919
05-06	-2.24581	-1.96922	-2.09951	-1.86196	-1.83425	-1.86965	-1.80203	-1.78759	-1.8308
06-06	-2.2375	-1.96275	-2.08898	-1.84734	-1.85093	-1.88649	-1.8039	-1.81386	-1.8468
07-06	-2.23356	-1.96205	-2.07852	-1.84931	-1.86315	-1.89863	-1.82229	-1.83917	-1.87201
08-06	-2.22237	-1.96069	-2.07499	-1.86104	-1.87662	-1.90966	-1.83673	-1.85414	-1.8899
09-06	-2.21072	-1.94875	-2.06563	-1.87339	-1.86692	-1.92525	-1.86116	-1.85159	-1.90638
10-06	-2.19839	-1.91218	-2.063	-1.88662	-1.83905	-1.93618	-1.86586	-1.82535	-1.91761
11-06	-2.18436	-1.87712	-2.06032	-1.88438	-1.82013	-1.93952	-1.86502	-1.80831	-1.92747

DATE	WATER TABLE DEPTHS (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
12-06	-2.15981	-1.86656	-2.05188	-1.87536	-1.81582	-1.94782	-1.86252	-1.8097	-1.93702
13-06	-2.12661	-1.86239	-2.04934	-1.86838	-1.82749	-1.95019	-1.86213	-1.8223	-1.9455
14-06	-2.09893	-1.87267	-2.04014	-1.86793	-1.85183	-1.9575	-1.86282	-1.84691	-1.95426
15-06	-2.06288	-1.8847	-2.03799	-1.85899	-1.87131	-1.95814	-1.84223	-1.88408	-1.93171
16-06	-2.02426	-1.90179	-2.03553	-1.7702	-1.88212	-1.94463	-1.6846	-1.86523	-1.85152
17-06	-1.9854	-1.91282	-2.02702	-1.68102	-1.87705	-1.92293	-1.60685	-1.78812	-1.8103
18-06	-1.93593	-1.92388	-2.02527	-1.67174	-1.86617	-1.90744	-1.56961	-1.75283	-1.80919
19-06	-1.90517	-1.93341	-2.02362	-1.69443	-1.86151	-1.90607	-1.6205	-1.7678	-1.82801
20-06	-1.88824	-1.94398	-2.02215	-1.73126	-1.8712	-1.9078	-1.6726	-1.80171	-1.84706
21-06	-1.87657	-1.95299	-2.01466	-1.77258	-1.88289	-1.91106	-1.72371	-1.83581	-1.87156
22-06	-1.88403	-1.96172	-2.01368	-1.80611	-1.90008	-1.92038	-1.77185	-1.86757	-1.88896
23-06	-1.89411	-1.96421	-2.01274	-1.83309	-1.91112	-1.92979	-1.80686	-1.88203	-1.90107
24-06	-1.90453	-1.97171	-2.01189	-1.85951	-1.92179	-1.93972	-1.84528	-1.90008	-1.9176
25-06	-1.91451	-1.97325	-2.01116	-1.87905	-1.93022	-1.9431	-1.86812	-1.91026	-1.92884
26-06	-1.92426	-1.9737	-2.01055	-1.89619	-1.93121	-1.95185	-1.8821	-1.91256	-1.93936
27-06	-1.9265	-1.97281	-2.00416	-1.90592	-1.93009	-1.96021	-1.89775	-1.91285	-1.9488
28-06	-1.92778	-1.97075	-2.00393	-1.91433	-1.92868	-1.96268	-1.90214	-1.9129	-1.95211
29-06	-1.93508	-1.96845	-2.0037	-1.91724	-1.92816	-1.97023	-1.91136	-1.91924	-1.96069
30-06	-1.93639	-1.9613	-2.00354	-1.92527	-1.92899	-1.97209	-1.92016	-1.9212	-1.96897
01-07	-1.93722	-1.96058	-2.00343	-1.92744	-1.93093	-1.97377	-1.92282	-1.92409	-1.97079
02-07	-1.93808	-1.96093	-2.00334	-1.93535	-1.93944	-1.98043	-1.93003	-1.93258	-1.9724
03-07	-1.94461	-1.96184	-2.0031	-1.93644	-1.9422	-1.98143	-1.93189	-1.94196	-1.97867
04-07	-1.94524	-1.96316	-2.00242	-1.9374	-1.95025	-1.98145	-1.93938	-1.95074	-1.97896
05-07	-1.9454	-1.96474	-2.00095	-1.93826	-1.95922	-1.98062	-1.94003	-1.95316	-1.9781
06-07	-1.94492	-1.97153	-1.99265	-1.93849	-1.96071	-1.97899	-1.93997	-1.96086	-1.97642
07-07	-1.94347	-1.97302	-1.99152	-1.93776	-1.96262	-1.97712	-1.93898	-1.96299	-1.96902
08-07	-1.94119	-1.97345	-1.98396	-1.93591	-1.9689	-1.97031	-1.93703	-1.96404	-1.96806
09-07	-1.93335	-1.96951	-1.98259	-1.93413	-1.95947	-1.96938	-1.92987	-1.96019	-1.9675
10-07	-1.93239	-1.91521	-1.98052	-1.93344	-1.91376	-1.96771	-1.92928	-1.91126	-1.96581
11-07	-1.93261	-1.86911	-1.97181	-1.93348	-1.85813	-1.95879	-1.92973	-1.86011	-1.95711
12-07	-1.93319	-1.84581	-1.96246	-1.93392	-1.84104	-1.94909	-1.93068	-1.83714	-1.9478
13-07	-1.93428	-1.83845	-1.95395	-1.93493	-1.83423	-1.94799	-1.93207	-1.83542	-1.94613
14-07	-1.93612	-1.83809	-1.95246	-1.93667	-1.83429	-1.94701	-1.94061	-1.83564	-1.94505
15-07	-1.9384	-1.83937	-1.95154	-1.93891	-1.83592	-1.94638	-1.94191	-1.83722	-1.94451
16-07	-1.94402	-1.84168	-1.95116	-1.94409	-1.83861	-1.9464	-1.94133	-1.83974	-1.94469
17-07	-1.91163	-1.851	-1.95156	-1.90642	-1.84815	-1.94719	-1.90867	-1.84902	-1.94553
18-07	-1.86346	-1.86175	-1.95265	-1.86423	-1.86469	-1.94866	-1.86609	-1.85981	-1.94708
19-07	-1.85133	-1.87262	-1.95429	-1.85236	-1.87561	-1.95065	-1.8511	-1.87643	-1.94913
20-07	-1.85314	-1.88801	-1.95629	-1.85404	-1.88572	-1.95299	-1.85268	-1.88647	-1.95151
21-07	-1.86138	-1.87015	-1.96365	-1.85688	-1.87324	-1.96092	-1.86081	-1.86804	-1.95946
22-07	-1.85998	-1.81679	-1.9657	-1.861	-1.81542	-1.96335	-1.85945	-1.81476	-1.96193
23-07	-1.85147	-1.79462	-1.97283	-1.85288	-1.79919	-1.97041	-1.85649	-1.79564	-1.96917
24-07	-1.84841	-1.8034	-1.97421	-1.84962	-1.80233	-1.9723	-1.84752	-1.8096	-1.97107
25-07	-1.84822	-1.82181	-1.97548	-1.84442	-1.82142	-1.97922	-1.84698	-1.82355	-1.97775
26-07	-1.85129	-1.83583	-1.97683	-1.84752	-1.83098	-1.98016	-1.85019	-1.83277	-1.97888
27-07	-1.86197	-1.83366	-1.98314	-1.86422	-1.82886	-1.98107	-1.86048	-1.83026	-1.97983
28-07	-1.87245	-1.82758	-1.98426	-1.87434	-1.8285	-1.98206	-1.87093	-1.8297	-1.98085
29-07	-1.88224	-1.8305	-1.98509	-1.88345	-1.8317	-1.98312	-1.8806	-1.83284	-1.98192
30-07	-1.89163	-1.83738	-1.98596	-1.89247	-1.83845	-1.9893	-1.88989	-1.83445	-1.98798
31-07	-1.90125	-1.83409	-1.98685	-1.90183	-1.8293	-1.98997	-1.89937	-1.83102	-1.98875
01-08	-1.91071	-1.83349	-1.99286	-1.91116	-1.8295	-1.99035	-1.90907	-1.83083	-1.98917
02-08	-1.92097	-1.83751	-1.9927	-1.92134	-1.83935	-1.99042	-1.91939	-1.83521	-1.98926
03-08	-1.92501	-1.85015	-1.99205	-1.92533	-1.85166	-1.99008	-1.92915	-1.85308	-1.98893
04-08	-1.9345	-1.86817	-1.99117	-1.93476	-1.86988	-1.98945	-1.93855	-1.86687	-1.9883

DATE	WATER TABLE DEPTHS (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
05-08	-1.943	-1.88633	-1.98996	-1.94314	-1.88697	-1.98842	-1.94074	-1.88481	-1.98727
06-08	-1.9447	-1.90281	-1.98279	-1.94483	-1.90378	-1.98648	-1.94879	-1.90227	-1.98533
07-08	-1.94638	-1.91449	-1.97998	-1.94649	-1.91504	-1.97826	-1.94958	-1.91375	-1.97714
08-08	-1.95365	-1.92555	-1.97141	-1.95372	-1.92546	-1.96924	-1.95116	-1.92911	-1.96803
09-08	-1.95557	-1.93671	-1.96233	-1.95564	-1.93651	-1.96601	-1.95832	-1.94035	-1.96481
10-08	-1.9568	-1.94736	-1.95204	-1.95687	-1.9472	-1.95643	-1.95943	-1.95	-1.95493
11-08	-1.96215	-1.95527	-1.92957	-1.9622	-1.95516	-1.92828	-1.95939	-1.95276	-1.92734
12-08	-1.9615	-1.95658	-1.90857	-1.96154	-1.95648	-1.90713	-1.95873	-1.95922	-1.90624
13-08	-1.9606	-1.95637	-1.8939	-1.96064	-1.95628	-1.89268	-1.95817	-1.95895	-1.89182
14-08	-1.96027	-1.95491	-1.89314	-1.9603	-1.95483	-1.89204	-1.95812	-1.95726	-1.89117
15-08	-1.96063	-1.95187	-1.8951	-1.96066	-1.9518	-1.89411	-1.95871	-1.94815	-1.89317
16-08	-1.96157	-1.94266	-1.89506	-1.9616	-1.94267	-1.8942	-1.95985	-1.93856	-1.89325
17-08	-1.96295	-1.94062	-1.89216	-1.96298	-1.94063	-1.89142	-1.96141	-1.93725	-1.89041
18-08	-1.96462	-1.94034	-1.89055	-1.96465	-1.94035	-1.88989	-1.96859	-1.93742	-1.88891
19-08	-1.96646	-1.94121	-1.89177	-1.96648	-1.94121	-1.89118	-1.97003	-1.93859	-1.89023
20-08	-1.97353	-1.94264	-1.89549	-1.97352	-1.94264	-1.89495	-1.97148	-1.94038	-1.89397
21-08	-1.9751	-1.94451	-1.9055	-1.97508	-1.94452	-1.90515	-1.97892	-1.94832	-1.90407
22-08	-1.97645	-1.94642	-1.91559	-1.97643	-1.94642	-1.91529	-1.97944	-1.9498	-1.91421
23-08	-1.98306	-1.95325	-1.926	-1.98306	-1.95322	-1.92997	-1.98035	-1.95092	-1.92888
24-08	-1.98355	-1.95428	-1.93638	-1.98355	-1.95425	-1.9414	-1.98111	-1.95186	-1.94022
25-08	-1.98106	-1.95475	-1.94629	-1.98106	-1.95473	-1.9443	-1.97894	-1.95785	-1.94316
26-08	-1.96946	-1.95491	-1.95519	-1.96946	-1.95489	-1.9528	-1.96712	-1.95793	-1.95174
27-08	-1.95071	-1.9548	-1.95755	-1.95071	-1.95478	-1.96119	-1.95578	-1.95749	-1.96015
28-08	-1.94809	-1.95464	-1.96476	-1.94809	-1.95462	-1.96285	-1.94689	-1.95703	-1.96182
29-08	-1.94749	-1.95463	-1.96628	-1.94749	-1.95461	-1.96437	-1.94603	-1.95676	-1.96333
30-08	-1.94811	-1.95508	-1.96766	-1.94811	-1.95506	-1.97116	-1.94681	-1.95694	-1.97013
31-08	-1.94956	-1.95602	-1.97451	-1.94956	-1.95601	-1.97243	-1.94842	-1.95767	-1.97171
01-09	-1.95152	-1.963	-1.97535	-1.95151	-1.96267	-1.97201	-1.95691	-1.96455	-1.95009
02-09	-1.95373	-1.96418	-1.97585	-1.95278	-1.96358	-1.94979	-1.93418	-1.95046	-1.87483
03-09	-1.96126	-1.96556	-1.97622	-1.93962	-1.95942	-1.92046	-1.86353	-1.88144	-1.84279
04-09	-1.96338	-1.96704	-1.97657	-1.91907	-1.91561	-1.90915	-1.82015	-1.80813	-1.83813
05-09	-1.97052	-1.9719	-1.97704	-1.90919	-1.87069	-1.90274	-1.81824	-1.76867	-1.84942
06-09	-1.972	-1.96313	-1.97763	-1.90836	-1.84678	-1.90518	-1.83128	-1.7663	-1.86743
07-09	-1.97337	-1.95293	-1.9783	-1.91055	-1.84599	-1.91372	-1.85083	-1.78509	-1.88457
08-09	-1.98005	-1.94108	-1.98401	-1.91447	-1.84635	-1.9166	-1.87523	-1.7977	-1.89482
09-09	-1.98104	-1.93002	-1.98312	-1.92453	-1.84811	-1.92362	-1.8939	-1.81507	-1.90301
10-09	-1.98199	-1.92176	-1.98159	-1.93498	-1.85803	-1.92471	-1.9105	-1.83443	-1.90586
11-09	-1.98309	-1.92129	-1.97456	-1.94449	-1.86929	-1.92582	-1.92266	-1.85365	-1.91328
12-09	-1.98431	-1.92279	-1.97294	-1.94798	-1.88616	-1.92715	-1.93815	-1.86721	-1.91596
13-09	-1.99049	-1.92564	-1.97162	-1.95705	-1.89767	-1.93471	-1.94302	-1.88532	-1.92388
14-09	-1.99165	-1.93474	-1.9706	-1.96572	-1.91321	-1.93641	-1.95319	-1.90271	-1.93917
15-09	-1.99258	-1.94448	-1.96482	-1.96904	-1.92369	-1.93687	-1.96652	-1.93243	-1.8993
16-09	-1.99356	-1.9463	-1.96499	-1.96422	-1.9265	-1.92315	-1.88631	-1.89666	-1.82209
17-09	-1.99394	-1.95422	-1.96589	-1.89615	-1.91949	-1.90247	-1.77819	-1.83392	-1.78355
18-09	-1.9914	-1.95627	-1.9671	-1.84808	-1.90169	-1.88871	-1.72718	-1.79482	-1.79937
19-09	-1.97977	-1.95839	-1.96853	-1.83467	-1.89436	-1.88981	-1.74224	-1.80127	-1.82057
20-09	-1.96945	-1.96585	-1.97501	-1.83864	-1.8959	-1.89906	-1.77684	-1.82216	-1.84269
21-09	-1.96623	-1.96798	-1.97644	-1.85676	-1.90002	-1.90941	-1.81098	-1.84818	-1.86799
22-09	-1.95948	-1.9751	-1.97766	-1.87661	-1.91014	-1.92002	-1.83886	-1.87342	-1.88626
23-09	-1.95905	-1.97656	-1.98421	-1.88954	-1.92113	-1.93529	-1.86544	-1.89222	-1.90487
24-09	-1.95943	-1.97787	-1.98496	-1.90624	-1.93551	-1.93921	-1.88412	-1.90508	-1.91608
25-09	-1.95905	-1.97925	-1.98561	-1.91525	-1.93982	-1.94804	-1.89969	-1.92915	-1.93086
26-09	-1.94896	-1.98569	-1.98619	-1.91431	-1.94918	-1.95028	-1.90031	-1.9332	-1.9415
27-09	-1.93758	-1.98697	-1.98668	-1.91165	-1.95805	-1.95781	-1.89898	-1.94321	-1.94359

DATE	WATER TABLE DEPTHS (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
28-09	-1.93547	-1.98802	-1.98708	-1.91115	-1.96101	-1.95921	-1.89981	-1.95296	-1.95167
29-09	-1.935	-1.98917	-1.98745	-1.91292	-1.96914	-1.96072	-1.90278	-1.95647	-1.9539
30-09	-1.93603	-1.9951	-1.98782	-1.91642	-1.97171	-1.96756	-1.91193	-1.96531	-1.96205
01-10	-1.93819	-1.99618	-1.98785	-1.92574	-1.97921	-1.95669	-1.92232	-1.97454	-1.87515
02-10	-1.9411	-1.99701	-1.98673	-1.93562	-1.98125	-1.9003	-1.92863	-1.99278	-1.79138
03-10	-1.94984	-1.99791	-1.98443	-1.93604	-1.98747	-1.86639	-1.8984	-1.95483	-1.75449
04-10	-1.9587	-1.99886	-1.98172	-1.93283	-1.98655	-1.85453	-1.87209	-1.92426	-1.77511
05-10	-1.96153	-2.00618	-1.97417	-1.92485	-1.98418	-1.86366	-1.86483	-1.90802	-1.79804
06-10	-1.96925	-2.00688	-1.97292	-1.91523	-1.97675	-1.87578	-1.86205	-1.90262	-1.82622
07-10	-1.97086	-2.00778	-1.97267	-1.90273	-1.97496	-1.89308	-1.85186	-1.90532	-1.85309
08-10	-1.97091	-2.00883	-1.97297	-1.89275	-1.97413	-1.90497	-1.84658	-1.91441	-1.87865
09-10	-1.97025	-2.00989	-1.97375	-1.88821	-1.96874	-1.92162	-1.85642	-1.9246	-1.89745
10-10	-1.96962	-2.01094	-1.97489	-1.89154	-1.96916	-1.93348	-1.86882	-1.93482	-1.91528
11-10	-1.96939	-2.01199	-1.97631	-1.90221	-1.97025	-1.94383	-1.88723	-1.94465	-1.92672
12-10	-1.9697	-2.01938	-1.97793	-1.91391	-1.97155	-1.95333	-1.89931	-1.94769	-1.94367
13-10	-1.97048	-2.02013	-1.98461	-1.92889	-1.97789	-1.96244	-1.91624	-1.956	-1.95406
14-10	-1.97164	-2.021	-1.98615	-1.9399	-1.97906	-1.96542	-1.93254	-1.95872	-1.96363
15-10	-1.97817	-2.0219	-1.98742	-1.94956	-1.97991	-1.97289	-1.95059	-1.96657	-1.97465
16-10	-1.97958	-2.02277	-1.99381	-1.95288	-1.98066	-1.97457	-1.94893	-1.96674	-1.93638
17-10	-1.98093	-2.02362	-1.9948	-1.96031	-1.9796	-1.97374	-1.91815	-1.94084	-1.90018
18-10	-1.98776	-2.02444	-1.99566	-1.96041	-1.9749	-1.97159	-1.89079	-1.90794	-1.8904
19-10	-1.98888	-2.02522	-1.99663	-1.95921	-1.95452	-1.96962	-1.87785	-1.87549	-1.89145
20-10	-1.99002	-2.03178	-1.99766	-1.95831	-1.92406	-1.9685	-1.88014	-1.84873	-1.89582
21-10	-1.99129	-2.03144	-2.00438	-1.95816	-1.90508	-1.96823	-1.89054	-1.83663	-1.90641
22-10	-1.99751	-2.03035	-2.00552	-1.95881	-1.8928	-1.96867	-1.90767	-1.84602	-1.91722
23-10	-1.99856	-2.02874	-2.00653	-1.96013	-1.89998	-1.96964	-1.91868	-1.86389	-1.93221
24-10	-1.99941	-2.02025	-2.00768	-1.96199	-1.90974	-1.97087	-1.93443	-1.88194	-1.94266
25-10	-2.0004	-2.01917	-2.00885	-1.96952	-1.91995	-1.97221	-1.93916	-1.89949	-1.95183
26-10	-2.00159	-2.01796	-2.00997	-1.9715	-1.92505	-1.9736	-1.94876	-1.91127	-1.95448
27-10	-2.00934	-2.01699	-2.01726	-1.97337	-1.94226	-1.975	-1.95819	-1.92734	-1.96231
28-10	-2.00992	-2.01636	-2.01807	-1.98034	-1.95257	-1.98151	-1.96139	-1.93899	-1.96462
29-10	-2.01097	-2.01605	-2.01892	-1.98203	-1.95552	-1.98267	-1.96967	-1.94914	-1.97192
30-10	-2.01208	-2.01605	-2.01979	-1.98344	-1.96421	-1.98366	-1.97827	-1.95918	-1.97372
31-10	-2.01323	-2.01633	-2.02068	-1.98971	-1.97273	-1.9848	-1.97949	-1.96751	-1.98122
01-11	-2.01444	-2.01682	-2.02163	-1.99104	-1.97542	-1.99112	-1.98702	-1.97728	-1.98052
02-11	-2.022	-2.01745	-2.02911	-1.99212	-1.98272	-1.9917	-1.98699	-1.97309	-1.96068
03-11	-2.02303	-2.01813	-2.02969	-1.99293	-1.98186	-1.99102	-1.96813	-1.922	-1.93088
04-11	-2.02432	-2.01882	-2.03076	-1.99253	-1.97103	-1.98942	-1.93219	-1.88113	-1.9183
05-11	-2.02572	-2.01949	-2.032	-1.99085	-1.9595	-1.98762	-1.92002	-1.86835	-1.91169
06-11	-2.02717	-2.02014	-2.03335	-1.98869	-1.95099	-1.98104	-1.91832	-1.87156	-1.91396
07-11	-2.03457	-2.02076	-2.03477	-1.98677	-1.9499	-1.98032	-1.91985	-1.88325	-1.92339
08-11	-2.03584	-2.02137	-2.03625	-1.98538	-1.95053	-1.98037	-1.92303	-1.90077	-1.93453
09-11	-2.03724	-2.02197	-2.03778	-1.97956	-1.95209	-1.98083	-1.93357	-1.91219	-1.93768
10-11	-2.0387	-2.02253	-2.0454	-1.97946	-1.95417	-1.98163	-1.93721	-1.92365	-1.94676
11-11	-2.04651	-2.02306	-2.04665	-1.98012	-1.95656	-1.98272	-1.94669	-1.93838	-1.95603
12-11	-2.04752	-2.02358	-2.04818	-1.98113	-1.96422	-1.98408	-1.95576	-1.94924	-1.96484
13-11	-2.04899	-2.02414	-2.04981	-1.98244	-1.96662	-1.99066	-1.96446	-1.95209	-1.96784
14-11	-2.05057	-2.02479	-2.05829	-1.98893	-1.97396	-1.99193	-1.96746	-1.96046	-1.97562
15-11	-2.05224	-2.03159	-2.05893	-1.99027	-1.97605	-1.99311	-1.98076	-1.96989	-1.98399
16-11	-2.05968	-2.03222	-2.06057	-1.99149	-1.98306	-1.99419	-1.98111	-1.98144	-1.98109
17-11	-2.06122	-2.03313	-2.06233	-1.99256	-1.98429	-1.9945	-1.97014	-1.96132	-1.96305
18-11	-2.06293	-2.03422	-2.06413	-1.99285	-1.98419	-1.9938	-1.93381	-1.92617	-1.94524
19-11	-2.06468	-2.03542	-2.07145	-1.9922	-1.98314	-1.9926	-1.9286	-1.91547	-1.94224
20-11	-2.0721	-2.03673	-2.07316	-1.99117	-1.98191	-1.99136	-1.9273	-1.91026	-1.94169

DATE	WATER TABLE DEPTHS (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
21-11	-2.07366	-2.04417	-2.07496	-1.99023	-1.98099	-1.98985	-1.92863	-1.91294	-1.94137
22-11	-2.07543	-2.04529	-2.07672	-1.98963	-1.98059	-1.98766	-1.93161	-1.92296	-1.93542
23-11	-2.07728	-2.04673	-2.08388	-1.98947	-1.98072	-1.98011	-1.94135	-1.934	-1.93554
24-11	-2.08479	-2.04829	-2.08512	-1.98972	-1.98135	-1.97838	-1.95114	-1.94403	-1.93695
25-11	-2.08636	-2.04992	-2.08628	-1.99031	-1.98239	-1.97758	-1.95456	-1.95343	-1.93925
26-11	-2.08812	-2.05755	-2.08729	-1.99115	-1.98375	-1.97734	-1.96293	-1.96303	-1.94778
27-11	-2.08999	-2.05892	-2.08819	-1.99218	-1.98528	-1.97757	-1.97131	-1.9655	-1.95638
28-11	-2.09882	-2.06058	-2.089	-1.99334	-1.98685	-1.9782	-1.97416	-1.9734	-1.95862
29-11	-2.10021	-2.06231	-2.08977	-1.99455	-1.99315	-1.97921	-1.98177	-1.97589	-1.96647
30-11	-2.10184	-2.07003	-2.09058	-2.00077	-1.99435	-1.98055	-1.98402	-1.98311	-1.97523
01-12	-2.10348	-2.07109	-2.09802	-2.00198	-1.99524	-1.98213	-1.99129	-1.98501	-1.97358
02-12	-2.10512	-2.07257	-2.09878	-2.00285	-1.99616	-1.98228	-1.9917	-1.99095	-1.92456
03-12	-2.11355	-2.07413	-2.09971	-2.00368	-1.99687	-1.97061	-1.98731	-1.97942	-1.86299
04-12	-2.1149	-2.07572	-2.10069	-2.0039	-2.00185	-1.95802	-1.96447	-1.94941	-1.85401
05-12	-2.11634	-2.08297	-2.10157	-2.00324	-2.00025	-1.94648	-1.9456	-1.93108	-1.85586
06-12	-2.11782	-2.0843	-2.10237	-2.00201	-1.99195	-1.93639	-1.93112	-1.92448	-1.85991
07-12	-2.12579	-2.08585	-2.10295	-2.00061	-1.99152	-1.92899	-1.93142	-1.92584	-1.8698
08-12	-2.12709	-2.08749	-2.10322	-1.99938	-1.99037	-1.92891	-1.93955	-1.92902	-1.88588
09-12	-2.12856	-2.08918	-2.10318	-1.99863	-1.98999	-1.93066	-1.94879	-1.93882	-1.89773
10-12	-2.13009	-2.09743	-2.10293	-1.99812	-1.99008	-1.93349	-1.95172	-1.94849	-1.90864
11-12	-2.13781	-2.09892	-2.10258	-1.99799	-1.99056	-1.94282	-1.96033	-1.95769	-1.92015
12-12	-2.13906	-2.10061	-2.10224	-1.99286	-1.99136	-1.95167	-1.96348	-1.96669	-1.93523
13-12	-2.14047	-2.10224	-2.10199	-1.99367	-1.9924	-1.96037	-1.97148	-1.9695	-1.94613
14-12	-2.14193	-2.10392	-2.1019	-1.99466	-1.9936	-1.96308	-1.97976	-1.97729	-1.96159
15-12	-2.14958	-2.10559	-2.10199	-1.99557	-1.9949	-1.97104	-1.98074	-1.98693	-1.96169
16-12	-2.15065	-2.10728	-2.10228	-1.99639	-1.99625	-1.97335	-1.99974	-1.98755	-1.95311
17-12	-2.15194	-2.10896	-2.10277	-1.99685	-2.00272	-1.97947	-1.96226	-1.97701	-1.91862
18-12	-2.15325	-2.11065	-2.10344	-2.0012	-2.00282	-1.9792	-1.93214	-1.94607	-1.90446
19-12	-2.15454	-2.1189	-2.10427	-1.9989	-2.00134	-1.97856	-1.91406	-1.92828	-1.90502
20-12	-2.1617	-2.12032	-2.10521	-1.99165	-1.99921	-1.97823	-1.91324	-1.9261	-1.91369
21-12	-2.1628	-2.1219	-2.11314	-1.98972	-1.99253	-1.97831	-1.9161	-1.92261	-1.92381
22-12	-2.16402	-2.12351	-2.11393	-1.98874	-1.99115	-1.97877	-1.92612	-1.92575	-1.92792
23-12	-2.16532	-2.1313	-2.11499	-1.9834	-1.99046	-1.97962	-1.93671	-1.93519	-1.93881
24-12	-2.16666	-2.13271	-2.11615	-1.98377	-1.9901	-1.98078	-1.94657	-1.94472	-1.94869
25-12	-2.17379	-2.13415	-2.11738	-1.98488	-1.99003	-1.9822	-1.95673	-1.95359	-1.95743
26-12	-2.17499	-2.13561	-2.12555	-1.98624	-1.99021	-1.98384	-1.95959	-1.95662	-1.9661
27-12	-2.17632	-2.14326	-2.12625	-1.99272	-1.99056	-1.99043	-1.96794	-1.96451	-1.97444
28-12	-2.17767	-2.14437	-2.12742	-1.99403	-1.99103	-1.99204	-1.97629	-1.97242	-1.97676
29-12	-2.18525	-2.14564	-2.12872	-1.99514	-1.99161	-1.9934	-1.97887	-1.97424	-1.98429
30-12	-2.18618	-2.14693	-2.13011	-1.99635	-1.99229	-1.99974	-1.98619	-1.97602	-1.98627
31-12	-2.18746	-2.1482	-2.13793	-2.00288	-1.99303	-2.00105	-1.98833	-1.98276	-1.98809

APPENDIX 2
(UNSATURATED ZONE DEFICIT IN MELLI METRES)

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE							
	S1	S2	S3	S4	S5	S6	S7	S8
01-01	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07
02-01	-244.358	-244.613	-243.765	-204.145	-207.473	-206.201	-174.844	-176.118
03-01	-247.244	-248.74	-247.269	-205.219	-211.188	-207.458	-176.423	-180.41
04-01	-249.649	-251.723	-250.332	-209.84	-216.746	-214.183	-182.156	-186.926
05-01	-244.671	-254.121	-253.423	-206.888	-220.9	-218.833	-179.804	-190.642
06-01	-247.264	-256.501	-255.851	-211.781	-224.978	-222.675	-184.466	-194.462
07-01	-250.017	-258.545	-257.691	-215.013	-228.094	-225.376	-188.77	-197.325
08-01	-252.34	-260.078	-259.484	-218.044	-230.377	-227.876	-191.736	-199.413
09-01	-254.102	-262.561	-261.038	-220.119	-232.23	-229.949	-193.671	-202.364
10-01	-256.53	-264.004	-263.577	-221.524	-234.01	-232.7	-194.945	-204.173
11-01	-258.115	-266.741	-265.993	-224.286	-237.061	-234.335	-196.655	-207.166
12-01	-259.821	-268.232	-267.336	-226.469	-238.8	-236.95	-199.814	-211.112
13-01	-262.91	-270.542	-269.613	-228.613	-241.335	-238.238	-202.056	-212.368
14-01	-264.646	-273.04	-270.817	-231.701	-245.032	-204.991	-205.455	-215.119
15-01	-267.195	-274.549	-273.557	-196.092	-212.182	-209.922	-141.72	-155.106
16-01	-269.789	-277.161	-275.101	-200.653	-216.878	-216.326	-146.117	-162.315
17-01	-271.059	-278.622	-277.515	-204.959	-222.871	-220.035	-152.242	-169.561
18-01	-273.207	-281.439	-279.895	-209.543	-227.067	-223.196	-156.155	-174.767
19-01	-274.626	-282.896	-280.988	-212.302	-230.451	-225.492	-159.761	-177.837
20-01	-276.205	-286.087	-284.416	-213.568	-233.254	-227.93	-160.624	-180.258
21-01	-192.06	-287.328	-285.395	-130.448	-235.661	-229.532	-76.7612	-183.588
22-01	-104.808	-289.469	-286.483	-40.9067	-237.454	-232.369	3.59221	-186.389
23-01	-108.134	-290.335	-288.523	-45.9409	-240.068	-233.789	1.58955	-188.75
24-01	-111.652	-292.497	-289.387	-49.3193	-241.639	-236.093		-191.363
25-01	-116.313	-293.534	-291.497	-54.7022	-245.197	-237.377	-6.05225	-192.939
26-01	-121.379	-295.98	-292.616	-62.1968	-246.757	-240.048	-13.0571	-195.897
27-01	-125.286	-296.622	-295.095	-67.145	-247.647	-241.757	-20.0361	-198.38
28-01	-128.13	-298.526	-296.228	-71.0151	-249.769	-245.329	-25.5601	-199.542
29-01	-131.007	-299.418	-298.796	-77.0981	-251.841	-246.921	-31.9565	-201.887
30-01	-134.338	-301.723	-300.134	-82.0425	-253.328	-249.459	-37.6782	-204.624
31-01	-138.618	-302.905	-302.105	-87.5479	-255.875	-214.263	-45.4175	-208.375
01-02	-140.896	-305.071	-302.802	-53.875	-220.96	-215.543	6.3564	-138.494
02-02	-145.11	-306.144	-304.894	-58.0366	-224.721	-220.655	1.62743	-143.318
03-02	-147.645	-308.323	-307.118	-63.3926	-229.4	-225.66		-150.297
04-02	-151.03	-309.26	-308.608	-69.7417	-232.985	-228.898	-10.5752	-153.074
05-02	-153.873	-311.557	-310.801	-76.1167	-236.99	-231.915	-17.6216	-156.521
06-02	-156.59	-312.838	-311.634	-80.9668	-240.122	-233.613	-23.4946	-160.416
07-02	-159.387	-315.397	-312.605	-85.6748	-243.134	-235.539	-29.8662	-163.171
08-02	-162.118	-316.733	-314.981	-90.2822	-245.583	-237.584	-36.4146	-166.535
09-02	-165.127	-319.312	-316.247	-94.146	-247.633	-240.907	-42.481	-169.84
10-02	-168.206	-320.667	-318.805	-99.1665	-249.477	-242.599	-49.8823	-173.987
11-02	-170.163	-323.752	-320.014	-103.021	-252.125	-246.385	-56.6621	-175.545
12-02	-173.73	-324.826	-323.01	-107.149	-254.463	-247.649	-61.3218	-178.089
13-02	-175.257	-325.777	-324.136	-110.037	-255.98	-249.921	-65.8647	-180.866
14-02	-171.834	-326.54	-325.183	-107.46	-258.271	-216.175	-62.7466	-183.409
15-02	-174.136	-328.688	-326.279	-69.5278	-223.99	-220.004	-0.14697	-115.801
16-02	-175.501	-329.754	-328.496	-69.4116	-228.61	-226.443	-0.0459	-122.248
17-02	-177.414	-332.088	-329.114	-74.7632	-234.491	-228.23	-5.73193	-129.792
18-02	-180.492	-333.255	-331.219	-79.0435	-239.021	-231.858	-11.7412	-134.48
19-02	-181.71	-335.52	-332.182	-83.0347	-242.749	-234.724	-16.5117	-137.417
20-02	-184.497	-336.623	-334.352	-86.6934	-245.865	-237.231	-20.8828	-142.043
21-02	-187.515	-338.847	-335.378	-91.7856	-248.345	-239.393	-27.2202	-145.077
22-02	-190.355	-339.921	-337.387	-95.5054	-250.493	-241.105	-33.8003	-148.205
23-02	-193.196	-342.072	-338.319	-100.388	-252.275	-245	-40.8096	-151.151

UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE							
S1	S2	S3	S4	S5	S6	S7	S8
-196.039	-342.283	-338.875	-106.271	-253.999	-246.072	-47.0542	-152.478
-192.722	-344.19	-340.962	-103.613	-256.314	-247.457	-46.7573	-155.188
-196.273	-344.953	-341.943	-109.346	-257.693	-250.108	-52.7578	-157.731
-198.429	-346.828	-344.201	-113.907	-260.113	-251.683	-59.4097	-160.34
-201.402	-347.741	-345.017	-116.566	-261.391	-217.818	-64.082	-162.98
-203.221	-348.49	-347.262	-80.2056	-223.282	-221.252	-0.1875	-99.6484
-205.848	-350.302	-348.356	-82.5249	-227.317	-227.006	-2.46973	-101.07
-209.063	-351.177	-349.513	-86.9395	-232.248	-230.731	-6.75195	-105.356
-210.141	-353.21	-351.701	-90.1748	-236.594	-234.491	-11.3887	-109.521
-212.404	-354.188	-352.813	-94.0176	-239.422	-237.67	-15.3413	-113.726
-213.76	-355.163	-354.942	-97.3472	-242.577	-240.134	-20.2451	-117.459
-216.1	-357.364	-355.535	-100.459	-245.174	-241.595	-24.4189	-120.628
-218.612	-358.333	-356.23	-104.803	-247.47	-245.316	-29.1187	-123.745
-220.122	-359.267	-358.317	-106.963	-249.421	-246.825	-34.1367	-126.716
-222.735	-362.359	-359.26	-111.188	-251.242	-248.275	-39.1494	-129.943
-225.318	-363.544	-360.33	-114.591	-253.981	-250.833	-44.7754	-132.936
-226.852	-364.492	-363.164	-119.173	-255.568	-252.168	-50.4941	-136.205
-229.134	-365.343	-364.015	-121.747	-258.216	-254.714	-55.6763	-140.066
-231.185	-366.296	-364.754	-124.165	-260.792	-214.084	-59.1768	-143.138
-232.275	-368.431	-364.456	-86.0273	-221.945	-213.53	-0.14209	-79.5527
-234.855	-369.184	-365.091	-88.5474	-226.455	-218.395	-0.60254	-83.1152
-237.406	-371.016	-365.891	-93.8784	-231.587	-222.236	-6.45703	-87.1567
-238.938	-371.912	-367.861	-97.981	-235.791	-226.159	-11.7056	-92.2998
-241.839	-372.728	-368.494	-101.293	-239.823	-228.826	-18.0278	-96.4863
-243.786	-374.792	-370.414	-103.726	-241.975	-231.359	-19.6738	-100.536
-238.417	-375.612	-371.328	-98.5576	-244.494	-233.726	-16.4019	-104.956
-238.683	-376.391	-371.997	-99.7642	-246.683	-235.535	-17.8032	-109.05
-240.313	-378.274	-373.771	-104.931	-249.529	-237.019	-20.5581	-110.632
-242.217	-375.823	-374.407	-107.66	-248.834	-238.311	-24.7671	-110.539
-244.079	-378.157	-375.045	-109.985	-250.579	-239.699	-29.3013	-114.231
-247.01	-379.172	-377.078	-113.329	-252.128	-243.4	-33.9429	-117.496
-248.66	-380.09	-378.066	-116.484	-254.782	-245.126	-38.6953	-120.547
-250.104	-382.121	-378.936	-119.519	-256.287	-246.633	-43.5649	-123.525
-252.865	-382.895	-380.932	-123.799	-258.647	-249.217	-47.8101	-126.115
-254.535	-383.636	-381.588	-125.626	-259.84	-213.325	-51.4951	-128.811
-255.684	-385.522	-382.163	-86.5493	-225.331	-214.372	5.79297	-65.3672
-257.834	-386.36	-384.174	-87.126	-226.851	-219.845	2.96863	-66.9316
-258.906	-387.076	-384.957	-91.0244	-230.943	-223.688	0.65524	-71.0405
-261.275	-388.722	-385.614	-94.8306	-233.843	-225.873		-73.5425
-262.505	-389.522	-387.593	-97.5156	-236.191	-228.991	-6.53076	-78.2368
-264.673	-390.332	-388.166	-100.509	-239.324	-230.921	-10.4448	-82.7388
-265.441	-391.141	-388.496	-103.383	-242.026	-231.994	-12.5015	-84.959
-267.496	-393.054	-390.189	-105.197	-244.247	-233.487	-15.8423	-88.9541
-268.417	-393.782	-390.885	-108.304	-246.18	-235.04	-19.248	-91.7939
-270.478	-390.428	-391.553	-109.93	-243.668	-237.84	-22.7505	-89.646
-271.357	-393.047	-393.347	-111.043	-245.406	-239.45	-25.1919	-92.4941
-273.153	-394.067	-394.113	-113.036	-246.861	-240.802	-27.459	-95.4404
-274.141	-395.127	-394.948	-115.53	-249.624	-244.637	-30.2505	-98.6231
-276.48	-395.933	-395.363	-119.202	-251.262	-245.368	-34.2822	-101.773
-277.568	-390.811	-395.725	-120.499	-245.057	-202.051	-36.9629	-95.648
-278.412	-391.946	-396.214	-81.2666	-203.41	-203.532	6.69823	-29.6997
-281.73	-393.113	-396.585	-81.7114	-205.81	-206.271	3.47758	-30.8267
-283.007	-390.271	-398.341	-86.1016	-204.189	-209.727	0.77316	-28.7495
-284.233	-392.733	-398.969	-89.8628	-207.686	-211.557		-31.1577

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE							
	S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**
19-04	-285.163	-394.142	-399.614	-91.9004	-210.501	-214.355	-5.8125	-33.9648
20-04	-287.014	-395.556	-400.261	-94.0874	-212.381	-216.834	-8.35205	-37.002
21-04	-287.701	-396.852	-402.252	-96.4038	-214.931	-219.169	-11.0151	-41.2998
22-04	-289.635	-397.917	-403.018	-98.813	-216.881	-221.347	-13.9473	-44.1777
23-04	-290.128	-400.074	-403.447	-99.5889	-218.355	-222.545	-15.8179	-46.8882
24-04	-291.878	-401.056	-404.967	-102.669	-219.856	-223.315	-17.8633	-50.1001
25-04	-292.751	-402.052	-404.923	-103.883	-221.476	-223.832	-21.1128	-53.6353
26-04	-294.653	-403.017	-405.434	-107.327	-224.279	-224.641	-23.5356	-57.3506
27-04	-295.829	-399.793	-406.047	-108.794	-221.67	-225.794	-26.1504	-54.1758
28-04	-296.946	-400.666	-406.675	-111.653	-222.528	-228.306	-30.4346	-55.9131
29-04	-299.251	-402.913	-408.343	-114.472	-223.663	-229.73	-34.7183	-59.3564
30-04	-299.888	-403.805	-409.089	-115.235	-224.675	-193.971	-36.8276	-60.7134
01-05	-283.316	-404.626	-409.686	-53.1411	-184.855	-193.972	10.4948	-0.09863
02-05	-280.293	-405.563	-410.219	-50.2622	-188.323	-196.532	6.43693	-0.00342
03-05	-281.064	-406.331	-411.735	-51.6938	-190.159	-198.427	4.16632	-1.89258
04-05	-282.583	-408.354	-412.348	-53.5576	-191.873	-201.16	2.34257	-4.7251
05-05	-284.134	-409.193	-412.967	-55.0049	-194.634	-202.358	1.22534	-7.74609
06-05	-286.168	-410.001	-367.225	-56.752	-196.97	-157.904		-10.5332
07-05	-288.264	-410.791	-363.348	-60.1919	-199.038	-153.652	-2.66943	-14.4775
08-05	-282.677	-411.521	-357.473	-54.7578	-200.787	-146.664	-0.62109	-17.0327
09-05	-283.527	-413.411	-360.077	-56.2959	-202.212	-149.377	-0.03613	-20.1851
10-05	-285.384	-400.147	-352.92	-58.3892	-189.134	-142.258	-1.77539	-8.9834
11-05	-285.584	-388.417	-354.378	-58.2578	-178.036	-143.76	-1.91406	-0.59863
12-05	-284.542	-370.8	-344.186	-57.3662	-161.411	-133.403	-1.85742	
13-05	-286.242	-366.883	-335.8	-59.2939	-155.988	-124.7	-3.61572	
14-05	-287.851	-367.988	-338.014	-62.6226	-158.018	-83.6753	-6.24023	
15-05	-289.162	-370.361	-339.3	-22.2061	-116.405	-84.2764	12.125	8.18671
16-05	-289.448	-372.407	-342.004	-19.4878	-118.347	-86.0581	7.10559	4.67374
17-05	-286.963	-370.293	-342.735	-17.3647	-116.848	-88.1519	5.1801	3.60164
18-05	-288.026	-347.615	-344.352	-18.4678	-95.4351	-90.0156	3.29881	6.26625
19-05	-289.287	-350.194	-345.682	-19.2817	-95.4551	-91.687	1.94528	3.63919
20-05	-290.762	-352.519	-340.709	-22.4604	-98.3828	-86.3066	0.56307	2.11236
21-05	-292.096	-353.2	-339.491	-24.6431	-100.01	-86.0249		1.16974
22-05	-293.253	-334.105	-341.487	-26.7544	-81.7627	-88.2866	-2.37207	4.2883
23-05	-294.228	-296.904	-343.524	-28.7793	-45.085	-90.3262	-4.4292	8.75377
24-05	-293.792	-295.708	-338.364	-28.2788	-43.0195	-85.0357	-4.47168	5.49217
25-05	-292.849	-296.015	-334.273	-27.8208	-44.5825	-82.4355	-4.36084	3.55859
26-05	-292.356	-296.927	-335.265	-27.7158	-44.4893	-84.0562	-4.29688	2.16891
27-05	-283.837	-299.293	-337.02	-19.897	-47.1211	-84.7124	1.68508	1.01781
28-05	-277.945	-284.24	-338.658	-14.686	-31.9482	-86.3164	2.55618	3.81167
29-05	-274.973	-285.075	-331.005	-11.73	-33.0664	-78.9419	2.50645	2.43096
30-05	-275.83	-285.174	-315.712	-12.2163	-34.7803	-19.4692	1.5596	1.27909
31-05	-276.303	-288.75	-316.339	10.0126	2.64345	-19.397	12.2249	11.9994
01-06	-278.616	-289.801	-315.258	6.27205	1.60456	-19.6172	6.29549	7.00346
02-06	-280.9	-277.14	-314.701	3.78112	3.40015	-17.7915	3.86683	6.78802
03-06	-247.746	-278.393	-315.729	10.4182	2.0938	-18.4883	7.97819	4.2598
04-06	-248.873	-280.273	-314.81	6.823	0.69992	-18.0078	4.82412	2.58224
05-06	-250.75	-276.914	-316.048	4.31286	1.35742	-18.4058	2.72716	2.73667
06-06	-253.464	-265.2	-316.776	2.57421	3.30143	-20.0068	1.17082	4.298
07-06	-253.131	-251.436	-318.459	2.29414	4.76346	-20.792	1.09292	5.38539
08-06	-232.406	-237.293	-311.893	6.57585	5.73577	-16.3003	4.52765	6.13757
09-06	-223.799	-219.325	-310.586	6.90694	6.22811	-14.7261	4.66245	6.70314
10-06	-214.305	-219.152	-308.371	7.06653	3.74552	-12.7896	4.88448	4.20461
11-06	-211.209	-221.407	-307.373	6.02373	2.15637	-11.957	4.10005	2.46375

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE							
	S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**
12-06	-209.856	-222.667	-307.237	4.88152	1.20975	-11.7705	3.23013	1.48777
13-06	-194.164	-222.81	-309.446	7.33661	0.48191	-12.5713	4.85856	0.76996
14-06	-184.238	-224.071	-310.533	7.28808		6.78565	4.66494	0.13905
15-06	-176.392	-225.452	-311.792	15.7722	4.32242	3.88679	14.6692	11.3343
16-06	-156.375	-226.739	-312.398	13.8129	2.62225	2.13205	10.4553	6.51844
17-06	-155.932	-228.061	-308.488	9.42333	1.33037	2.52212	5.96997	3.86309
18-06	-146.622	-229.425	-310.063	8.1423	0.19291	1.15823	5.44018	2.44704
19-06	-147.534	-230.693	-309.952	5.50013		0.92393	3.6107	1.26938
20-06	-148.624	-229.699	-311.399	3.7245	-0.86182		2.42571	1.35775
21-06	-150.019	-228.968	-313.246	2.70405	-0.9082	-1.80859	1.6003	1.11177
22-06	-151.907	-228.803	-314.911	1.59514	-0.95117	-4.27881	0.60246	0.83145
23-06	-152.41	-211.705	-316.071	1.16533	3.4489	-6.18066	0.2853	3.89257
24-06	-138.716	-209.875	-313.778	4.48089	2.9506	-5.99707	3.1657	3.22366
25-06	-132.875	-202.207	-314.825	4.95662	3.77558	-6.49414	3.72827	3.96703
26-06	-134.005	-201.681	-315.974	3.32595	2.64033	-8.69971	2.39899	2.76503
27-06	-136.193	-201.479	-317.236	2.2053	1.87577	-11.0806	1.44099	1.97781
28-06	-128.823	-202.592	-318.607	3.90103	1.05982	-13.0679	3.0155	1.14807
29-06	-126.122	-204.339	-313.614	3.83682	0.33598	-9.59912	3.11577	0.43367
30-06	-126.454	-205.823	-305.226	2.50421		-2.05273	1.95999	
01-07	-120.732	-205.441	-299.479	3.9139	-1.00879	1.37969	3.24006	-0.62256
02-07	-121.507	-205.611	-297.143	2.51425	-1.19873	1.61159	2.01624	-1.1333
03-07	-115.749	-206.834	-291.469	3.95399	-2.59717	2.51183	3.39287	-2.51074
04-07	-111.085	-208.394	-291.024	4.42501	-5.09424	2.02433	4.42574	-4.98242
05-07	-105.931	-207.827	-292.47	4.73715	-5.26514	0.85207	5.21345	-5.15527
06-07	-98.9766	-183.412	-294.297	5.33196	4.96944		6.61357	5.00777
07-07	-98.8018	-182.813	-289.432	3.80869	3.49564		5.14165	3.52428
08-07	-100.537	-151.508	-272.888	2.6691	7.60008	3.30679	3.74893	7.86994
09-07	-92.1733	-130.3	-271.251	4.41368	7.73702	2.80527	6.39454	8.0198
10-07	-92.4854	-129.697	-271.9	3.24902	4.85221	1.61575	4.96565	5.32412
11-07	-94.0005	-124.863	-272.608	2.03251	4.25196	1.24886	3.38798	4.5833
12-07	-95.4131	-111.983	-264.864	1.17248	4.93196	2.71386	2.26453	6.79304
13-07	-91.7207	-109.556	-265.388	2.337	3.81928	1.43831	3.70778	5.90231
14-07	-89.5176	-100.763	-266.569	2.54844	4.46902	0.68808	4.00946	7.81049
15-07	-50.9575	-98.6016	-268.995	11.6207	3.31376		15.5779	6.63397
16-07	-35.4229	-96.5293	-269.828	12.9132	3.15221	-1.03467	15.8406	6.50125
17-07	-36.5195	-96.791	-271.805	10.786	1.86714	-3.02881	11.0045	4.6313
18-07	-36.9023	-92.3482	-272.305	8.65213	2.76095	-5.14063	7.76114	6.07769
19-07	-33.2886	-85.4902	-274.007	9.31377	3.58512	-7.43897	7.94897	7.50679
20-07	-11.8975	-44.7949	-275.343	16.8537	11.9069	-9.63818	13.2947	19.1065
21-07	-10.1279	-35.3428	-268.038	14.3813	12.2319	-3.7915	10.3987	16.0362
22-07	3.13236	-36.5132	-269.571	17.7222	8.67171	-4.20508	13.063	11.3829
23-07	4.94367	-38.2324	-271.102	15.8745	5.91242	-6.03857	11.1453	8.4116
24-07	4.57559	-28.3521	-272.583	13.2446	8.57091	-8.18555	8.861	10.4933
25-07	5.58232	-6.65723	-274.42	12.8039	13.6741	-10.8525	8.65937	14.5539
26-07	5.27547	-2.1377	-276.067	11.2098	11.2805	-13.6577	7.2742	11.6407
27-07	7.72498	-0.04395	-277.355	13.1834	9.81317	-15.5718	9.14039	9.80347
28-07	5.75511	1.90149	-273.366	10.5101	8.69859	-12.6631	6.67714	8.73162
29-07	4.132	10.6254	-273.394	8.25242	14.79	-13.0493	4.86341	14.8519
30-07	2.66448	8.88506	-260.309	6.24171	11.3985	-0.86816	3.23691	11.4332
31-07	1.36468	7.522	-258.074	4.43702	9.37926	-0.02832	1.85288	9.40972
01-08	1.58319	5.70121	-259.279	4.29527	7.02369		2.01116	7.04881
02-08	6.9334	3.91535	-261.473	10.0134	4.92037	-1.91943	7.23194	4.94054
03-08	5.17636	2.4872	-248.725	8.32998	3.27444	2.45175	5.3916	3.29097
04-08	3.41156	1.15238	-242.716	6.13629	1.84093	3.13775	3.58741	1.85448

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE							
	S1	S2	S3	S4	S5	S6	S7	S8
05-08	1.92392		-243.055	4.27453	0.44759	2.19195	2.06668	0.46285
06-08	0.89181	-1.8877	-234.899	2.94898		3.42786	1.04456	
07-08	3.82806	-4.58984	-235.196	6.0478	-3.4751	2.39392	3.92924	-3.4668
08-08	6.36319	-7.58398	-234.196	8.84979	-6.42334	1.89005	6.47002	-6.41699
09-08	7.63721	7.10783	-202.866	10.6764	7.34368	7.14855	7.72438	7.3595
10-08	5.20334	7.08148	-203.251	8.30116	7.2398	4.40742	5.2647	7.25982
11-08	3.53887	5.79553	-199.218	6.3083	5.91652	3.85756	3.56952	5.93344
12-08	2.21044	7.18378	-199.174	4.6773	7.27969	2.67028	2.22609	7.29676
13-08	1.32894	10.0706	-198.958	3.4825	10.1732	2.14124	1.34148	10.2199
14-08	0.77028	7.00208	-185.056	2.64642	7.09649	4.21718	0.78004	7.16017
15-08		5.09399	-171.946	1.35833	5.17785	5.08302		5.23466
16-08	-2.81885	3.42159	-173.34		3.49216	3.19099	-2.81543	3.54211
17-08	-4.59131	5.70458	-175.93	-1.68994	5.76351	1.96824	-4.58984	5.81705
18-08	-4.8623	3.98737	-177.52	-2.12646	4.04509	0.84953	-4.8584	4.08677
19-08	-0.07178	2.98521	-179.233	1.9864	3.04076		-0.63916	3.06988
20-08	0.392	6.3225	-179.606	2.14536	6.37068	-1.30518	0.26166	6.40088
21-08		4.89039	-181.465	0.6638	4.94236	-3.64014		4.96905
22-08	-2.43018	5.59275	-183.027		5.64103	-6.06152	-2.50537	5.66389
23-08	14.5767	5.28922	-183.747	17.7066	5.34073	-7.96387	14.6771	5.36171
24-08	10.3091	6.3873	-169.836	14.3719	6.44666	-0.26074	10.4652	6.47022
25-08	7.06589	5.2321	-172.516	10.9956	5.29867		7.20239	5.31896
26-08	4.85137	6.00225	-175.309	8.34334	6.06298	-1.8667	4.96977	6.08088
27-08	3.03389	3.89415	-177.55	6.12581	3.95472	-4.07422	3.13345	3.96867
28-08	2.68184	2.32117	-179.351	5.43985	2.36971	-6.64648	2.76928	2.38084
29-08	3.74874	1.67606	-175.126	6.35463	1.71715	-4.04443	3.83448	1.72635
30-08	2.81966	0.81333	-166.955	5.26056	0.85131	1.85645	2.89625	0.85968
31-08	2.36109		-168.348	4.5858		7.18417	2.43076	
01-09	1.5231	-1.44287	-169.301	13.0745		4.09131	13.17	
02-09	1.4876	-1.51953	-171.392	10.4526	1.98859	2.35388	9.72243	2.49382
03-09	0.24449	11.9629	-171.986	7.63912	13.994	1.68405	6.58879	12.4548
04-09		10.0812	-173.82	5.94707	11.4186	0.34609	4.84719	10.4994
05-09	-1.89014	6.84634	-169.826	4.02211	7.79118	1.32244	2.98277	7.38949
06-09	-4.88086	11.604	-157.071	2.26497	12.2696	3.60546	1.29528	11.9699
07-09	-7.87061	10.3651	-155.603	0.70591	10.7952	2.78121		10.6303
08-09	-10.48	7.32549	-154.888		7.65107	1.79467	-2.25635	7.53522
09-09	-13.8262	6.54148	-150.997	-4.07471	6.79093	2.53727	-6.23975	6.71709
10-09	-17.585	4.49064	-148.229	-8.36475	4.67928	2.52712	-9.99463	4.62921
11-09	-21.0537	2.78036	-150.087	-11.4238	2.93114	1.11206	-13.0801	2.89427
12-09	-24.8369	4.26633	-150.347	-14.7661	4.40802	0.95201	-16.7451	4.38624
13-09	-26.936	3.92798	-151.364	-17.7095	3.99904	0.45147	-19.5361	3.98926
14-09	-27.772	3.14626	-153.457	-17.5786	3.21068	7.31946	-19.3369	3.20493
15-09	4.15653	1.79396	-154.139	19.3548	9.77098	4.58664	20.265	13.4638
16-09	8.43504		-155.284	20.3349	5.95284	3.05518	18.0265	8.52144
17-09	6.20595	-2.52832	-156.73	15.3624	3.79469	1.71368	12.3795	5.61727
18-09	4.54349	-4.05859	-157.579	12.0081	2.50001	0.88467	9.14147	3.80923
19-09	2.28749	-4.07568	-158.652	8.42336	2.15994		5.77642	3.28079
20-09	1.11707	-4.44287	-160.586	6.23704	1.455	-2.63867	3.89357	2.41879
21-09	1.99809	-6.48584	-162.19	6.6479	0.18223	-5.80176	4.47972	1.08515
22-09	5.30746	-9.12402	-149.52	9.49128		2.11179	6.94172	
23-09	6.48245	-12.0415	-148.95	10.5102	-3.79883	1.81831	7.5876	-2.35596
24-09	11.4063	-16.9199	-149.01	16.4092	-8.57275	1.45879	12.1813	-6.52881
25-09	8.65581	-20.3418	-150.09	13.541	-11.667	0.89749	9.18651	-10.146
26-09	5.79824	-22.7603	-153.871	10.1122	-14.7339		6.2191	-13.0352
27-09	3.6423	-26.1538	-155.695	7.41749	-17.0449	-3.46387	3.98319	-16.3315

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE							
	S1	S2	S3	S4	S5	S6	S7	S8
28-09	1.81746	-28.8076	-156.889	5.04642	-20.2739	-5.60352	2.1156	-18.4805
29-09		-31.1689	-134.481	2.46271	-22.4053	3.81155		-21.5444
30-09	-5.57129	-33.4482	-131.012		-25.6494	10.6403	-5.14453	-23.7681
01-10	-8.5542	-36.4863	-131.678		1.85754	5.98687	12.1907	10.6905
02-10	-11.3291	-40.9243	-131.547	0.96009	0.73089	3.6254	7.06383	5.64931
03-10	-13.9639	-44.3257	-135.004			1.55671	4.12215	2.57544
04-10	-2.74268	-42.3281	-138.571	4.33496	-1.82813		7.30885	2.39341
05-10	6.36941	-44.2041	-141.339	12.4637	-1.85449	-4.83154	11.7826	1.51903
06-10	4.4264	-43.9937	-143.533	9.81448	-1.98389	-9.01074	7.97888	1.26144
07-10	3.1866	-45.8564	-146.876	7.82185	-3.4707	-13.4077	5.98924	
08-10	0.66908	-49.5327	-147.478	4.89269	-6.77881	-16.3169	3.14631	-2.66064
09-10		-49.688	-149.373	2.29989	-7.92725	-18.166	0.55011	-3.95801
10-10	-5.75732	-52.9897	-151.593	0.50934	-10.6284	-20.5132		-6.66309
11-10	-8.50391	-44.4209	-152.351		-2.95947	-22.5146	-4.11084	-0.07178
12-10	-12.6714	-46.2554	-154.571	-3.72949	-4.09424	-24.5049	-8.46094	-0.29541
13-10	-16.8242	-50.1079	-155.601	-8.64307	-8.93652	-28.3784	-12.8926	-5.15869
14-10	-21.687	-57.3335	-157.6	-12.9551	-14.8315	-0.56836	-17.7578	-11.5923
15-10	-26.0864	-60.1426	-159.314	8.63698	6.47705	0.13484	10.7926	11.5322
16-10	-30.7954	-62.7861	-161.333	4.47449	3.53531		5.31638	6.27142
17-10	-31.7563	-57.7334	-164.151	3.271	3.56443	-7.08252	3.45038	5.23131
18-10	-35.2148	-32.5522	-167.348	0.98139	6.96663	-12.2002	1.26733	7.97802
19-10	-39.9043	-35.4985	-169.203		3.55542	-17.1709		4.54355
20-10	-43.75	-38.6602	-172.302	-6.48193	0.82073	-19.3745	-5.73242	1.52345
21-10	-49.5288	-43.8643	-164.434	-12.0195		-14.1777	-11.062	
22-10	-55.751	-49.2051	-159.324	-17.5459	-7.64209	-9.93067	-17.3281	-6.51953
23-10	-58.0483	-53.6553	-162.398	-20.3257	-12.4736	-11.5718	-19.1548	-11.2012
24-10	-59.8521	-60.1211	-165.35	-21.877	-17.9375	-14.9956	-20.7007	-17.4497
25-10	-56.7397	-63.6392	-168.652	-19.3711	-22.6523	-20.1968	-18.981	-21.1338
26-10	-59.9766	-67.9351	-170.217	-22.0176	-27.2656	-23.4165	-22.207	-25.6406
27-10	-64.5254	-72.1172	-173.446	-26.0713	-32.3032	-26.523	-25.2207	-31.7651
28-10	-67.9028	-75.8267	-175.517	-29.7778	-36.5815	-31.2632	-28.8921	-34.8652
29-10	-70.9033	-79.7236	-178.916	-33.4287	-41.2603	-36.1147	-33.6274	-39.5064
30-10	-74.8071	-73.6357	-182.167	-38.2998	-36.0854	-41.4248	-37.3457	-34.5967
31-10	-80.0044	-72.3135	-185.167	-44.5347	-34.5693	-9.28662	-44.772	-33.4585
01-11	-82.6211	-70.5991	-187.084	-7.02979	4.36956	-9.5127	6.90872	8.93907
02-11	-84.9912	-73.9932	-190.021	-5.22412	2.20265	-15.3389	3.6352	4.77241
03-11	-88.3516	-77.4185	-192.03	-8.58594		-18.6265	1.4895	1.9222
04-11	-88.7148	-83.0908	-193.447	-10.1567	-5.04883	-20.1929	0.38412	
05-11	-90.7012	-86.292	-194.804	-12.7495	-11.895	-24.4629		-7.57959
06-11	-94.0718	-88.7236	-197.636	-16.6743	-13.7588	-29.1563	-4.68213	-9.81787
07-11	-97.3198	-89.3384	-200.653	-20.4907	-15.0903	-34.3911	-9.12354	-10.9912
08-11	-101.39	-87.2935	-203.609	-26.3345	-14.354	-39.5029	-14.0137	-10.4067
09-11	-106.567	-89.7861	-205.568	-32.3794	-15.2764	-45.2456	-20.9463	-11.1377
10-11	-111.888	-93.1025	-209.697	-41.2285	-19.4272	-51.3516	-29.2769	-15.895
11-11	-112.672	-96.4619	-211.475	-44.9175	-24.4307	-58.0542	-32.8521	-19.7671
12-11	-116.861	-99.9043	-214.46	-49.1152	-28.9966	-64.7842	-37.9185	-25.0757
13-11	-121.319	-104.921	-217.511	-55.2183	-34.394	-69.7163	-43.3833	-30.439
14-11	-123.009	-109.628	-219.758	-59.3814	-40.2827	-36.4365	-47.1929	-36.0913
15-11	-127.174	-111.762	-222.191	-23.1528	-8.35986	-38.6035	6.01949	7.81485
16-11	-130.616	-115.504	-224.472	-25.3643	-8.33936	-41.5757	2.12558	3.91582
17-11	-134.153	-118.712	-226.858	-31.0522	-13.7354	-45.3149		0.60409
18-11	-139.082	-123.294	-228.565	-38.4614	-19.3857	-51.4907	-9.14893	
19-11	-143.663	-125.711	-204.753	-46.397	-23.3467	-28.4937	-17.5938	-8.52881
20-11	-145.521	-129.271	-208.443	-52.2354	-29.7607	-32.1743	-23.1841	-13.8355

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE							
	S1	S2	S3	S4	S5	S6	S7	S8
21-11	-148.605	-133.109	-213.282	-55.2715	-37.0059	-35.145	-26.9697	-20.9316
22-11	-150.69	-136.551	-217.177	-58.3862	-42.7129	-40.0317	-29.7212	-27.1191
23-11	-151.678	-140.553	-220.152	-61.543	-48.2476	-44.6621	-33.4844	-33.3657
24-11	-154.501	-144.59	-221.583	-65.9604	-53.9297	-47.0913	-37.1397	-38.5234
25-11	-157.404	-143.532	-224.702	-70.145	-55.7056	-52.3154	-41.9819	-40.0313
26-11	-159.618	-145.935	-227.216	-73.0513	-58.5366	-59.023	-44.773	-42.5317
27-11	-159.21	-145.687	-229.698	-73.1631	-59.7056	-65.8472	-44.8882	-43.7397
28-11	-161.204	-146.606	-231.776	-76.5762	-62.1006	-70.7686	-49.7583	-47.2105
29-11	-164.197	-148.494	-234.808	-81.1255	-65.791	-75.4775	-53.9897	-50.4707
30-11	-166.827	-150.816	-232.112	-86.3823	-67.8438	-36.6685	-59.523	-53.9966
01-12	-170.619	-154.083	-217.167	-46.8794	-36.5493	-18.9199	-0.08496	-0.53809
02-12	-174.717	-157.416	-221.53	-52.8833	-37.8555	-23.4004	-2.27539	-0.09961
03-12	-177.716	-160.404	-223.663	-57.978	-42.6602	-25.4463	-8.72022	-5.99902
04-12	-180.563	-163.768	-208.556	-64.6157	-48.9556	-11.125	-14.4175	-12.0918
05-12	-183.523	-167.294	-212.836	-69.4307	-55.9673	-14.1548	-20.0557	-18.8589
06-12	-186.355	-170.855	-216.482	-73.5195	-62.9692	-18.9341	-25.6763	-26.4326
07-12	-189.482	-174.711	-220.142	-78.3506	-66.8247	-23.0063	-31.4355	-31.6201
08-12	-191.979	-177.417	-224.28	-82.0649	-71.0186	-28.2954	-36.9199	-37.7012
09-12	-194.472	-180.436	-227.518	-85.813	-77.374	-34.521	-40.3823	-43.418
10-12	-193.341	-183.614	-230.372	-86.0303	-82.3604	-40.085	-40.7451	-49.8799
11-12	-189.787	-186.914	-232.948	-83.2188	-87.7822	-46.2339	-38.8945	-57.0073
12-12	-191.252	-189.662	-235.101	-85.7002	-91.9429	-53.6875	-41.313	-63.0596
13-12	-192.822	-192.21	-238.178	-87.9399	-94.9194	-59.1104	-44.5366	-66.7534
14-12	-195.257	-194.59	-241.176	-91.9292	-97.6802	-28.9058	-48.9526	-70.2056
15-12	-198.66	-195.741	-242.999	-56.5679	-62.458	-31.5439	5.69238	-6.50049
16-12	-201.757	-197.327	-246.84	-58.2627	-61.7153	-37.6528	2.30715	-5.5376
17-12	-203.973	-199.458	-248.294	-63.9331	-67.6372	-43.3086		-11.2842
18-12	-207.333	-202.517	-250.566	-70.2705	-73.8794	-48.5	-8.93945	-17.8462
19-12	-211.555	-205.241	-250.434	-75.6826	-78.1856	-51.4893	-16.4292	-23.1914
20-12	-213.086	-204.669	-251.792	-81.9727	-77.1548	-56.291	-23.126	-24.1191
21-12	-215.55	-203.401	-254.264	-86.021	-79.5532	-60.4985	-27.7349	-24.709
22-12	-217.721	-207.902	-255.73	-87.2847	-82.752	-65.2788	-31.8262	-29.9287
23-12	-220.528	-210.151	-258.561	-91.9844	-87.8042	-69.9741	-37.1626	-35.1074
24-12	-222.493	-207.483	-261.223	-93.9331	-86.8564	-75.9146	-40.6958	-35.1899
25-12	-225.335	-207.173	-262.656	-97.9678	-87.8862	-80.8208	-45.6001	-36.4429
26-12	-227.105	-209.746	-265.307	-103.607	-92.2642	-85.7246	-51.1548	-42.2544
27-12	-230.368	-213.28	-267.877	-106.867	-96.2949	-90.4107	-58.8413	-48.0171
28-12	-232.909	-212.355	-268.898	-110.584	-96.6602	-91.8311	-64.4785	-49.2607
29-12	-235.593	-213.344	-271.23	-115.103	-98.3384	-96.1738	-68.8618	-50.3398
30-12	-236.949	-216.227	-273.649	-117.848	-104.153	-99.7466	-72.8101	-58.1152
	-239.425	-218.552	-275.172	-120.669	-107.608	-103.733	-76.5684	-63.7017

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
01-01	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07
02-01	-173.987	-244.358	-244.613	-243.765	-207.087	-206.853	-206.201	-174.844	-176.118
03-01	-176.445	-247.244	-248.74	-247.269	-207.378	-209.69	-207.458	-176.423	-180.41
04-01	-183.343	-249.649	-251.723	-250.332	-212.552	-216.172	-214.183	-182.156	-186.926
05-01	-188.459	-244.671	-254.121	-253.423	-210.764	-220.242	-218.833	-179.804	-190.642
06-01	-192.052	-247.264	-256.501	-255.851	-214.506	-224.314	-222.675	-184.466	-194.462
07-01	-194.451	-250.017	-258.545	-257.691	-218.954	-227.402	-225.376	-188.77	-197.325
08-01	-196.761	-252.34	-260.078	-259.484	-222.022	-229.65	-227.876	-191.736	-199.413
09-01	-199.915	-254.102	-262.561	-261.038	-224.135	-231.469	-229.949	-193.671	-202.364
10-01	-202.696	-256.53	-264.004	-263.577	-225.584	-233.216	-232.7	-194.945	-204.173
11-01	-206.216	-258.115	-266.741	-265.993	-227.382	-236.132	-234.335	-196.655	-207.166
12-01	-206.911	-259.821	-268.232	-267.336	-229.366	-237.886	-236.95	-199.814	-211.112
13-01	-210.398	-262.91	-270.542	-269.613	-232.608	-240.353	-238.238	-202.056	-212.368
14-01	-145.718	-264.646	-273.04	-270.817	-234.584	-241.949	-204.991	-205.455	-215.119
15-01	-148.998	-267.195	-274.549	-273.557	-201.996	-209.374	-209.922	-141.842	-151.825
16-01	-156.642	-269.789	-277.161	-275.101	-207.074	-214.154	-216.326	-147.089	-156.715
17-01	-160.97	-271.059	-278.622	-277.515	-211.906	-220.347	-220.035	-152.379	-163.964
18-01	-163.794	-273.207	-281.439	-279.895	-215.098	-225.671	-223.196	-156.305	-169.195
19-01	-165.662	-274.626	-282.896	-280.988	-218.902	-227.929	-225.492	-160.001	-172.222
20-01	-169.186	-276.205	-286.087	-284.416	-220.137	-230.658	-227.93	-160.839	-174.576
21-01	-172.57	-192.06	-287.328	-285.395	-136.768	-233.013	-229.532	-77.625	-177.919
22-01	-174.338	-104.808	-289.469	-286.483	-58.5088	-235.874	-232.369	-18.0146	-180.749
23-01	-176.689	-108.134	-290.335	-288.523	-78.7471	-237.239	-233.789	-54.1353	-183.183
24-01	-177.886	-118.898	-292.497	-289.387	-85.4248	-239.898	-236.093	-60.8823	-185.898
25-01	-180.305	-131.051	-293.534	-291.497	-104.166	-241.372	-237.377	-84.6445	-188.51
26-01	-183.042	-141.8	-295.98	-292.616	-121.682	-245.155	-240.048	-107.662	-190.29
27-01	-186.005	-148.585	-296.622	-295.095	-135.013	-246.124	-241.759	-125.171	-192.831
28-01	-188.677	-154.538	-298.526	-296.228	-142.607	-246.987	-245.329	-135.656	-195.092
29-01	-191.593	-157.871	-299.418	-298.796	-151.217	-249.194	-246.92	-145.529	-197.322
30-01	-193.592	-162.449	-301.723	-300.134	-156.09	-250.467	-249.459	-151.082	-198.933
31-01	-125.093	-165.443	-302.905	-302.105	-159.893	-253.011	-214.263	-156.274	-201.735
01-02	-129.21	-168.774	-305.071	-302.802	-130.942	-218.555	-215.543	-96.5166	-137.366
02-02	-134.54	-171.858	-306.144	-304.894	-134.609	-221.271	-220.655	-110.848	-140.424
03-02	-139.689	-175.496	-308.323	-307.118	-142.587	-225.257	-225.66	-117.768	-146.293
04-02	-143.519	-178.378	-309.26	-308.608	-150.144	-228.356	-228.898	-130.305	-150.249
05-02	-146.983	-181.117	-311.557	-310.801	-154.993	-231.884	-231.915	-140.471	-155.563
06-02	-148.144	-183.703	-312.838	-311.634	-159.849	-235.097	-233.613	-148.407	-159.87
07-02	-150.984	-185.329	-315.397	-312.605	-162.918	-238.027	-235.539	-154.214	-163.675
08-02	-154.034	-188.029	-316.733	-314.981	-165.518	-242.202	-237.584	-158.588	-166.913
09-02	-157.195	-190.818	-319.312	-316.247	-168.589	-244.808	-240.908	-163.04	-170.231
10-02	-160.263	-193.608	-320.667	-318.805	-171.512	-246.722	-242.599	-165.858	-174.007
11-02	-163.193	-196.454	-323.752	-320.014	-175.491	-248.145	-246.386	-168.872	-175.857
12-02	-165.81	-199.009	-324.826	-323.01	-176.88	-250.619	-247.65	-172.513	-178.421
13-02	-168.706	-200.806	-325.777	-324.136	-178.552	-251.935	-249.919	-173.212	-181.163
14-02	-101.36	-196.697	-326.54	-325.183	-174.851	-254.23	-216.176	-169.561	-183.698
15-02	-108.092	-198.032	-328.688	-326.279	-139.341	-220.404	-220.004	-102.161	-119.697
16-02	-114.433	-199.65	-329.754	-328.496	-140.099	-223.902	-226.444	-111.171	-126.789
17-02	-117.177	-203.021	-332.088	-329.114	-146.231	-229.876	-228.23	-117.268	-134.188
18-02	-120.092	-204.959	-333.255	-331.219	-150.646	-233.646	-231.858	-128.448	-142.162
19-02	-123.675	-208.459	-335.52	-332.182	-154.947	-237.063	-234.723	-138.185	-149.614
20-02	-127.008	-210.033	-336.623	-334.352	-157.775	-240.107	-237.231	-144.851	-156.394
21-02	-130.252	-211.753	-338.847	-335.378	-161.775	-242.515	-239.392	-153.005	-161.021
22-02	-134.225	-214.525	-339.921	-337.387	-164.845	-245.866	-241.105	-156.704	-165.097
23-02	-135.932	-217.314	-342.072	-338.319	-167.899	-247.623	-245	-161.38	-167.92

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
24-02	-139.009	-220.11	-342.283	-338.875	-171.076	-249.312	-246.072	-164.521	-169.368
25-02	-141.83	-216.993	-344.19	-340.962	-168.933	-250.58	-247.456	-162.402	-172.722
26-02	-144.731	-220.184	-344.953	-341.943	-171.204	-252.972	-250.108	-164.895	-174.43
27-02	-147.835	-222.3	-346.828	-344.201	-175.488	-255.312	-251.684	-168.197	-175.833
28-02	-83.4297	-225.14	-347.741	-345.017	-177.272	-256.625	-217.818	-172.203	-178.566
01-03	-87.3125	-226.862	-348.49	-347.262	-143.504	-221.738	-221.252	-117.89	-114.706
02-03	-93.5776	-229.403	-350.302	-348.356	-146.307	-222.656	-227.006	-117.632	-119.74
03-03	-99.2139	-231.521	-351.177	-349.513	-150.915	-227.589	-230.731	-127.618	-126.048
04-03	-103.343	-232.715	-353.21	-351.701	-153.276	-230.761	-234.491	-136.102	-134.987
05-03	-108.069	-235.156	-354.188	-352.813	-156.635	-234.757	-237.67	-143.348	-141.862
06-03	-112.413	-236.373	-355.163	-354.942	-159.035	-237.901	-240.134	-150.091	-149.6
07-03	-114.5	-238.71	-357.364	-355.535	-162.071	-240.457	-241.595	-153.843	-154.905
08-03	-117.168	-241.28	-358.333	-356.23	-164.907	-242.71	-245.316	-157.478	-158.498
09-03	-120.06	-242.668	-359.267	-358.317	-166.835	-244.619	-246.824	-161.971	-162.91
10-03	-123.131	-246.143	-362.359	-359.26	-169.712	-246.383	-248.275	-164.536	-165.623
11-03	-126.152	-247.646	-363.544	-360.33	-173.716	-247.884	-250.833	-167.575	-168.568
12-03	-129.078	-248.996	-364.492	-363.164	-175.451	-250.656	-252.168	-169.542	-172.601
13-03	-133.07	-251.168	-365.343	-364.015	-177.784	-253.154	-254.715	-172.884	-174.31
14-03	-69.3525	-253.028	-366.296	-364.754	-179.875	-254.733	-220.791	-173.811	-177.334
15-03	-66.7222	-254.167	-368.431	-364.456	-144.395	-221.547	-218.87	-118.449	-114.676
16-03	-71.0132	-256.634	-369.184	-365.091	-146.82	-223.664	-221.787	-120.74	-121.111
17-03	-75.1729	-257.95	-371.016	-365.891	-151.341	-228.402	-225.421	-127.405	-126.941
18-03	-80.1123	-260.511	-371.912	-367.861	-155.706	-233.303	-229.411	-137.411	-136.549
19-03	-81.8223	-262.977	-372.728	-368.494	-159.273	-235.185	-232.128	-145.979	-144.3
20-03	-86.2031	-263.306	-374.792	-370.414	-159.977	-238.402	-234.672	-150.021	-151.712
21-03	-90.4644	-258.68	-375.612	-371.328	-154.884	-240.941	-237.021	-146.711	-156.68
22-03	-92.021	-258.713	-376.391	-371.997	-156.642	-244.069	-238.773	-150.477	-161.182
23-03	-94.6055	-260.279	-378.274	-373.771	-159.329	-245.971	-240.181	-153.223	-163.788
24-03	-97.1997	-263.331	-375.823	-374.407	-161.879	-243.986	-243.25	-157.228	-163.382
25-03	-99.9697	-265.209	-378.157	-375.045	-164.119	-247.055	-244.943	-159.562	-165.266
26-03	-103.192	-266.948	-379.172	-377.078	-167.35	-248.776	-246.477	-162.721	-168.306
27-03	-107.608	-269.613	-380.09	-378.066	-168.974	-251.375	-248.132	-165.479	-169.913
28-03	-111.88	-271.17	-382.121	-378.936	-172.774	-253.049	-250.834	-167.303	-173.745
29-03	-114.838	-272.681	-382.895	-380.932	-174.479	-255.271	-252.291	-170.195	-174.964
30-03	-50.7803	-274.575	-383.636	-381.588	-176.172	-256.637	-217.55	-172.829	-177.47
31-03	-52.4644	-275.587	-385.522	-382.163	-140.269	-221.464	-218.456	-116.032	-123.274
01-04	-56.9863	-277.921	-386.36	-384.174	-139.59	-223.178	-223.665	-114.096	-122.2
02-04	-61.8818	-278.865	-387.076	-384.957	-145.224	-226.37	-226.61	-123.127	-130.255
03-04	-66.0547	-280.408	-388.722	-385.614	-148.74	-229.295	-230.118	-132.454	-138.13
04-04	-70.6353	-283.519	-389.522	-387.593	-152.398	-232.839	-232.313	-141.785	-143.675
05-04	-73.6787	-284.462	-390.332	-388.166	-156.114	-235.719	-234.109	-146.401	-149.874
06-04	-76.4624	-285.118	-391.141	-388.495	-158.685	-238.268	-235.19	-150.987	-155.217
07-04	-78.0054	-287.123	-393.054	-390.189	-161.152	-240.454	-236.813	-155.301	-159.544
08-04	-81.8662	-287.976	-393.782	-390.885	-162.382	-242.34	-238.412	-157.939	-162.246
09-04	-85.4507	-289.983	-390.428	-391.553	-164.791	-239.807	-242.146	-160.385	-159.844
10-04	-87.4121	-290.811	-393.047	-393.347	-165.892	-241.498	-243.639	-162.455	-161.819
11-04	-91.4077	-292.556	-394.067	-394.114	-168.809	-242.913	-245.037	-163.204	-163.309
12-04	-93.5703	-293.484	-395.127	-394.948	-170.063	-244.494	-246.529	-165.657	-166.226
13-04	-95.3911	-294.443	-395.933	-395.364	-171.256	-245.965	-248.442	-167.064	-167.829
14-04	-28.5239	-296.533	-390.811	-395.725	-173.326	-240.924	-209.999	-170.226	-163.929
15-04	-28.3374	-297.361	-391.946	-396.215	-137.451	-203.365	-210.019	-112.725	-95.9292
16-04	-30.186	-299.56	-393.113	-396.585	-137.397	-202.109	-211.458	-111.866	-104.981
17-04	-32.959	-300.719	-390.27	-398.341	-141.971	-201.816	-214.96	-120.727	-104.221
18-04	-35.5737	-302.999	-392.733	-398.969	-147.239	-204.117	-216.833	-132.67	-114.456

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
19-04	-39.937	-304.021	-394.142	-399.614	-151.695	-206.838	-219.601	-139.369	-126.379
20-04	-43.2554	-304.65	-395.556	-400.262	-154.643	-209.89	-222.092	-145.518	-135.559
21-04	-46.9297	-306.519	-396.852	-402.252	-156.204	-211.21	-224.45	-150.194	-142.045
22-04	-52.1172	-307.268	-397.917	-403.018	-158.949	-213.105	-226.666	-153.194	-147.47
23-04	-54.8286	-308.924	-400.075	-403.447	-160.715	-214.541	-227.912	-155.537	-150.866
24-04	-57.3721	-309.57	-401.056	-404.967	-161.541	-216.001	-228.73	-157.775	-155.309
25-04	-56.8731	-311.412	-402.052	-404.923	-163.945	-217.589	-229.268	-160.016	-158.222
26-04	-60.0645	-312.432	-403.017	-405.434	-165.182	-220.413	-230.129	-162.181	-160.957
27-04	-61.9746	-313.404	-399.793	-406.047	-166.584	-217.713	-232.422	-163.562	-158.092
28-04	-65.7598	-315.757	-400.666	-406.675	-170.322	-218.524	-233.842	-166.414	-159.109
29-04	-69.75	-316.955	-402.914	-408.343	-171.825	-219.606	-235.278	-168.059	-161.589
30-04	-3.46777	-317.504	-403.804	-409.089	-173.341	-221.568	-199.617	-170.806	-162.723
01-05	-0.92822	-301.832	-404.626	-409.686	-117.473	-184.114	-199.136	-83.1436	-95.9224
02-05	-3.80566	-299.111	-405.562	-410.22	-112.125	-183.48	-201.865	-89.624	-105.579
03-05	-5.67773	-299.836	-406.331	-411.735	-117.126	-186.383	-203.974	-93.0928	-109.046
04-05	-8.73682	-301.216	-408.354	-412.348	-125.495	-189.162	-206.707	-106.373	-118.114
05-05	-11.6362	-302.647	-409.194	-412.967	-133.946	-190.706	-208.002	-116.476	-129.236
06-05	7.55135	-304.597	-410.001	-367.225	-139.188	-192.964	-163.599	-127.687	-137.534
07-05	5.45128	-306.639	-410.792	-363.348	-144.954	-195.005	-158.596	-135.877	-143.313
08-05	4.76296	-301.044	-411.521	-357.473	-141.395	-196.753	-153.503	-135.919	-148.353
09-05	2.5716	-301.867	-413.411	-360.077	-144.476	-198.2	-154.084	-139.313	-152.741
10-05	3.47578	-303.707	-400.147	-352.92	-147.353	-185.154	-148.243	-143.95	-142.419
11-05	1.99925	-303.902	-388.416	-354.378	-149.302	-174.072	-149.869	-146.12	-131.558
12-05	3.66738	-302.853	-370.8	-344.186	-149.786	-157.596	-138.482	-147.011	-114.885
13-05	4.01669	-304.545	-366.883	-335.8	-151.822	-152.135	-131.878	-149.377	-114.918
14-05	13.2996	-306.146	-367.988	-338.014	-153.674	-154.269	-95.6133	-152.689	-120.205
15-05	7.19838	-307.456	-370.361	-339.3	-116.774	-115.545	-97.6074	-85.1392	-61.6816
16-05	4.27863	-305.889	-372.407	-342.004	-115.217	-115.381	-109.774	-96.8906	-84.1743
17-05	2.69992	-305.06	-370.293	-342.735	-118.253	-117.619	-120.735	-96.4356	-83.6533
18-05	1.36184	-306.13	-347.616	-344.352	-126.12	-103.167	-129.787	-106.895	-73.2783
19-05	0.09036	-307.393	-350.194	-345.682	-132.959	-110.362	-137.633	-117.284	-89.6587
20-05	1.38469	-308.865	-352.519	-340.709	-139.237	-119.441	-136.644	-127.349	-104.804
21-05	1.24913	-310.201	-353.2	-339.491	-143.569	-128.713	-138.413	-135.36	-116.765
22-05		-311.37	-334.105	-341.487	-148.232	-114.678	-142.951	-141.381	-105.437
23-05	-1.771	-312.362	-296.904	-343.524	-151.003	-82.1392	-147.069	-145.765	-75.8467
24-05	-0.43652	-311.905	-295.708	-338.364	-151.701	-89.6899	-142.293	-147.917	-84.9512
25-05	1.12912	-310.713	-296.015	-334.273	-150.772	-102.926	-141.341	-148.503	-100.281
26-05	0.52212	-309.991	-296.927	-335.266	-151.643	-114.103	-143.356	-149.419	-111.98
27-05		-301.477	-299.293	-337.02	-143.482	-124.849	-145.92	-141.525	-122.576
28-05	-1.51074	-295.584	-284.24	-338.659	-138.977	-115.56	-148.292	-137.308	-114.53
29-05	1.81016	-292.572	-285.076	-331.005	-136.038	-121.503	-140.986	-135.692	-120.563
30-05	14.8917	-293.331	-285.174	-315.711	-137.965	-127.065	-88.3052	-136.55	-128.379
31-05	7.88881	-293.053	-288.75	-316.338	-101.397	-95.0059	-90.8745	-80.5249	-78.2803
01-06	5.40441	-294.754	-289.8	-315.257	-104.647	-99.3682	-103.347	-85.0171	-89.9185
02-06	3.91991	-296.969	-277.14	-314.701	-114.738	-96.5303	-111.391	-99.209	-81.0503
03-06	2.57216	-265.034	-278.393	-315.73	-91.7339	-107.262	-121.653	-78.9497	-93.52
04-06	2.15785	-266.925	-280.273	-314.81	-100.423	-116.974	-125.963	-93.0801	-107.087
05-06	1.40757	-268.003	-276.914	-316.048	-111.104	-121.896	-132.102	-105.235	-113.561
06-06	0.59635	-270.716	-265.2	-316.776	-122.167	-115.445	-136.584	-118.822	-109.531
07-06		-270.541	-251.447	-318.459	-128.542	-108.159	-141.781	-126.326	-103.042
08-06		-249.901	-236.249	-311.893	-113.871	-99.8359	-137.996	-111.531	-96.2485
09-06	0.81219	-241.173	-218.45	-310.586	-110.557	-90.0816	-140.129	-108.417	-87.7393
10-06	1.36427	-231.488	-218.813	-308.371	-107.252	-98.8071	-138.87	-105.996	-97.4917
11-06	1.0844	-229.041	-221.171	-307.373	-110.069	-110.17	-140.292	-109.164	-108.957

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
12-06	1.00408	-227.301	-221.67	-307.237	-114.783	-120.387	-141.139	-113.84	-119.808
13-06		-212.001	-223.521	-309.446	-107.066	-128.582	-144.018	-106.808	-127.964
14-06	6.24746	-201.815	-225.002	-310.533	-105.14	-135.783	-107.616	-104.879	-135.131
15-06	3.90757	-195.033	-226.478	-311.792	-65.7139	-101.125	-109.019	-38.7139	-73.1768
16-06	2.30633	-174.79	-226.637	-312.398	-55.7725	-103.538	-117.431	-37.2397	-89.9297
17-06	2.78995	-172.669	-227.917	-308.488	-72.9707	-113.111	-121.151	-50.2754	-92.3525
18-06	1.4566	-165.359	-229.264	-310.063	-82.5811	-122.976	-128.217	-63.5737	-105.155
19-06	1.24002	-165.024	-230.526	-309.952	-96.0366	-131.57	-131.746	-83.5303	-117.562
20-06	0.23776	-166.496	-229.528	-311.399	-108.797	-135.291	-137.683	-100.678	-124.912
21-06		-166.916	-228.795	-313.246	-119.764	-138.411	-143.253	-112.752	-130.668
22-06	-2.60938	-168.865	-228.628	-314.911	-128.212	-141.824	-147.091	-123.225	-134.898
23-06	-4.18115	-169.359	-211.527	-316.071	-134.934	-126.593	-150.077	-130.095	-121.912
24-06	-3.99414	-156.702	-209.704	-313.777	-125.293	-126.82	-150.316	-122.822	-122.55
25-06	-5.14551	-150.464	-201.958	-314.825	-123.67	-122.483	-152.849	-121.415	-118.78
26-06	-6.57861	-151.785	-201.526	-315.974	-127.761	-124.815	-154.205	-126.963	-121.718
27-06	-8.86279	-153.19	-201.426	-317.236	-133.348	-128.744	-155.655	-131.448	-127.129
28-06	-11.4214	-146.616	-203.598	-318.607	-129.741	-133.759	-158.275	-128.166	-133.217
29-06	-7.91162	-143.735	-204.188	-313.614	-129.733	-139.095	-152.861	-128.296	-138.486
30-06	-0.22656	-144.974	-205.667	-305.226	-133.847	-142.657	-144.712	-133.756	-142.241
01-07	1.56563	-138.573	-206.483	-299.48	-130.021	-146.56	-140.301	-129.852	-144.956
02-07	1.79646	-140.918	-206.726	-297.143	-134.242	-147.139	-137.59	-134.086	-148.208
03-07	2.66248	-135.143	-207.971	-291.47	-131.584	-150.104	-133.25	-131.429	-149.707
04-07	2.1536	-131.639	-208.291	-291.024	-129.465	-153.073	-133.064	-129.33	-152.813
05-07	0.99872	-128.897	-207.693	-292.471	-127.449	-152.574	-137.432	-127.32	-152.366
06-07		-124.591	-183.27	-294.299	-123.292	-129.146	-141.065	-123.198	-128.989
07-07		-128.118	-182.563	-289.434	-127.148	-129.009	-139.592	-127.122	-128.958
08-07	3.4294	-132.398	-151.716	-272.89	-131.546	-98.6494	-125.355	-131.512	-100.703
09-07	3.00448	-128.263	-130.072	-271.253	-126.314	-84.5889	-124.853	-127.298	-85.3257
10-07	1.79387	-131.594	-129.758	-271.901	-131.225	-93.4272	-128.31	-130.866	-93.377
11-07	1.41183	-135.748	-126.221	-272.609	-135.325	-98.7988	-132.619	-135.113	-99.1475
12-07	2.84858	-140.239	-118.36	-264.866	-139.861	-97.2407	-128.304	-139.638	-97.4556
13-07	1.55979	-139.85	-117.448	-265.389	-139.511	-103.658	-132.777	-139.321	-103.749
14-07	0.83472	-138.905	-114.662	-266.571	-138.603	-103.87	-136.268	-138.431	-103.984
15-07		-102.09	-119.322	-268.997	-101.861	-110.526	-140.668	-101.831	-111.785
16-07	-0.46729	-91.8452	-120.679	-269.829	-91.5884	-116.229	-145.639	-91.4727	-116.466
17-07	-2.55371	-100.292	-127.854	-271.806	-100.034	-124.505	-148.806	-100.009	-123.896
18-07	-4.53369	-110.565	-127.425	-272.306	-110.332	-124.26	-150.676	-110.305	-123.806
19-07	-6.56689	-115.569	-123.83	-274.008	-115.494	-121.08	-153.797	-115.468	-122.175
20-07	-8.75879	-101.715	-87.5215	-275.343	-101.669	-85.8193	-156.173	-101.665	-85.9531
21-07	-3.08643	-106.982	-85.4209	-268.039	-106.958	-84.0303	-148.629	-106.954	-84.3857
22-07	-3.41797	-100.832	-97.7603	-269.572	-100.832	-96.3062	-150.46	-100.833	-96.5596
23-07	-5.12354	-104.983	-110.111	-271.103	-104.869	-109.748	-152.396	-104.988	-109.968
24-07	-7.71631	-112.261	-108.875	-272.584	-112.06	-108.469	-153.975	-112.258	-108.281
25-07	-10.3364	-115.499	-95.6587	-274.421	-115.529	-95.2266	-155.833	-115.497	-95.6782
26-07	-12.291	-122.365	-100.055	-276.068	-122.37	-99.6563	-158.584	-122.363	-100.005
27-07	-14.9746	-117.92	-105.337	-277.356	-117.922	-105.528	-159.696	-117.919	-105.945
28-07	-11.7466	-123.76	-112.189	-273.367	-123.765	-111.331	-155.358	-123.76	-111.694
29-07	-12.0161	-131.051	-95.6626	-273.394	-131.055	-95.3037	-155.409	-131.05	-95.6074
30-07	-0.63574	-136.326	-100.56	-260.31	-136.357	-101.309	-142.65	-136.329	-100.507
31-07	0.88958	-142.165	-109.128	-258.075	-142.19	-109.541	-141.026	-142.166	-109.08
01-08		-144.361	-119.29	-259.28	-144.383	-118.927	-143.083	-144.363	-119.285
02-08	-1.28711	-132.845	-128.57	-261.475	-132.854	-127.334	-146.109	-132.846	-128.56
03-08	2.51633	-134.531	-135.549	-248.727	-134.538	-135.708	-135.833	-134.532	-135.553
04-08	3.19991	-139.096	-141.059	-242.717	-139.103	-140.255	-130.114	-139.097	-141.061

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
05-08	2.25297	-144.116	-146.175	-243.056	-144.12	-145.523	-131.7	-144.117	-146.177
06-08	3.49141	-147.59	-150.611	-234.9	-147.593	-150.111	-125.872	-147.591	-150.612
07-08	2.45389	-140.945	-153.856	-235.196	-140.948	-153.396	-128.599	-140.945	-153.857
08-08	1.95448	-136.554	-156.843	-234.198	-136.556	-156.442	-131.498	-136.554	-156.843
09-08	7.15081	-130.656	-132.796	-202.965	-130.656	-133.525	-103.814	-130.655	-132.796
10-08	4.20869	-134.897	-131.63	-202.568	-134.898	-131.304	-108.244	-134.898	-131.631
11-08	3.80208	-139.134	-133.083	-199.221	-139.135	-132.849	-111.747	-139.135	-133.083
12-08	2.62834	-143.387	-128.088	-199.178	-143.387	-127.847	-118.179	-143.387	-128.088
13-08	2.12634	-146.539	-120.649	-198.961	-146.539	-120.399	-125.642	-146.539	-120.648
14-08	3.89378	-147.93	-125.611	-185.058	-147.929	-125.279	-115.712	-147.929	-125.611
15-08	4.91005	-151.305	-130.896	-171.949	-151.304	-130.559	-110.213	-151.304	-130.896
16-08	3.12469	-154.706	-137.602	-173.343	-154.706	-137.213	-115.961	-154.706	-137.602
17-08	1.91298	-155.575	-133.982	-175.932	-155.576	-133.656	-122.614	-155.575	-133.981
18-08	0.80047	-156.872	-138.498	-177.521	-156.872	-138.313	-131.875	-156.872	-138.498
19-08		-149.475	-141.99	-179.236	-149.475	-141.771	-136.413	-149.475	-141.989
20-08	-1.31299	-149.709	-134.393	-179.61	-149.709	-134.17	-141.769	-149.709	-134.392
21-08	-4.06689	-152.496	-137.347	-181.468	-152.497	-137.13	-146.867	-152.497	-137.347
22-08	-6.0249	-153.815	-135.98	-183.03	-153.817	-135.758	-150.209	-153.816	-135.98
23-08	-7.94434	-114.403	-136.346	-183.75	-114.404	-136.122	-153.802	-114.403	-136.347
24-08	-0.26514	-118.098	-133.64	-169.84	-118.099	-133.414	-140.103	-118.099	-133.64
25-08		-126.293	-136.026	-172.519	-126.294	-135.808	-143.495	-126.293	-136.026
26-08	-1.86475	-132.685	-133.281	-175.312	-132.686	-133.006	-146.741	-132.686	-133.281
27-08	-4.07031	-139.085	-137.975	-177.554	-139.086	-137.745	-149.466	-139.085	-137.975
28-08	-6.63916	-142.239	-142.899	-179.354	-142.24	-141.664	-151.591	-142.239	-142.899
29-08	-4.00586	-142.003	-144.708	-175.13	-142.004	-144.738	-147.654	-142.004	-144.708
30-08	1.8485	-144.766	-147.926	-166.959	-144.766	-147.814	-139.925	-144.766	-147.927
31-08	10.4383	-145.581	-150.893	-168.35	-145.581	-150.736	-103.095	-145.581	-150.893
01-09	5.9086	-148.631	-153.68	-169.302	-109.415	-113.854	-105.972	-80.2798	-85.3096
02-09	3.52631	-148.615	-152.481	-171.393	-108.133	-111.963	-114.418	-92.2607	-95.0064
03-09	2.55011	-152.034	-124.227	-171.988	-117.278	-87.3926	-123.771	-95.6675	-66.2432
04-09	1.12551	-152.793	-121.15	-173.822	-125.544	-93.7505	-130.82	-106.748	-76.8022
05-09	1.91509	-154.621	-128.366	-169.829	-133.551	-107.084	-132.079	-119.413	-94.9107
06-09	4.12054	-157.858	-116.736	-157.073	-140.083	-100.677	-122.779	-129.28	-91.792
07-09	3.17909	-159.325	-116.877	-155.606	-145.469	-105.509	-125.183	-137.605	-97.7632
08-09	2.09784	-161.691	-123.969	-154.891	-149.21	-115.688	-129.783	-142.04	-110.806
09-09	2.89659	-163.814	-128.462	-151	-154.51	-121.207	-129.032	-148.001	-118.355
10-09	2.9763	-165.647	-133.982	-148.231	-157.97	-130.203	-128.99	-153.128	-127.493
11-09	1.56762	-168.377	-140.395	-150.09	-160.787	-136.854	-134.709	-157.498	-134.431
12-09	1.34376	-171.83	-138.637	-150.351	-163.37	-136.423	-136.608	-160.228	-134.948
13-09	0.80646	-172.598	-140.353	-151.369	-164.043	-138.315	-140.26	-162.277	-137.07
14-09	10.8366	-173.286	-141.852	-153.463	-164.899	-140.042	-105.459	-162.869	-140.07
15-09	6.87039	-134.828	-146.204	-154.146	-82.3838	-105.124	-108.156	-56.001	-76.5645
16-09	4.77946	-123	-150.661	-155.292	-84.9014	-108.692	-116.032	-58.4189	-92.7261
17-09	3.01363	-126.999	-153.028	-156.742	-87.231	-117.951	-125.578	-69.8809	-95.8999
18-09	1.96805	-131.47	-155.271	-157.592	-99.6167	-126.652	-131.707	-87.168	-108.884
19-09	0.92797	-138.714	-154.209	-158.668	-116.33	-132.541	-138.438	-103.679	-117.563
20-09		-144.059	-155.476	-160.605	-125.253	-136.73	-144.267	-118.185	-126.62
21-09	-3.49561	-143.999	-156.881	-162.211	-130.747	-142.385	-149.355	-123.23	-133.74
22-09	2.65561	-136.8	-158.688	-149.543	-125.92	-147.543	-138.625	-121.583	-140.935
23-09	2.34758	-133.911	-160.517	-148.976	-124.397	-151.434	-139.057	-122.402	-146.404
24-09	2.01764	-117.966	-164.073	-149.038	-112.155	-155.758	-140.175	-110.003	-152.2
25-09	1.40099	-121.356	-165.708	-150.119	-115.933	-158.973	-142.17	-115.109	-156.582
26-09		-129.138	-168.143	-153.903	-125.527	-161.327	-146.834	-124.318	-159.193
27-09	-2.73389	-136.812	-171.174	-155.73	-133.393	-162.277	-150.359	-132.317	-161.463

	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE								
DATE	S9	S10	S11	S12	S13	S14	S15	S16	S17
28-09	-4.66064	-141.994	-172.376	-156.926	-141.266	-164.576	-152.017	-139.167	-162.523
29-09	5.00885	-149.619	-173.132	-134.408	-146.781	-165.44	-131.141	-146.117	-164.57
30-09	15.4033	-153.135	-175.137	-131.14	-151.945	-167.56	-89.8179	-152.276	-166.747
01-10	10.1253	-157.698	-176.558	-133.758	-119.136	-131.552	-93.4946	-88.751	-103.62
02-10	7.27373	-160.081	-179.312	-135.42	-120.065	-130.834	-102.972	-101.379	-113.043
03-10	4.40053	-161.758	-181.984	-140.414	-125.644	-137.832	-117.842	-104.886	-117.971
04-10	1.95517	-148.636	-180.658	-146.42	-118.433	-138.215	-128.753	-100.316	-123.244
05-10		-132.388	-180.127	-152.453	-106.931	-141.44	-137.937	-92.3648	-129.011
06-10	-3.81641	-134.613	-179.851	-156.27	-114.586	-143.507	-145.088	-103.261	-134.252
07-10	-8.72363	-137.046	-180.886	-160.025	-121.056	-147.636	-151.974	-114.821	-139.496
08-10	-11.0894	-143.059	-182.406	-161.821	-132.88	-150.615	-154.501	-127.882	-145.568
09-10	-12.9648	-148.827	-183.776	-162.412	-140.441	-152.788	-156.853	-135.822	-148.928
10-10	-16.2598	-153.859	-184.776	-164.793	-145.991	-154.725	-159.543	-143.829	-152.366
11-10	-18.0674	-156.761	-175.572	-165.568	-150.707	-146.608	-161.42	-148.57	-143.277
12-10	-19.9995	-160.166	-177.679	-167.431	-155.809	-149.085	-162.701	-153.867	-147.457
13-10	-22.5713	-162.354	-181.265	-170.377	-159.466	-153.518	-164.092	-158.706	-152.073
14-10	10.8509	-165.411	-185.144	-171.725	-163.871	-157.913	-129.386	-161.848	-156.649
15-10	6.30763	-168.615	-186.68	-172.373	-129.23	-122.472	-126.506	-107.038	-90.9033
16-10	2.81328	-172.244	-187.3	-175.294	-130.947	-120.16	-134.489	-109.135	-101.593
17-10	0.47851	-172.219	-183.291	-176.965	-133.893	-119.971	-141.445	-115.959	-97.9868
18-10		-173.882	-158.019	-180.066	-139.772	-99.1211	-147.406	-127.969	-80.1567
19-10	-7.83447	-176.487	-161.149	-182.966	-145.651	-109.262	-153.387	-135.942	-95.5283
20-10	-10.7896	-178.238	-165.885	-185.058	-152.012	-121.486	-156.314	-144.105	-110.613
21-10	-5.7627	-181.399	-168.968	-177.185	-156.767	-131.667	-150.344	-150.517	-125.089
22-10	-1.33252	-184.587	-172.508	-171.931	-160.937	-141.419	-146.745	-157.347	-136.837
23-10	-2.60742	-186.276	-175.435	-174.803	-164.052	-149.913	-150	-159.425	-143.98
24-10	-6.7041	-187.17	-178.101	-177.706	-165.519	-154.457	-153.43	-161.044	-151.384
25-10	-11.665	-182.87	-180.94	-182.132	-161.463	-158.898	-156.984	-157.173	-156.805
26-10	-13.771	-186.117	-184.012	-183.844	-163.693	-163.096	-158.693	-160.575	-161
27-10	-17.5938	-188.102	-187.083	-185.889	-165.764	-165.888	-160.779	-162.682	-164.131
28-10	-22.5669	-190.504	-189.624	-189.017	-167.103	-168.562	-164.037	-165.154	-166.647
29-10	-27.2891	-192.531	-191.139	-191.431	-171.382	-172.239	-167.565	-167.361	-169.625
30-10	-32.4341	-195.607	-185.558	-194.691	-173.325	-165.661	-169.895	-171.596	-163.077
31-10	7.50942	-199.097	-183.037	-197.687	-176.938	-163.195	-135.913	-174.177	-160.796
01-11	3.40956	-199.907	-180.508	-199.611	-140.251	-121.162	-137.828	-107.549	-90.2422
02-11	0.01146	-202.16	-183.12	-202.622	-141.286	-121.502	-145.718	-113.939	-101.818
03-11		-204.45	-187.072	-204.963	-143.91	-129.265	-149.174	-117.892	-107.671
04-11	-3.4126	-205.312	-190.705	-205.659	-147.08	-137.789	-150.432	-124.594	-119.083
05-11	-7.7583	-205.976	-193.976	-206.99	-149.487	-146.258	-154.906	-133.916	-133.086
06-11	-12.8535	-209.788	-194.972	-210.813	-152.894	-150.025	-159.068	-140.968	-140.051
07-11	-18.2622	-211.377	-194.926	-212.607	-157.14	-153.429	-162.887	-147.368	-145.374
08-11	-23.772	-213.115	-192.629	-215.329	-160.261	-151.857	-166.081	-153.532	-145.976
09-11	-28.9536	-216.355	-193.818	-218.151	-164.58	-155.017	-168.547	-159.408	-149.047
10-11	-35.6597	-219.699	-197.272	-220.103	-168.616	-158.919	-171.906	-164.582	-153.786
11-11	-41.5376	-221.752	-199.096	-223.092	-170.866	-161.98	-176.252	-166.52	-157.698
12-11	-49.2798	-224.321	-202.027	-226.058	-174.681	-164.856	-179.464	-169.717	-161.21
13-11	-56.3257	-225.913	-205.249	-229.022	-176.557	-167.18	-182.815	-173.732	-164.752
14-11	-0.58887	-228.484	-207.422	-231.238	-179.222	-170.845	-148.389	-175.295	-168.362
15-11	-0.17969	-231.145	-211.3	-233.603	-145.876	-136.323	-149.534	-111.071	-104.095
16-11	-4.5083	-233.951	-212.55	-234.787	-148.124	-137.412	-154.309	-119.588	-113.476
17-11	-8.79492	-236.716	-215.3	-237.238	-154.504	-145.021	-157.037	-126.212	-120.04
18-11	-14.418	-238.763	-218.164	-240.003	-160.023	-149.4	-160.913	-136.295	-129.389
19-11	3.39031	-241.796	-220.494	-215.116	-164.165	-154.154	-137.249	-146.143	-139.426
20-11	1.07913	-244.416	-223.359	-219.818	-166.726	-158.937	-141.553	-154.244	-147.358

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
21-11		-247.126	-225.415	-224.552	-169.355	-163.228	-145.457	-157.821	-154.679
22-11	-6.68994	-248.232	-228.272	-227.315	-172.486	-167.9	-150.185	-161.383	-159.78
23-11	-10.9058	-248.975	-230.876	-230.124	-173.41	-171.68	-154.805	-163.229	-164.186
24-11	-13.7422	-251.428	-233.43	-231.555	-176.269	-174.729	-157.713	-166.111	-168.099
25-11	-19.3921	-253.858	-233.645	-234.677	-179.131	-174.378	-160.838	-169.277	-167.727
26-11	-25.3911	-254.844	-233.653	-237.205	-181.262	-175.408	-164.846	-172.355	-168.873
27-11	-32.5435	-253.297	-233.651	-239.696	-179.495	-174.969	-168.349	-170.615	-168.504
28-11	-38.3189	-256.117	-234.921	-242.917	-181.729	-176.207	-172.73	-172.878	-170.904
29-11	-45.6187	-257.723	-237.253	-244.78	-184.931	-178.215	-174.657	-174.777	-173.914
30-11	7.47618	-260.867	-238.496	-243.945	-188.542	-180.435	-135.304	-178.498	-175.041
01-12	6.98907	-262.699	-241.641	-228.188	-155.301	-145.384	-116.569	-115.951	-115.889
02-12	3.0286	-265.445	-245.136	-232.446	-158.608	-146.892	-123.814	-123.156	-124.037
03-12	1.12136	-268.131	-247.07	-234.502	-164.04	-153.389	-132.45	-130.231	-130.032
04-12	3.74748	-269.5	-248.708	-219.361	-168.458	-158.226	-120.165	-139.218	-140.12
05-12	1.22797	-272.05	-251.596	-223.553	-172.068	-162.367	-128.542	-146.797	-147.097
06-12		-274.401	-253.313	-226.035	-174.626	-165.685	-136.448	-152.877	-154.928
07-12	-5.61328	-275.95	-255.813	-229.764	-178.489	-169.058	-142.805	-158.417	-159.683
08-12	-11.126	-278.176	-258.312	-233.958	-181.306	-172.849	-150.242	-162.609	-164.11
09-12	-17.3442	-279.267	-260.796	-237.238	-184.016	-175.223	-156.084	-165.066	-166.981
10-12	-23.0474	-278.456	-262.46	-240.099	-183.301	-178.383	-160.31	-164.957	-170.459
11-12	-29.7061	-274.56	-265.205	-242.637	-179.755	-181.727	-165.302	-162.156	-174.993
12-12	-35.3096	-275.952	-267.547	-245.072	-181.307	-184.51	-168.59	-164.285	-177.665
13-12	-42.3916	-279.039	-268.724	-248.947	-182.928	-187.095	-171.996	-164.864	-180.353
14-12	6.78683	-281.125	-270.892	-250.647	-185.368	-189.422	-138.541	-167.19	-182.702
15-12	2.4846	-283.203	-271.291	-253.4	-152.355	-152.832	-143	-107.233	-117.157
16-12		-285.009	-272.113	-254.928	-154.813	-152.884	-149.626	-117.712	-120.871
17-12	-7.729	-286.821	-273.701	-257.575	-160.758	-159.169	-153.568	-124.909	-127.405
18-12	-12.9727	-289.797	-276.581	-259.951	-166.362	-163.398	-158.295	-135.67	-136.453
19-12	-14.6733	-291.575	-277.964	-259.732	-170.582	-166.69	-159.496	-145.636	-145.276
20-12	-19.0688	-294.046	-276.879	-261.044	-173.146	-166.021	-162.088	-152.734	-148.172
21-12	-24.186	-295.16	-276.745	-263.446	-177.199	-165.871	-165.054	-157.428	-150.334
22-12	-29.1768	-297.172	-278.533	-265.974	-178.412	-168.655	-168.378	-161.214	-155.118
23-12	-35.8267	-298.402	-280.754	-267.605	-181.507	-173.4	-172.571	-165.574	-160.477
24-12	-41.1665	-300.266	-280.026	-270.196	-183.46	-171.217	-174.874	-167.4	-158.353
25-12	-46.9463	-301.575	-279.473	-271.636	-186.829	-171.394	-177.853	-171.974	-159.926
26-12	-53.2026	-303.93	-281.717	-274.304	-189.823	-174.112	-181.001	-173.95	-162.594
27-12	-59.8208	-305.469	-283.816	-276.844	-193.323	-176.43	-184.044	-177.58	-166.154
28-12	-63.375	-307.697	-282.868	-277.904	-195.98	-176.828	-186.392	-180.27	-165.542
29-12	-67.5435	-308.884	-283.546	-280.382	-197.92	-176.965	-189.12	-183.274	-165.813
30-12	-71.8701	-311.021	-286.035	-281.668	-200.593	-179.954	-192.002	-185.955	-170.064
	-78.3066	-312.975	-288.21	-285.219	-203.204	-183.494	-195.141	-188.588	-174.469

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE									
	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
01-01	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07	-239.07
02-01	-173.987	-244.358	-244.613	-243.765	-207.087	-207.473	-206.201	-188.547	-188.913	-187.691
03-01	-176.445	-269.802	-271.358	-269.883	-231.844	-234.853	-231.285	-228.749	-231.793	-229.226
04-01	-183.343	-295.057	-297.185	-295.788	-261.041	-264.309	-262.01	-234.854	-240	-236.481
05-01	-188.459	-309.894	-319.213	-318.433	-280.586	-290.985	-288.978	-255.748	-266.635	-264.76
06-01	-192.052	-328.146	-336.741	-336.013	-302.139	-311.36	-309.925	-282.217	-293.042	-292.234
07-01	-194.451	-343.409	-351.29	-349.493	-320.465	-330.59	-329.17	-306.997	-313.568	-312.019
08-01	-196.761	-354.462	-361.066	-360.333	-336.031	-344.536	-343.528	-325.058	-331.564	-330.26
09-01	-199.915	-363.444	-369.903	-370.42	-347.626	-354.894	-354.336	-339.23	-345.384	-345.688
10-01	-202.696	-371.606	-378.164	-377.463	-356.969	-364.428	-363.923	-350.227	-358.633	-356.572
11-01	-206.216	-378.042	-385.08	-384.141	-366.076	-373.483	-372.803	-359.775	-367.023	-366.935
12-01	-206.911	-384.541	-391.004	-389.804	-373.682	-380.571	-379.72	-368.932	-375.797	-375.227
13-01	-210.398	-389.679	-395.12	-395.01	-381.033	-386.612	-387.038	-376.386	-382.083	-381.81
14-01	-145.862	-394.355	-399.146	-398.729	-387.251	-391.457	-354.765	-384.512	-388.461	-323.293
15-01	-150.391	-398.34	-402.863	-401.39	-356.938	-362.865	-361.452	-324.785	-329.199	-331.304
16-01	-157.446	-402.036	-406.289	-405.221	-363.46	-368.93	-370.645	-331.687	-336.864	-339.324
17-01	-161.802	-404.113	-408.251	-408.228	-370.785	-376.15	-376.937	-338.745	-344.909	-346.663
18-01	-164.641	-407.115	-411.387	-409.751	-375.375	-382.57	-381.077	-345.478	-352.148	-353.018
19-01	-166.514	-408.875	-412.83	-412.294	-380.119	-386.577	-384.804	-352.429	-359.212	-360.146
20-01	-170.607	-410.971	-415.457	-413.621	-382.828	-390.297	-388.662	-358.439	-366.221	-367.883
21-01	-172.382	-327.151	-416.557	-414.581	-300.595	-393.7	-391.715	-279.656	-372.306	-374.186
22-01	-173.979	-238.362	-417.444	-416.899	-213.987	-396.532	-394.71	-194.756	-377.418	-381.069
23-01	-176.421	-244.645	-419.345	-417.627	-224.439	-398.905	-398.46	-212.083	-383.882	-385.904
24-01	-178.762	-264.027	-420.259	-418.36	-250.434	-401.235	-400.515	-241.204	-388.639	-390.122
25-01	-181.22	-289.329	-421.081	-419.089	-278.222	-404.569	-402.513	-271.813	-391.882	-393.112
26-01	-183.883	-309.516	-421.942	-421.168	-301.321	-406.503	-405.721	-297.173	-396.333	-397.207
27-01	-185.711	-327.896	-423.195	-422.148	-321.467	-407.82	-407.501	-316.484	-399.73	-400.914
28-01	-188.429	-340.084	-423.696	-422.964	-336.58	-408.976	-409.102	-333.537	-401.496	-403.028
29-01	-191.421	-353.029	-424.357	-423.89	-349.405	-411.52	-411.972	-347.364	-404.767	-406.468
30-01	-194.438	-362.479	-425.149	-425.951	-361.46	-412.696	-413.407	-358.334	-406.514	-408.36
31-01	-129.255	-371.659	-427.147	-426.484	-368.695	-413.948	-378.533	-367.722	-409.504	-354.886
01-02	-132.285	-379.127	-427.8	-426.956	-343.94	-379.401	-378.817	-313.653	-355.059	-353.523
02-02	-138.64	-386.867	-428.515	-427.581	-353.459	-382.433	-383.377	-324.182	-355.296	-358.941
03-02	-145.21	-390.251	-429.145	-429.609	-361.283	-387.268	-387.866	-331.358	-362.366	-364.665
04-02	-151.682	-394.98	-430.909	-430.448	-369.458	-390.647	-391.661	-340.595	-366.496	-370.048
05-02	-156.214	-399.262	-431.659	-431.148	-374.654	-393.97	-394.758	-349.097	-370.123	-374.252
06-02	-160.117	-402.785	-432.439	-432.608	-380.483	-397.141	-396.83	-356.854	-374.601	-377.293
07-02	-162.732	-406.014	-434.239	-433.319	-384.599	-400.231	-399.144	-365.932	-379.943	-381.668
08-02	-165.761	-408.728	-435.158	-434.065	-388.319	-402.88	-401.561	-372.657	-384.525	-385.773
09-02	-169.208	-410.446	-435.885	-434.808	-393.13	-405.217	-403.835	-380.658	-388.558	-390.741
10-02	-173.1	-411.989	-436.601	-436.656	-396.07	-406.145	-405.919	-384.928	-392.204	-393.979
11-02	-174.926	-414.599	-438.257	-437.354	-400.163	-407.889	-407.752	-389.957	-395.279	-398.103
12-02	-177.419	-415.542	-438.9	-437.913	-402.304	-409.485	-409.276	-394.265	-399.228	-400.424
13-02	-180.096	-416.064	-439.506	-438.502	-405.101	-410.981	-410.727	-397.647	-401.548	-403.792
14-02	-116.847	-412.784	-440.015	-440.293	-401.294	-412.212	-377.399	-394.496	-404.898	-340.174
15-02	-124.542	-413.923	-441.753	-441.027	-366.687	-378.431	-380.539	-340.33	-342.082	-345.66
16-02	-131.43	-415.151	-442.477	-441.634	-366.853	-381.294	-385.834	-339.237	-346.115	-352.017
17-02	-138	-416.489	-443.172	-442.011	-372.269	-387.221	-388.554	-346.805	-353.041	-356.519
18-02	-145.651	-417.706	-443.859	-443.879	-377.167	-391.584	-391.647	-353.126	-359.183	-361.35
19-02	-151.543	-419.736	-445.786	-444.525	-380.692	-394.862	-394.531	-357.854	-364.341	-366.835
20-02	-157.681	-420.748	-446.535	-445.161	-383.275	-397.896	-397.314	-363.549	-370.93	-372.58
21-02	-160.932	-421.857	-447.126	-445.774	-387.333	-400.504	-399.851	-369.879	-376.443	-377.599
22-02	-163.76	-422.875	-447.663	-446.311	-390.903	-402.894	-402.025	-375.226	-381.303	-383.089
23-02	-166.498	-425.089	-448.148	-448.053	-394.17	-405.025	-403.97	-381.227	-385.521	-386.78

	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE									
DATE	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
24-02	-168.793	-426.157	-449.437	-448.386	-397.157	-406.126	-405.47	-386.598	-389.539	-391.074
25-02	-172.455	-422.388	-449.978	-448.932	-394.956	-407.737	-407.165	-385.176	-393.796	-395.191
26-02	-174.271	-424.208	-450.404	-450.644	-398.072	-409.144	-408.817	-390.462	-396.375	-397.84
27-02	-177.253	-426.641	-452.036	-451.353	-400.629	-410.472	-410.411	-394.814	-400.113	-401.59
28-02	-111.77	-427.792	-452.586	-451.799	-402.856	-411.719	-375.837	-397.485	-403.19	-338
01-03	-120.917	-428.832	-453.012	-452.416	-369.722	-376.756	-378.483	-335.073	-338.086	-342.091
02-03	-128.133	-429.677	-453.354	-454.148	-372.852	-376.815	-384.108	-340.279	-341.694	-348.83
03-03	-136.921	-430.326	-455.068	-454.848	-377.113	-381.446	-388.657	-343.807	-346.619	-355.546
04-03	-145.877	-432.126	-455.655	-455.402	-380.531	-385.303	-392.043	-348.833	-351.556	-361.025
05-03	-152.889	-432.885	-456.192	-455.986	-384.125	-388.787	-395.333	-354.887	-357.412	-368.084
06-03	-157.741	-433.541	-456.726	-457.682	-387.238	-391.94	-398.164	-361.582	-363.302	-373.859
07-03	-161.282	-434.168	-458.445	-458.019	-390.172	-394.825	-400.155	-367.25	-369.503	-378.229
08-03	-164.822	-436.018	-459.01	-458.434	-391.939	-397.577	-402.157	-372.591	-374.777	-383.463
09-03	-167.36	-436.848	-459.524	-458.904	-394.939	-400.027	-404.107	-378.638	-380.647	-387.119
10-03	-169.304	-437.583	-460.082	-460.557	-397.549	-402.333	-405.945	-383.856	-385.941	-391.888
11-03	-173.087	-438.363	-461.757	-461.126	-400.044	-404.367	-407.622	-387.619	-390.543	-395.965
12-03	-174.59	-439.087	-462.346	-461.623	-402.304	-406.303	-409.138	-392.293	-393.724	-399.572
13-03	-177.29	-440.782	-462.86	-462.119	-404.115	-408.033	-410.547	-396.164	-397.87	-401.791
14-03	-113.614	-441.274	-463.433	-463.7	-406.898	-409.743	-376.054	-398.341	-401.541	-338.346
15-03	-116.055	-441.809	-465.133	-462.748	-371.613	-376.675	-373.283	-335.243	-339.524	-337.003
16-03	-120.464	-442.516	-465.626	-463.371	-373.139	-378.377	-376.828	-338.208	-342.58	-341.475
17-03	-130.001	-444.559	-466.074	-464.064	-378.152	-383.152	-380.998	-343.414	-348.202	-347.296
18-03	-140.08	-445.298	-466.565	-464.639	-382.401	-387.123	-384.45	-349.542	-354.411	-353.289
19-03	-145.059	-445.956	-468.051	-466.283	-386.319	-390.553	-387.284	-355.984	-359.812	-359.997
20-03	-150.798	-445.991	-468.794	-466.861	-388.086	-393.868	-390.333	-361.375	-365.83	-366.034
21-03	-155.801	-441.333	-469.29	-467.421	-383.864	-396.749	-392.107	-359.987	-371.749	-371.612
22-03	-159.863	-441.737	-469.78	-467.851	-385.336	-399.346	-394.817	-363.982	-376.874	-376.182
23-03	-162.082	-443.205	-470.179	-469.444	-388.327	-401.517	-397.119	-370.248	-382.495	-381.567
24-03	-164.072	-444.59	-468.944	-469.876	-391.304	-400.215	-399.189	-376.06	-384.028	-386.117
25-03	-166.541	-446.836	-470.196	-470.319	-392.901	-402.503	-401.155	-381.31	-388.687	-390.384
26-03	-168.339	-447.885	-471.05	-470.877	-395.756	-404.451	-403.166	-385.091	-391.933	-394.464
27-03	-172.484	-448.733	-471.756	-471.494	-398.249	-406.232	-405.164	-389.8	-396.073	-397.194
28-03	-174.224	-449.505	-473.481	-473.256	-400.496	-407.832	-406.948	-392.753	-398.516	-400.905
29-03	-177.084	-450.318	-474.026	-473.809	-403.642	-409.172	-408.553	-396.83	-401.908	-402.978
30-03	-110.957	-451.899	-474.528	-474.179	-405.026	-410.419	-374.624	-398.676	-403.715	-338.596
31-03	-118.125	-452.469	-475.006	-474.53	-369.328	-375.268	-374.506	-333.806	-339.396	-339.851
01-04	-123.796	-453.032	-475.509	-476.179	-369.308	-376.089	-379.305	-335.173	-341.46	-345.505
02-04	-132.34	-453.572	-477.152	-476.751	-372.842	-380.043	-382.939	-340.104	-346.276	-351.399
03-04	-140.876	-455.205	-477.521	-477.173	-376.811	-382.654	-386.016	-344.772	-350.118	-356.502
04-04	-148.361	-456.059	-478.007	-477.71	-380.491	-385.675	-389.39	-350.701	-355.448	-362.306
05-04	-153.055	-456.575	-478.548	-478.024	-383.657	-388.851	-391.931	-357.55	-362.344	-367.934
06-04	-155.553	-456.946	-479.071	-479.332	-385	-391.958	-392.557	-362.933	-368.241	-372.064
07-04	-158.399	-457.409	-480.706	-479.768	-387.874	-394.723	-394.988	-367.998	-373.34	-377.58
08-04	-162.335	-459.02	-481.188	-480.217	-390.501	-395.976	-397.298	-373.763	-377.885	-382.579
09-04	-163.527	-459.54	-477.866	-480.662	-392.976	-393.817	-399.459	-378.921	-378.473	-386.046
10-04	-166.204	-459.969	-479.172	-481.111	-395.213	-396.366	-401.481	-383.517	-383.475	-390.481
11-04	-167.755	-460.305	-480.037	-482.71	-397.119	-398.5	-403.363	-387.541	-387.76	-394.516
12-04	-171.761	-460.754	-481.975	-483.273	-399.106	-400.626	-405.216	-391.488	-390.795	-397.099
13-04	-172.326	-462.458	-482.655	-483.499	-401.041	-402.553	-406.447	-394.031	-394.821	-400.257
14-04	-107.76	-462.924	-476.395	-483.339	-402.722	-396.93	-369.732	-397.543	-389.752	-333.219
15-04	-113.873	-463.369	-477.594	-483.97	-368.003	-360.52	-367.924	-332.277	-334.515	-332.887
16-04	-117.108	-463.9	-478.839	-484.236	-368.032	-361.051	-370.23	-333.789	-332.727	-335.775
17-04	-126.765	-464.497	-477.216	-484.656	-372.223	-359.3	-373.546	-338.421	-331.967	-340.456
18-04	-134.118	-466.339	-478.558	-485.027	-376.362	-362.986	-376.561	-343.98	-336.984	-346.008

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE									
	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
19-04	-141.674	-466.827	-479.948	-485.501	-379.725	-366.075	-378.797	-350.768	-342.886	-353.321
20-04	-147.343	-467.113	-481.252	-487.108	-382.335	-369.198	-382.421	-355.51	-349.609	-359.695
21-04	-152.619	-467.455	-482.352	-487.693	-383.642	-372.527	-384.663	-361.131	-356.323	-366.716
22-04	-157.359	-469.019	-483.196	-488.233	-386.39	-376.517	-388.216	-367.356	-363.074	-372.006
23-04	-159.574	-469.348	-485.032	-488.508	-388.543	-379.854	-390.762	-373.492	-369.669	-377.2
24-04	-161.313	-469.69	-485.769	-488.73	-390.706	-383.142	-392.875	-376.844	-374.061	-381.767
25-04	-161.874	-470.116	-486.523	-488.289	-393.021	-386.425	-393.526	-381.532	-378.197	-384.423
26-04	-162.713	-470.512	-487.261	-488.739	-395.248	-389.548	-395.498	-385.734	-383.374	-388.358
27-04	-163.924	-472.057	-484.064	-490.388	-397.441	-387.712	-397.599	-388.819	-383.216	-390.979
28-04	-166.671	-472.72	-485.001	-490.931	-399.643	-391.158	-400.868	-393.009	-386.805	-394.945
29-04	-167.989	-473.296	-485.988	-491.47	-401.691	-393.259	-402.642	-395.592	-389.314	-397.227
30-04	-111.603	-473.563	-487.883	-491.84	-403.138	-396.379	-366.422	-398.773	-392.82	-331.67
01-05	-110.532	-456.02	-488.635	-492.277	-348.8	-359.965	-366.015	-313.211	-326.939	-334.216
02-05	-118.445	-454.255	-489.415	-492.676	-342.706	-359.687	-368.996	-308.123	-328.09	-336.844
03-05	-128.429	-455.126	-490.037	-494.219	-345.003	-362.699	-371.417	-310.1	-330.172	-340.259
04-05	-135.371	-456.189	-490.667	-494.658	-347.325	-366.454	-374.498	-317.232	-336.787	-346.706
05-05	-141.555	-457.327	-491.302	-495.141	-349.793	-370.343	-377.879	-325.511	-343.025	-351.135
06-05	-99.5357	-458.88	-491.924	-449.54	-354.852	-372.914	-332.799	-335.482	-349.377	-311.312
07-05	-99.5195	-461.63	-492.537	-444.622	-360.546	-375.824	-329.547	-344.127	-356.961	-310.612
08-05	-101.919	-455.803	-494.531	-438.716	-357.94	-379.312	-325.137	-345.394	-363.541	-310.374
09-05	-114.209	-456.378	-494.941	-440.787	-361.605	-382.505	-329.793	-352.497	-369.591	-317.356
10-05	-114.02	-457.944	-481.707	-433.615	-367.113	-371.053	-325.643	-359.817	-360.567	-317.089
11-05	-121.743	-457.941	-470.031	-434.989	-370.268	-360.914	-331.538	-363.902	-352.427	-324.854
12-05	-117.213	-456.683	-452.484	-424.859	-371.069	-345.996	-326.224	-366.402	-336.988	-320.112
13-05	-115.724	-458.151	-447.434	-418.014	-375.562	-342.274	-323.482	-371.317	-335.532	-319.182
14-05	-55.4194	-459.551	-448.305	-419.515	-378.545	-345.445	-290.949	-375.648	-339.544	-267.705
15-05	-80.2241	-460.69	-451.317	-421.165	-342.736	-309.114	-295.036	-311.595	-284.046	-270.308
16-05	-83.1631	-460.73	-453.68	-423.455	-342.043	-311.19	-303.191	-310.108	-283.85	-282.182
17-05	-98.459	-458.15	-451.888	-425.398	-341.536	-312.586	-313.912	-309.187	-289.727	-296.853
18-05	-112.436	-459.137	-429.776	-426.089	-344.032	-295.079	-324.978	-315.775	-276.937	-312.1
19-05	-124.237	-460.316	-430.918	-427.733	-348.676	-304.242	-335.416	-324.066	-289.616	-325.455
20-05	-125.035	-461.708	-433.92	-422.17	-353.553	-314.203	-338.638	-334.02	-303.668	-330.214
21-05	-129.835	-464.197	-434.988	-422.268	-358.888	-323.647	-343.44	-343.566	-316.093	-338.786
22-05	-136.098	-465.406	-415.333	-423.591	-363.434	-311.9	-351.732	-350.685	-306.015	-347.098
23-05	-141.921	-466.433	-377.879	-424.782	-367.367	-282.572	-359.128	-358.082	-278.165	-354.875
24-05	-138.833	-465.878	-377.007	-419.809	-370.381	-288.699	-357.797	-361.846	-284.739	-354.985
25-05	-138.149	-464.893	-377.038	-417.112	-372.484	-295.743	-358.285	-364.942	-294.151	-355.699
26-05	-140.598	-464.399	-379.217	-417.184	-373.668	-308.31	-362.463	-368.983	-306.24	-360.179
27-05	-143.466	-455.946	-381.586	-419.037	-368.145	-319.599	-365.899	-363.689	-318.786	-365.028
28-05	-146.081	-450.145	-365.241	-420.758	-363.674	-314.094	-370.42	-359.631	-313.209	-368.265
29-05	-140.265	-447.153	-365.593	-411.95	-363.203	-322.495	-364.037	-359.622	-321.761	-363.448
30-05	-58.2505	-447.736	-367.891	-397.889	-364.919	-331.724	-313.271	-362.807	-331.057	-282.13
31-05	-72.3316	-448.881	-369.481	-398.514	-328.284	-301.922	-311.955	-305.979	-280.579	-285.202
01-06	-80.4463	-450.509	-370.793	-399.004	-328.572	-305.103	-314.233	-305.133	-283.559	-286.244
02-06	-92.1123	-452.306	-358.772	-396.772	-333.241	-299.222	-317.038	-309.349	-278.354	-295.242
03-06	-106.151	-420.04	-360.036	-397.451	-303.624	-306.866	-325.808	-284.283	-290.295	-308.649
04-06	-115.754	-421.048	-364.151	-397.626	-308.11	-316.592	-331.177	-293.065	-303.357	-317.68
05-06	-124.603	-423.092	-362.9	-397.977	-315.747	-321.038	-338.19	-303.721	-311.361	-327.89
06-06	-130.576	-424.939	-351.033	-398.787	-324.567	-317.292	-346.438	-315.879	-309.168	-337.808
07-06	-137.075	-425.112	-339.444	-399.488	-331.02	-310.295	-352.631	-325.132	-304.967	-346.614
08-06	-134.759	-404.548	-327.214	-394.219	-317.52	-303.876	-351.397	-312.013	-298.838	-346.75
09-06	-136.065	-395.454	-312.264	-391.964	-314.81	-292.395	-355.187	-312.018	-289.293	-349.7
10-06	-135.388	-386.636	-314.219	-389.835	-313.617	-298.94	-356.097	-308.721	-296.171	-352.597
11-06	-137.211	-383.203	-319.858	-390.092	-315.642	-308.605	-358.127	-311.539	-306.262	-356.058

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE									
	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
12-06	-139.548	-381.737	-328.241	-388.788	-319.641	-317.785	-361.044	-317.219	-316.678	-357.852
13-06	-142.528	-365.621	-334.552	-390.923	-309.626	-327.453	-364.654	-308.483	-326.276	-363.076
14-06	-78.9839	-357.692	-342.156	-392.028	-307.615	-337.633	-330.93	-306.466	-336.562	-299.474
15-06	-92.4326	-348.908	-349.081	-393.25	-266.578	-307.023	-330.384	-237.677	-278.199	-301.229
16-06	-95.1524	-328.185	-356.448	-394.976	-248.838	-310.854	-334.762	-234.858	-287.048	-304.572
17-06	-102.426	-328.043	-362.05	-390.229	-259.297	-319.348	-333.876	-234.625	-289.204	-307.45
18-06	-114.053	-320.269	-367.638	-391.949	-266.591	-327.306	-338.556	-245.518	-300.984	-317.143
19-06	-121.229	-323.995	-372.232	-391.991	-281.773	-334.43	-343.378	-267.361	-314.051	-325.281
20-06	-129.818	-329.694	-374.547	-393.58	-297.982	-340.058	-349.243	-285.888	-324.523	-335.145
21-06	-136.298	-334.348	-376.862	-394.32	-312.965	-345.452	-354.904	-302.547	-334.271	-345.239
22-06	-141.727	-342.583	-379.444	-396.073	-325.384	-351.793	-361.253	-318.18	-343.14	-352.954
23-06	-146.133	-348.547	-363.626	-397.346	-334.71	-339.199	-366.384	-328.697	-331.374	-359.811
24-06	-147.72	-340.701	-363.583	-396.321	-329.961	-341.048	-368.715	-326.482	-334.931	-362.814
25-06	-150.427	-339.351	-356.459	-397.558	-330.56	-336.927	-371.935	-327.424	-331.491	-368.955
26-06	-152.993	-344.939	-357.331	-398.839	-337.928	-339.741	-376.417	-334.112	-334.969	-372.239
27-06	-154.564	-349.472	-359.246	-398.988	-344.269	-343.781	-380.503	-342.227	-339.542	-376.906
28-06	-157.223	-345.578	-362.244	-400.45	-342.035	-348.705	-383.234	-338.994	-344.916	-381.156
29-06	-151.864	-347.04	-365.44	-395.515	-342.549	-353.493	-380.662	-341.219	-351.329	-377.465
30-06	-143.704	-351.102	-367.22	-387.241	-348.552	-357.846	-373.328	-347.194	-355.856	-371.814
01-07	-139.346	-347.687	-369.928	-381.592	-345.327	-361.418	-368.588	-344.157	-359.722	-367.105
02-07	-136.886	-351.996	-371.913	-379.247	-351.007	-365.415	-368.354	-349.98	-363.886	-367.014
03-07	-131.65	-349.585	-374.77	-373.349	-347.48	-368.826	-363.09	-346.509	-368.714	-361.861
04-07	-132.748	-347	-377.833	-372.423	-345.209	-373.658	-362.921	-345.474	-373.383	-361.8
05-07	-137.061	-344.442	-378.693	-374.403	-342.848	-375.834	-365.715	-343.066	-374.613	-364.705
06-07	-140.737	-340.385	-356.708	-375.718	-338.95	-352.924	-369.054	-339.161	-352.922	-368.16
07-07	-139.316	-343.819	-356.644	-372.419	-342.509	-353.291	-366.622	-342.713	-353.214	-365.82
08-07	-125.12	-348.347	-326.386	-355.44	-347.207	-324.605	-350.103	-347.378	-323.281	-350.601
09-07	-124.703	-342.595	-308.156	-353.9	-342.843	-305.52	-349.104	-341.876	-305.493	-349.496
10-07	-128.154	-346.373	-306.737	-356.443	-346.51	-306.681	-352.192	-345.725	-305.635	-351.266
11-07	-132.447	-351.32	-307.424	-357.174	-351.453	-305.048	-353.379	-350.764	-305.634	-352.745
12-07	-128.198	-355.866	-301.808	-350.296	-355.991	-301.019	-347.155	-355.351	-300.181	-347.583
13-07	-132.681	-354.885	-306.081	-353.154	-354.998	-305.171	-351.379	-354.413	-305.6	-350.6
14-07	-137.307	-355.521	-305.075	-356.975	-355.626	-304.265	-355.347	-356.077	-304.582	-354.761
15-07	-141.418	-319.33	-311.395	-360.973	-319.423	-310.681	-359.536	-319.92	-310.943	-359
16-07	-145.197	-308.119	-315.726	-364.729	-308.102	-315.082	-363.438	-307.359	-315.326	-362.942
17-07	-148.431	-311.86	-324.882	-368.45	-310.793	-324.337	-367.291	-311.521	-324.473	-366.835
18-07	-150.415	-316.038	-326.735	-371.937	-316.35	-327.2	-370.893	-316.598	-326.311	-370.474
19-07	-153.527	-319.338	-326.029	-375.311	-319.552	-326.491	-374.367	-319.143	-326.669	-375.15
20-07	-155.905	-304.23	-292.442	-378.225	-304.417	-291.647	-377.368	-304.116	-291.745	-378.047
21-07	-148.387	-310.373	-288.435	-373.573	-309.394	-289.115	-372.925	-310.25	-288.003	-372.235
22-07	-150.246	-303.481	-295.21	-376.275	-303.886	-294.86	-375.662	-303.378	-294.879	-376.37
23-07	-152.205	-306.034	-305.614	-380.088	-306.292	-306.526	-379.634	-307.027	-305.787	-378.956
24-07	-153.802	-313.563	-305.741	-382.465	-313.811	-305.348	-382.009	-313.137	-306.975	-382.707
25-07	-156.674	-317.033	-293.554	-385.178	-316.027	-293.41	-385.893	-316.761	-293.582	-385.31
26-07	-158.317	-322.252	-299.961	-387.64	-321.458	-298.816	-388.261	-322.021	-299.069	-387.755
27-07	-159.494	-320.839	-305.753	-390.968	-321.313	-304.851	-390.294	-320.594	-305.114	-390.967
28-07	-155.139	-328.501	-310.215	-387.493	-328.843	-310.598	-386.965	-328.233	-310.844	-387.524
29-07	-155.188	-336.407	-293.157	-388.157	-336.65	-293.413	-387.679	-336.13	-293.616	-388.195
30-07	-142.43	-344.178	-300.823	-375.663	-344.351	-301.028	-376.403	-343.966	-300.039	-375.7
31-07	-140.884	-351.201	-308.628	-373.834	-351.338	-307.785	-374.447	-351.094	-308.042	-373.867
01-08	-143.053	-355.053	-317.911	-377.191	-355.162	-317.121	-376.628	-355.019	-317.373	-376.094
02-08	-146.087	-345.738	-327.03	-379.244	-345.828	-327.4	-378.763	-345.745	-326.526	-378.275
03-08	-135.814	-349.913	-336.161	-368.342	-349.983	-336.396	-367.893	-350.885	-336.745	-367.445
04-08	-130.187	-356.029	-345.358	-362.481	-356.089	-345.592	-362.068	-356.763	-344.854	-361.658

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE									
	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
05-08	-131.768	-361.873	-353.633	-363.039	-361.91	-353.699	-362.663	-361.351	-353.367	-362.295
06-08	-125.675	-365.592	-360.982	-354.313	-365.626	-361.129	-355.194	-366.193	-361.034	-354.864
07-08	-128.237	-360.597	-367.077	-355.639	-360.628	-367.155	-355.093	-361.221	-366.951	-356.067
08-08	-131.108	-356.766	-372.869	-355.91	-356.789	-372.825	-355.612	-356.123	-373.711	-356.295
09-08	-103.929	-352.101	-351.992	-325.225	-352.122	-351.943	-326.15	-352.767	-352.642	-325.558
10-08	-108.618	-355.982	-352.318	-327.698	-356	-352.28	-328.422	-356.537	-352.713	-328.001
11-08	-111.918	-361.229	-354.895	-326.45	-361.238	-354.866	-326.033	-360.499	-354.185	-326.651
12-08	-119.427	-364.923	-350.975	-330.036	-364.933	-350.947	-329.741	-364.34	-351.634	-330.195
13-08	-124.608	-368.132	-341.22	-333.078	-368.141	-341.196	-332.814	-367.599	-341.757	-333.238
14-08	-116.584	-370.83	-345.742	-324.632	-370.839	-345.72	-324.397	-370.342	-346.213	-324.774
15-08	-108.532	-374.319	-350.518	-317.573	-374.325	-350.498	-317.365	-373.876	-349.664	-317.7
16-08	-115.762	-377.968	-354.5	-323.396	-377.974	-354.5	-323.206	-377.566	-353.857	-323.51
17-08	-124.373	-380.48	-351.444	-330.792	-380.484	-351.443	-330.619	-380.114	-350.811	-330.896
18-08	-131.273	-382.185	-356.08	-338.27	-382.189	-356.079	-338.113	-382.994	-355.492	-338.367
19-08	-136.752	-376.289	-359.694	-344.634	-376.293	-359.694	-344.495	-376.986	-359.167	-344.719
20-08	-141.969	-378.619	-353.285	-350.521	-378.614	-353.285	-350.398	-378.085	-352.792	-350.599
21-08	-147.043	-381.627	-356.271	-357.501	-381.623	-356.271	-357.466	-382.211	-356.995	-357.582
22-08	-150.262	-383.706	-355.064	-363.576	-383.702	-355.064	-363.546	-384.293	-355.708	-363.752
23-08	-153.864	-346.453	-356.752	-368.588	-346.452	-356.747	-369.52	-345.881	-356.121	-368.704
24-08	-140.158	-349.162	-353.796	-358.364	-349.161	-353.791	-358.967	-348.673	-353.307	-358.49
25-08	-143.545	-352.674	-355.75	-363.772	-352.673	-355.746	-363.18	-352.226	-356.528	-363.809
26-08	-146.785	-356.472	-354.081	-368.815	-356.471	-354.076	-368.436	-356.038	-354.721	-367.711
27-08	-149.478	-359.078	-358.693	-372.141	-359.077	-358.689	-372.938	-359.966	-359.27	-372.44
28-08	-151.601	-361.817	-363.219	-376.548	-361.817	-363.215	-376.053	-361.384	-363.742	-375.562
29-08	-147.662	-361.068	-366.06	-373.651	-361.067	-366.057	-373.262	-360.767	-366.533	-374.025
30-08	-139.932	-364.288	-369.284	-366.597	-364.287	-369.282	-367.423	-364.014	-369.724	-366.854
31-08	-79.9531	-366.407	-372.551	-370.596	-366.406	-372.549	-331.037	-366.156	-372.956	-310.09
01-09	-91.7749	-369.337	-376.913	-372.997	-330.464	-338.412	-330.335	-300.507	-307.854	-308.451
02-09	-96.1914	-370.605	-377.22	-375.614	-328.626	-335.508	-333.97	-301.043	-306.417	-312.212
03-09	-106.886	-375.224	-348.545	-377.147	-333.598	-308.306	-336.977	-305.212	-277.232	-319.227
04-09	-118.352	-377.265	-347.697	-379.96	-337.663	-306.43	-343.659	-312.728	-281.814	-327.244
05-09	-123.069	-381.477	-353.013	-376.946	-344.19	-313.769	-343.244	-322.831	-293.532	-333.031
06-09	-115.182	-384.503	-337.997	-364.796	-351.173	-303.998	-334.394	-333.307	-287.751	-324.986
07-09	-119.77	-387.269	-335.794	-364.476	-357.197	-307.709	-338.032	-343.226	-295.363	-330.756
08-09	-124.807	-390.984	-340.184	-367.471	-362.536	-317.077	-342.467	-352.902	-306.993	-337.023
09-09	-125.397	-393.859	-342.25	-363.745	-369.42	-323.053	-342.96	-361.324	-316.207	-337.69
10-09	-127.55	-396.558	-347.315	-361.951	-375.422	-332.387	-343.262	-368.993	-327.184	-338.681
11-09	-132.307	-398.852	-353.429	-364.046	-380.712	-341.061	-348.68	-375.105	-337.37	-345.709
12-09	-135.585	-400.961	-352.764	-365.585	-384.433	-343.724	-351.814	-381.579	-339.301	-349.125
13-09	-139.227	-403.8	-355.282	-367.979	-388.788	-348.054	-356.845	-384.649	-345.273	-354.694
14-09	-81.5195	-403.793	-359.629	-371.344	-391.125	-353.953	-322.485	-387.607	-351.618	-291.813
15-09	-92.749	-366.991	-364.899	-372.259	-315.996	-321.192	-322.852	-284.689	-291.352	-295.385
16-09	-97.042	-355.213	-369.693	-375.094	-303.01	-323.844	-328.653	-274.69	-296.945	-298.129
17-09	-108.816	-356.96	-374.838	-378.056	-306.277	-331.596	-334.378	-278.001	-301.613	-308.259
18-09	-119.407	-359.441	-377.469	-380.422	-313.539	-336.831	-339.355	-289.378	-311.053	-319.002
19-09	-128.343	-363.644	-378.218	-382.939	-324.246	-340.868	-346.053	-305.821	-319.568	-329.788
20-09	-136.911	-366.303	-381.086	-387.31	-332.933	-346.288	-353.996	-320.342	-329.182	-341.18
21-09	-143.489	-365.576	-383.717	-389.986	-337.946	-352.266	-360.946	-327.929	-339.919	-351.114
22-09	-134.156	-358.282	-387.825	-378.301	-336.942	-359.309	-352.904	-328.438	-349.806	-344.756
23-09	-135.154	-355.251	-390.603	-379.242	-336.976	-365.98	-356.862	-331.272	-358.035	-349.513
24-09	-136.727	-339.537	-393.806	-379.269	-325.472	-373.522	-358.429	-319.905	-365.429	-354.894
25-09	-140.1	-341.876	-396.385	-380.439	-330.354	-377.696	-362.303	-326.579	-373.822	-358.041
26-09	-145.008	-346.724	-399.806	-384.032	-337.639	-382.764	-367.543	-334.253	-377.966	-363.739
27-09	-148.845	-351.957	-401.526	-386.297	-345.105	-387.171	-372.349	-342.118	-382.844	-369.024

	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE									
DATE	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
28-09	-151.719	-357.99	-403.245	-388.082	-351.955	-390.039	-375.302	-349.298	-387.341	-373.423
29-09	-130.798	-364.426	-404.699	-366.813	-359.087	-393.938	-355.118	-356.704	-390.068	-353.328
30-09	-59.5972	-370.372	-407.258	-363.414	-365.651	-396.083	-314.725	-364.648	-394.017	-282.188
01-10	-80.0391	-374.972	-408.536	-364.644	-334.069	-362.308	-313.778	-312.769	-329.406	-286.867
02-10	-81.9321	-378.972	-409.847	-365.728	-337.121	-362.946	-315.694	-314.92	-333.186	-287.573
03-10	-96.4917	-383.504	-411.051	-369.949	-342.125	-368.546	-324.046	-320.756	-336.442	-301.025
04-10	-114.626	-373.495	-408.855	-374.7	-333.68	-367.999	-333.137	-313.044	-338.123	-316.896
05-10	-125.877	-356.944	-410.023	-377.846	-318.776	-369.898	-343.52	-301.42	-342.168	-329.578
06-10	-137.095	-361.863	-409.018	-381.951	-324.75	-369.937	-352.314	-311.108	-345.769	-341.51
07-10	-145.299	-364.325	-410.244	-386.001	-330.8	-373.545	-361.657	-319.177	-352.099	-352.516
08-10	-150.343	-369.706	-411.627	-388.586	-339.589	-377.419	-367.481	-329.419	-359.372	-361.272
09-10	-152.91	-374.651	-411.663	-391.006	-347.285	-378.095	-374.29	-340.272	-364.47	-368.259
10-10	-157.058	-378.38	-412.697	-393.588	-354.179	-381.384	-379.483	-348.875	-370.057	-375.215
11-10	-159.12	-381.752	-402.576	-395.698	-361.384	-373.101	-383.935	-357.592	-363.96	-380.85
12-10	-160.927	-385.641	-405.244	-397.274	-368.653	-376.482	-387.662	-364.828	-368.14	-384.87
13-10	-162.128	-389.37	-408.156	-400.567	-376.267	-382.437	-391.71	-373.047	-374.885	-389.143
14-10	-106.391	-392.613	-411.219	-402.217	-381.843	-387.247	-356.313	-380.029	-380.397	-324.336
15-10	-104.173	-396.768	-412.723	-403.705	-350.164	-351.948	-357.221	-318.906	-326.678	-326.806
16-10	-116.445	-399.246	-412.927	-406.731	-352.881	-351.612	-362.189	-323.377	-325.295	-331.637
17-10	-126.765	-399.817	-407.697	-408.185	-356.69	-347.979	-367.132	-324.059	-323.17	-337.89
18-10	-136.937	-402.982	-381.873	-409.715	-362.111	-324.625	-372.518	-333.306	-300.737	-345.684
19-10	-145.522	-404.811	-384.813	-411.03	-367.537	-328.596	-377.362	-340.805	-307.696	-353.927
20-10	-151.054	-406.605	-390.086	-411.937	-372.969	-335.201	-380.992	-349.572	-318.14	-361.131
21-10	-145.254	-408.361	-393.817	-405.494	-378.298	-343.163	-375.287	-358.625	-328.165	-358.495
22-10	-143.455	-411.182	-397.455	-399.935	-383.145	-349.837	-371.781	-367.83	-339.842	-357.888
23-10	-146.997	-411.889	-400.814	-402.029	-386.275	-358.905	-375.882	-373.588	-350.706	-364.526
24-10	-150.792	-412.19	-402.847	-404.35	-388.467	-366.845	-379.881	-379.208	-360.417	-370.656
25-10	-154.63	-407.767	-405.05	-407.034	-387.034	-373.481	-384.245	-377.252	-368.488	-375.806
26-10	-157.696	-409.545	-407.289	-408.553	-390.221	-378.54	-387.06	-382.564	-374.899	-380.759
27-10	-159.828	-412.283	-409.338	-411.63	-393.302	-385.246	-390.316	-387.506	-381.967	-385.647
28-10	-163.109	-413.504	-410.989	-413.343	-397.061	-389.779	-394.731	-390.403	-386.861	-389.209
29-10	-166.459	-414.805	-412.518	-414.926	-399.496	-392.968	-397.572	-394.898	-391.336	-393.801
30-10	-168.771	-416.003	-406.13	-416.361	-401.799	-389.144	-400.186	-398.574	-387.623	-396.752
31-10	-104.21	-417.382	-403.721	-417.66	-405.421	-388.851	-366.658	-401.32	-387.364	-334.151
01-11	-114.391	-417.966	-401.031	-418.845	-369.125	-348.442	-369.924	-335.867	-317.092	-337.342
02-11	-120.169	-419.903	-403.22	-421.126	-369.04	-349.936	-375.453	-336.892	-319.281	-343.028
03-11	-129.552	-420.632	-405.745	-421.888	-372.216	-354.963	-378.445	-340.114	-324.553	-347.563
04-11	-135.026	-420.717	-408.679	-421.88	-374.452	-360.775	-379.973	-342.905	-332.958	-352.212
05-11	-142.958	-420.771	-411.343	-422.901	-376.882	-366.828	-383.806	-348.726	-342.489	-358.066
06-11	-151.169	-421.494	-412.243	-423.89	-380.818	-370.041	-386.431	-356.092	-349.703	-364.863
07-11	-155.672	-423.56	-411.928	-424.904	-384.7	-372.923	-390.473	-362.692	-355.821	-372.241
08-11	-159.627	-424.64	-409.352	-425.806	-388.875	-373.053	-393.86	-369.203	-359.925	-377.416
09-11	-164.181	-425.823	-410.354	-426.766	-391.643	-376.362	-396.958	-376.534	-365.553	-383.531
10-11	-167.339	-427.079	-412.197	-428.876	-395.49	-380.838	-399.771	-381.791	-372.478	-388.704
11-11	-170.891	-428.684	-413.749	-429.862	-397.867	-384.815	-402.317	-386.789	-379.269	-393.443
12-11	-175.216	-429.536	-415.234	-430.796	-400.361	-389.752	-404.695	-391.47	-384.371	-397.787
13-11	-177.335	-430.39	-416.805	-431.674	-402.698	-393.157	-408.031	-395.764	-388.419	-400.546
14-11	-111.844	-431.076	-418.322	-433.16	-405.859	-397.582	-373.089	-398.31	-393.305	-347.352
15-11	-119.332	-431.83	-420.772	-433.952	-371.922	-364.56	-374.34	-336.43	-331.069	-347.137
16-11	-124.535	-433.79	-421.803	-434.479	-374.254	-367.273	-378.396	-340.062	-335.236	-352.455
17-11	-133.391	-434.628	-422.889	-435.05	-380.134	-372.789	-381.967	-346.955	-341.076	-357.771
18-11	-140.752	-435.516	-424.015	-435.799	-385.629	-378.04	-386.221	-352.769	-347.001	-363.794
19-11	-121.095	-436.345	-424.787	-412.225	-390.293	-381.916	-362.859	-361.797	-354.296	-341.668
20-11	-128.518	-438.095	-425.843	-415.642	-393.801	-386.446	-367.223	-368.716	-361.083	-348.273

DATE	UNSATURATED ZONE DEFICIT/RECHARGE AND DISCHARGE									
	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
21-11	-135.981	-438.503	-428.114	-419.017	-396.332	-390.745	-372.327	-373.933	-368.373	-355.448
22-11	-143.937	-438.869	-429.105	-421.984	-398.552	-394.273	-376.912	-378.366	-375.707	-361.956
23-11	-149.891	-439.232	-429.908	-425.494	-400.559	-397.242	-379.709	-383.459	-381.781	-367.66
24-11	-153.064	-440.966	-430.662	-426.602	-402.719	-399.871	-382.58	-388.35	-387.033	-371.706
25-11	-157.873	-441.609	-429.533	-429.144	-404.675	-400.051	-387.004	-391.613	-389.486	-377.212
26-11	-163.419	-442.01	-430.806	-430.969	-406.193	-401.294	-390.738	-395.516	-392.612	-381.908
27-11	-165.786	-439.625	-429.618	-432.709	-404.95	-400.929	-394.2	-395.939	-393.032	-387.394
28-11	-170.074	-442.302	-430.521	-434.315	-406.976	-402.673	-397.326	-398.629	-396.678	-391.14
29-11	-174.29	-443.347	-431.299	-435.799	-408.642	-405.528	-400.147	-402.31	-398.772	-395.736
30-11	-102.37	-444.364	-433.144	-433.007	-411.644	-406.915	-360.307	-404.542	-402.078	-326.649
01-12	-93.5298	-445.295	-434.272	-418.681	-378.481	-372.765	-342.421	-342.277	-337.371	-310.422
02-12	-99.3125	-446.013	-435.306	-422.849	-380.739	-374.832	-347.984	-345.681	-341.787	-316.569
03-12	-111.307	-448.008	-436.168	-424.748	-386.27	-379.721	-351.856	-353.141	-347.846	-322.631
04-12	-105.201	-448.648	-437.149	-409.387	-390.213	-385.688	-339.013	-358.215	-353.222	-312.961
05-12	-115.954	-449.307	-439.277	-412.89	-393.907	-390.107	-344.944	-363.515	-359.964	-323.462
06-12	-128.405	-449.861	-440.262	-416.267	-397.003	-392.919	-351.208	-367.768	-366.757	-333.349
07-12	-138.211	-451.788	-440.959	-419.248	-400.013	-395.888	-357.096	-374.117	-373.006	-343.378
08-12	-144.889	-452.256	-441.655	-422.89	-402.182	-398.75	-364.555	-380.156	-378.158	-354.342
09-12	-151.47	-452.704	-442.397	-425.927	-404.106	-401.353	-370.799	-385.368	-384.083	-362.694
10-12	-158.111	-450.285	-444.526	-428.577	-402.718	-403.791	-376.381	-385.635	-389.352	-370.293
11-12	-162.847	-447.801	-445.372	-430.935	-399.787	-406.098	-382.777	-385.257	-394.163	-377.099
12-12	-166.232	-448.91	-445.965	-432.955	-400.359	-407.884	-388.147	-387.918	-398.134	-384.048
13-12	-169.546	-449.885	-446.417	-434.79	-402.102	-409.402	-392.873	-391.765	-400.518	-389.208
14-12	-107.553	-451.433	-446.779	-436.439	-404.338	-410.665	-361.1	-395.783	-403.802	-329.208
15-12	-116.477	-453.856	-447.344	-437.982	-370.365	-374.99	-366.474	-331.664	-339.233	-335.297
16-12	-123.872	-454.944	-447.42	-439.362	-372.143	-373.793	-373.077	-336.675	-339.231	-342.386
17-12	-134.391	-456.032	-448.168	-440.57	-378.123	-380.82	-379.608	-342.354	-346.089	-349.482
18-12	-142.066	-457.103	-448.787	-441.527	-384.843	-385.555	-383.765	-350.305	-351.865	-355.229
19-12	-147.163	-458.072	-450.473	-440.37	-389.561	-389.214	-385.117	-357.281	-358.009	-360.064
20-12	-152.869	-459.976	-448.398	-441.65	-391.928	-389.134	-388.975	-364.976	-361.768	-366.649
21-12	-157.633	-460.596	-446.954	-443.816	-395.122	-388.156	-392.265	-371.103	-363.811	-373.589
22-12	-162.313	-461.034	-448.471	-444.88	-397.601	-391.815	-395.415	-377.272	-370.059	-380.807
23-12	-165.561	-461.742	-450.853	-445.939	-399	-395.241	-398.366	-383.086	-376.818	-385.058
24-12	-168.618	-462.031	-447.884	-446.831	-401.025	-393.766	-400.915	-387.584	-378.234	-390.105
25-12	-171.81	-464.018	-447.143	-447.694	-403.41	-394.288	-403.249	-392.272	-381.253	-394.576
26-12	-176.082	-464.655	-449.025	-449.702	-405.436	-397.435	-405.426	-395.407	-385.505	-398.544
27-12	-179.073	-465.466	-451.65	-450.599	-408.864	-400.216	-408.602	-399.782	-390.657	-401.19
28-12	-181.464	-465.933	-450.364	-451.118	-410.215	-399.925	-409.844	-403.126	-392.268	-404.373
29-12	-184.216	-467.667	-449.555	-451.745	-411.696	-399.985	-411.198	-405.189	-392.962	-406.166
30-12	-187.268	-468.2	-451.434	-452.405	-412.849	-402.767	-413.743	-408.132	-396.396	-409.145
31-12	-190.374	-468.687	-452.852	-454.29	-415.117	-405.097	-414.869	-409.521	-400.541	-410.697

APPENDIX 3
(EXCHANGE BETWEEN UNSATURATED AND SATURATED ZONE)

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
01-01									
02-01	-0.01136	-0.01135	-0.01139	-0.01887	-0.01722	-0.0179	-0.1697	-0.10446	-0.1712
03-01	-0.01685	-0.01654	-0.01693	-0.50866	-0.40968	-0.49217	-1.66698	-1.63021	-1.7012
04-01	-0.00915	-0.00675	-0.00816	-0.43309	-0.406	-0.35979	-0.35642	-0.3846	-0.35384
05-01	-0.05648	0.00338	8.26E-04	-0.19633	-0.12252	-0.18692	-0.10813	-0.09867	-0.09877
06-01	0.00477	0.01226	0.00944	-0.03246	-0.02167	-0.01648	-0.02005	-0.00293	-4.57E-04
07-01	0.00525	0.01968	0.01775	-0.07313	-0.00149	-4.17E-04	-0.00578	0.01565	0.01744
08-01	0.00802	0.02563	0.02401	-9.12E-04	0.01298	0.01359	0.00651	0.02943	0.02982
09-01	0.01263	0.08752	0.02864	0.00758	0.02363	0.02402	0.01718	0.09325	0.08897
10-01	0.07481	0.02943	0.0873	0.01515	0.03076	0.08659	0.02523	0.04122	0.09504
11-01	0.01804	0.08712	0.09011	0.08372	0.08703	0.03159	0.02999	0.09487	0.1769
12-01	0.02365	0.03326	0.0299	0.01517	0.03798	0.08968	0.08629	0.15257	-0.03438
13-01	0.0821	0.08969	0.08986	0.02917	0.09571	0.03875	0.03828	0.04071	0.15095
14-01	0.02859	0.09025	0.0333	0.08654	0.15943	0.09178	0.1007	0.10203	-0.00963
15-01	0.08576	0.03303	0.08755	0.08821	0.02589	-0.05554	-0.01466	0.02386	-1.54916
16-01	0.09433	0.08781	0.03486	-0.14387	-0.02667	-0.21592	-1.44864	-1.08712	-0.15492
17-01	0.02679	0.03673	0.08666	-0.28669	-0.19696	-0.09927	-0.15177	-0.23623	-0.00499
18-01	0.0884	0.09331	0.09668	-0.04328	-0.10008	-0.01184	-0.00796	-0.01263	0.02093
19-01	0.03428	0.02979	0.03035	-0.06773	-0.01104	0.00437	0.01499	0.01388	0.03488
20-01	0.0886	0.14956	0.14805	0.005	0.00535	0.01548	0.02879	0.02978	0.09878
21-01	0.02786	0.03328	0.02687	-0.4374	0.01853	0.02421	-1.59877	0.09317	0.15822
22-01	-3.90665	0.09677	0.03163	-5.68191	0.02831	0.08706	-7.44509	0.09976	0.03592
23-01	-1.92481	0.0299	0.09013	-0.86009	0.09023	0.02921		0.1031	0.10528
24-01	-0.10024	0.08746	0.02904	0.02205	0.03465	0.08794		0.10183	0.03963
25-01	0.011	0.03108	0.08719	0.17138	0.1461	0.03455	1.24337	0.04235	0.09551
26-01	0.09193	0.08725	0.02833	0.30863	0.03131	0.09115	0.52984	0.10124	0.09556
27-01	0.11379	0.03041	0.08596	0.20907	0.03391	0.03628	0.46321	0.09027	0.09748
28-01	0.11202	0.08471	0.02814	0.20464	0.08582	0.14622	0.35807	0.03324	0.10444
29-01	0.11231	0.02765	0.0843	0.29938	0.09545	0.03317	0.35973	0.09984	0.10451
30-01	0.1243	0.08438	0.02865	0.20582	0.02424	0.10302	0.28183	0.10322	0.04005
31-01	0.18178	0.02854	0.08592	0.20972	0.08996	0.02523	0.37337	0.15969	-0.10311
01-02	0.0551	0.08482	0.02991	-0.47804	0.03162	-0.03291	-3.86943	-0.1238	-1.63212
02-02	0.17727	0.02883	0.08357	-0.58494	0.0342	-0.21735		-1.59957	-0.12871
03-02	0.12545	0.08197	0.08955	0.04736	-0.21581	-0.1146		-0.08724	-0.0029
04-02	0.11672	0.02955	0.02088	0.20344	-0.11472	-0.08045	1.66152	-0.06431	0.02045
05-02	0.12016	0.08007	0.08917	0.33887	-0.02446	-0.00326	0.44244	0.01336	0.10051
06-02	0.11467	0.02956	0.02129	0.19793	-0.01453	0.00881	0.36722	0.08934	0.03744
07-02	0.11505	0.08007	0.03064	0.20754	0.00286	0.01797	0.36768	0.03293	0.10191
08-02	0.10821	0.02997	0.08211	0.20621	0.01344	0.02426	0.36248	0.10199	0.10223
09-02	0.11251	0.08837	0.03009	0.1513	0.0224	0.08491	0.2838	0.11275	0.10583
10-02	0.11602	0.02888	0.08728	0.21073	0.02879	0.03108	0.36826	0.16856	0.10594
11-02	0.05554	0.14737	0.02834	0.15726	0.08926	0.14406	0.31091	0.05109	0.1098
12-02	0.16427	0.0198	0.14671	0.19674	0.09869	0.03306	0.21317	0.10834	0.10904
13-02	0.11783	0.0272	0.01876	0.18282	0.02601	0.10307	0.29003	0.10808	0.11343
14-02	0.02865	0.02882	0.02615	0.10204	0.08888	0.02463	0.04026	0.10607	-0.40804
15-02	0.02376	0.08484	0.02775	-0.61239	0.0333	-0.02413	-4.8367	-0.18925	-1.51821
16-02	0.02532	0.02697	0.0863	-0.87285	0.04452	-0.14361	-0.04261	-1.62604	-0.01925
17-02	0.02983	0.08219	0.02563	-0.00237	-0.1933	-0.15997	1.0625	-0.0371	0.01772
18-02	0.09153	0.02598	0.08349	0.04781	-0.10839	-0.01926	0.52567	0.01437	0.03434
19-02	0.03779	0.08113	0.02472	0.17306	-0.01762	-0.0047	0.34446	0.03929	0.1041
20-02	0.09528	0.02597	0.08358	0.12965	-0.00359	0.00599	0.2714	0.16289	0.11304
21-02	0.09839	0.08172	0.02335	0.19431	0.00887	0.01508	0.36586	0.11644	0.11914
22-02	0.1016	0.02569	0.08396	0.14695	0.01868	0.02224	0.36873	0.11039	0.18032

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
	S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
23-02	0.10129	0.08613	0.02113	0.20041	0.02572	0.14496	0.36158	0.11123	0.05274
24-02	0.1067	0.02505	0.02521	0.2621	0.08652	0.02539	0.28607	0.11481	0.16239
25-02	0.03281	0.0817	0.08122	0.04218	0.09253	0.03015	0.14276	0.10355	0.1021
26-02	0.07844	0.02453	0.02485	0.15801	0.022	0.09072	0.16961	0.10019	0.10962
27-02	0.02718	0.08319	0.07981	0.19312	0.08962	0.02996	0.29553	0.09969	0.10781
28-02	0.09257	0.02178	0.02392	0.05311	0.02892	0.08787	0.2043	0.10172	-0.70489
01-03	0.0414	0.02561	0.08121	-0.22255	0.08681	-0.02899	-3.60716	-0.43077	-1.41274
02-03	0.09759	0.0765	0.02242	-0.7741	-0.02176	-0.20701	-0.27886	-1.54996	6.53E-04
03-03	0.15412	0.02449	0.02521	-0.00898	-0.22203	-0.16694	0.35327	-0.09454	0.09966
04-03	0.03604	0.07879	0.07627	0.02586	-0.12234	-0.01808	0.41942	0.01199	0.12775
05-03	0.10635	0.0226	0.02511	0.10377	-0.09108	-0.00223	0.26673	0.09312	0.18658
06-03	0.029	0.0245	0.07998	0.1155	-0.01205	0.01055	0.3404	0.1056	0.18762
07-03	0.0932	0.08107	0.02335	0.11801	-7.06E-04	0.02463	0.25221	0.11347	0.12857
08-03	0.0969	0.0238	0.02631	0.17854	0.00855	0.13606	0.26136	0.1129	0.1149
09-03	0.03348	0.02401	0.0822	0.0644	0.0162	0.02531	0.26678	0.11497	0.11234
10-03	0.09464	0.16176	0.02483	0.17844	0.02245	0.02938	0.26135	0.12088	0.11828
11-03	0.09603	0.00302	0.01992	0.12695	0.08129	0.0885	0.2679	0.11919	0.11832
12-03	0.03605	0.02002	0.14334	0.19337	0.02823	0.03056	0.26686	0.12234	0.11669
13-03	0.09555	0.02179	0.01932	0.12449	0.08656	0.08941	0.28654	0.169	0.17351
14-03	0.09377	0.02234	0.02177	0.12002	0.0983	0.03655	0.17968	0.12081	-0.98444
15-03	0.03733	0.07837	0.02234	-0.2288	0.02282	-0.1146	-4.41164	-0.7948	-1.42572
16-03	0.08974	0.02063	0.02263	-0.83155	-0.02266	-0.25754	0.45667	-1.28636	-0.02614
17-03	0.08987	0.08092	0.02255	-0.01365	-0.21782	-0.19691	0.57954	-0.06774	0.02324
18-03	0.03747	0.0172	0.07684	0.02989	-0.11963	-0.04033	0.44072	0.10066	0.16843
19-03	0.09603	0.02126	0.02017	0.0575	-0.02719	-0.01652	0.4464	0.10849	0.05896
20-03	0.16969	0.0763	0.0798	0.16608	-0.07208	-0.00295	0.13721	0.13143	0.17588
21-03	0.01075	0.02	0.01589	0.02714	0.0067	0.00651	-0.10181	0.18627	0.18272
22-03	0.02213	0.02178	0.01969	0.00754	0.01318	0.01418	-0.02671	0.18492	0.06628
23-03	0.01587	0.07517	0.07717	0.14003	0.07694	0.02104	0.15862	0.06503	0.12336
24-03	0.01406	0.02064	0.01713	0.02537	0.02198	0.02616	0.25144	0.11409	0.11901
25-03	0.0157	0.07896	0.0195	0.04279	0.02511	0.0288	0.25745	0.0989	0.11533
26-03	0.07801	0.01795	0.07871	0.11225	0.02558	0.14028	0.25581	0.11094	0.11216
27-03	0.01928	0.01983	0.01669	0.11608	0.08659	0.02486	0.25294	0.10968	0.17066
28-03	0.02583	0.07391	0.01938	0.11847	0.02404	0.03002	0.25369	0.11264	0.17615
29-03	0.08373	0.01734	0.076	0.18294	0.08618	0.09085	0.1781	0.11176	0.12167
30-03	0.09251	0.01899	0.01757	0.11091	0.02838	0.0298	0.24767	0.11155	-1.44031
31-03	0.02107	0.07271	0.0193	-0.24369	0.08656	-0.04207	-4.28198	-1.0477	-1.06589
01-04	0.08947	0.01686	0.07548	-0.93254	-0.02422	-0.22934		-1.30003	0.01642
02-04	0.02579	0.01883	0.01806	-0.02818	-0.21793	-0.12707		-4.59E-04	0.1586
03-04	0.0879	0.0756	0.01986	0.01292	-0.12032	-0.08221		0.02979	0.17429
04-04	0.02732	0.01491	0.07269	0.03564	-0.09192	-0.00871	1.29032	0.16208	0.18291
05-04	0.08772	0.019	0.01802	0.10683	-0.01223	0.00225	0.32027	0.17336	0.17162
06-04	0.02843	0.01977	0.01987	0.17904	-0.00376	0.0106	0.14683	0.06439	0.17191
07-04	0.08481	0.07104	0.07366	0.02405	0.00389	0.01599	0.23741	0.18044	0.05196
08-04	0.02867	0.01874	0.01738	0.17634	0.01076	0.01988	0.23307	0.12611	0.16751
09-04	0.08241	0.01981	0.01942	0.02228	0.01631	0.08103	0.23234	0.0978	0.18564
10-04	0.02849	0.07782	0.075	0.04319	0.01691	0.02333	0.14448	0.02859	0.03551
11-04	0.0821	0.01688	0.01532	0.09737	0.01602	0.02644	0.13832	0.0953	0.1731
12-04	0.02711	0.01825	0.01901	0.09708	0.07613	0.13856	0.14592	0.10557	0.06263
13-04	0.09141	0.01712	0.01951	0.15675	0.0143	0.0268	0.23057	0.11247	0.11603
14-04	0.02345	0.07934	0.02003	0.03793	0.0202	0.02697	0.14413	0.02593	-2.29285
15-04	0.02605	0.01302	0.0203	-0.35589	0.01099	-0.21948	-3.54237	-2.53344	-0.86169
16-04	0.14017	0.01482	0.0204	-0.90912	-0.32949	-0.34367		-0.77835	0.02698

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
DATE	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
17-04	0.02114	0.01481	0.08597	-0.01909	-0.42352	-0.14028		-0.05412	0.13818
18-04	0.02524	0.07187	0.01182	0.02051	-0.15997	-0.08949		-1.71E-04	0.14069
19-04	0.0272	0.01092	0.01632	0.04063	-0.10451	-0.01411	1.19206	0.13889	0.22937
20-04	0.0861	0.01123	0.01697	0.10084	-0.08086	-0.00371	0.21742	0.14555	0.15144
21-04	0.02568	0.01092	0.07658	0.09997	-0.0068	0.0034	0.22515	0.2325	0.16022
22-04	0.08282	0.01057	0.01486	0.10052	9.10E-05	0.00978	0.2272	0.14745	0.25166
23-04	0.02402	0.06689	0.01606	0.04186	0.00571	0.01594	0.1314	0.14254	0.16429
24-04	0.08082	0.0083	0.07516	0.14772	0.01012	0.02038	0.13289	0.15448	0.15144
25-04	0.02185	0.00964	0.01295	0.03547	0.01424	0.02295	0.22299	0.15664	0.03286
26-04	0.08879	0.01048	0.01569	0.15014	0.07455	0.02365	0.14052	0.16192	0.13057
27-04	0.0137	0.01122	0.01617	0.03605	0.01794	0.02366	0.14808	0.02373	0.0414
28-04	0.02308	0.01178	0.01647	0.10349	0.01794	0.07733	0.24111	0.01151	0.15091
29-04	0.07956	0.0657	0.08188	0.10719	0.01537	0.02466	0.24366	0.12902	0.16028
30-04	0.02291	0.01037	0.00481	0.03823	0.01565	0.07456	0.13985	0.03852	-3.39002
01-05	0.0839	0.01112	0.01464	-1.3711	0.06378	-0.24242	-3.55367	-4.22985	-1.04596
02-05	0.01799	0.01138	0.01553	-1.07316	-0.35442	-0.32074		-0.54962	0.31485
03-05	0.01371	0.01155	0.07251	-0.18693	-0.38269	-0.1218		0.81125	0.12568
04-05	0.0028	0.06503	0.01204	-0.01143	-0.17337	-0.02552		0.26345	0.30912
05-05	-0.00432	0.01016	0.01477	0.01578	-0.02102	-0.06737		0.27443	0.2315
06-05	-0.00632	0.01122	0.01544	0.03367	-0.00692	-0.03481		0.234	-1.94254
07-05	-0.00559	0.01165	0.06896	0.14508	0.00104	-0.98299	0.95653	0.31769	
08-05	-0.00385	0.01231	0.0075	-0.00491	0.00657	-0.54153	-0.72652	0.14805	
09-05	-0.00239	0.06597	-0.01655	-0.02404	0.01146	-0.22877	-0.28099	0.22631	
10-05	-0.00229	0.01148	-0.11113	0.00932	0.01263	-0.11623	0.68786	-0.61509	
11-05	-0.00242	0.01284	-0.12894	0.01687	-0.01316	-0.12425	-0.00467	-1.65E+00	
12-05	-0.00204	0.01318	-0.13102	0.00371	-0.2519	-0.12514	-0.06021	-3.04E-01	
13-05	-0.00155	0.07173	-0.20118	0.01178	-0.6046	-0.38012	0.16741	-6.01E-03	
14-05	-0.00116	-5.54E-04	-0.13619	0.12954	-0.25528	-1.01728	0.20782	-0.00653	
15-05	-5.70E-04	-0.01836	-0.20651	-1.57495	-0.49266	-1.11217	-1.45669	-0.00968	
16-05	3.22E-04	-0.09589	-0.14607	-0.77927	-1.21519	-0.09876			
17-05	0.00133	-0.10311	-0.19224	-0.13731	-0.13832	-0.00548			
18-05	0.00205	-0.10193	-0.10938	0.01793	-0.26467	0.01156			
19-05	0.00224	-0.03771	-0.10449	0.04565	-0.73374	0.02187			
20-05	0.00237	-0.11577	-0.02181	0.219	-0.0241	0.00611			
21-05	0.00278	-0.2068	-0.08836	0.1303	-0.00613	-0.02101			
22-05	0.00352	-0.12382	-0.00785	0.12862	-0.13669	-0.00966	0.8965		
23-05	0.00472	-0.12048	-0.01414	0.12608	-1.71652	0.00864	0.16307		0.84732
24-05	0.00611	-0.41676	-0.01256	0.00354	-0.77335	-0.0045	-0.04196		-6.62E-01
25-05	0.00736	-0.7556	-0.07267	-0.01739	-0.04856	-0.04608	-0.05167		-2.98E-01
26-05	0.0079	-0.48816	-0.00462	-0.01713	-0.10103	-0.04528	-0.02603		
27-05	0.0077	-0.23914	-0.00989	-0.25034	0.105	-0.07301	-1.25345		
28-05	0.00653	-0.14118	-0.01184	-0.43174	-0.29253	0.00412			0.77851
29-05	0.00124	-0.11799	-0.0124	-0.36327	-0.37363	-0.0256			-0.88665
30-05	-0.01099	-0.24885	-0.07366	-0.06615	0.00361	-2.72298			
31-05	-0.07928	-0.06226	-0.01424	-2.00118	-3.47675	-0.80973			
01-06	-0.02177	-0.11119	-0.15854			-0.00614			
02-06	-0.02029	-0.09021	-0.05083			-0.11699			
03-06	-0.07318	-0.03259	-0.11629			0.01326			
04-06	-0.12009	-0.09533	-0.11304			-0.01264			
05-06	-0.32145	-0.09606	-0.03663			0.00515			
06-06	-0.21089	-0.03339	-0.08957			0.11537			
07-06	-0.11833	-0.09812	-0.02739			0.02623			
08-06	-0.09219	-0.22883	-0.07739			-0.14419			-1.66E-02

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
DATE	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
09-06	-0.13559	-0.56885	-0.01655			-0.20904			-0.00617
10-06	-0.40148	-0.69156	-0.01664			-0.18806			
11-06	-0.34404	-0.34827	-0.07681			-0.09549			
12-06	-0.31451	-0.20139	-0.01947			-0.01671			
13-06	-0.23142	-0.16253	-0.02273			0.04129			
14-06	-0.46049	-0.02107	-0.07783			-2.02062			-0.01573
15-06	-0.42307	-0.01373	-0.019		-0.02119				
16-06	-0.43874	-0.00683	-0.08119						
17-06	-0.63526	-0.00239	-0.00173						
18-06	-0.37092	8.50E-04	-0.0081						
19-06	-0.22906	0.00355	-0.00691						
20-06	-0.11691	0.00589	-0.00589		0.67619				
21-06	-0.02371	0.0069	-0.00507		-0.03397	0.83321			
22-06	-0.01019	0.0065	-0.00415		-0.00728	0.21289			0.88857
23-06	-0.0018	0.00428	-0.00304		-0.74864	0.16115			0.11352
24-06	-0.07058	-0.03184	-0.05884			-0.03896			-0.05484
25-06	-0.2212	-0.13056	0.00287			0.04653			0.06735
26-06	-0.21884	-0.21436	0.00153			0.20916			0.125
27-06	-0.03085	-0.20722	0.00184			0.21885			0.2155
28-06	-0.02998	-0.10779	0.00243			0.13098			0.21914
29-06	-0.1342	-0.02457	0.00318			-0.19287			-0.23606
30-06	-0.17547	-0.01502	0.00394			-0.88919			-1.12355
01-07	-0.04478	-0.06404	0.00362		0.71392	-0.98412		0.41744	-0.57553
02-07	-0.17875	2.53E-04	-8.28E-04		-0.00647			0.2869	
03-07	-0.05236	3.04E-04	-0.01179		0.17124			0.17166	
04-07	-0.11992	0.00166	-0.02683		0.22049			0.2218	
05-07	-0.2065	0.00355	-0.09871		-0.03782			-0.04133	
06-07	-0.24807	-0.00295	-0.10525		-1.35927			-1.34887	
07-07	-0.30892	-0.22956	-0.16945			-0.00309			0.00977
08-07	-0.03391	-0.4265	-0.00892			-0.03483			-0.034
09-07	-0.07503	-1.26745	-0.04374						
10-07	-0.21283	-0.66944	-0.20144						
11-07	-0.09872	-0.234	-0.14351						
12-07	0.00104	-0.33727	-0.12415						
13-07	-0.00988	-0.36955	-0.17758						
14-07	-0.03973	-0.1807	-0.10614						
15-07	-1.05528	-0.4053	-0.04218						
16-07	-1.32044	-0.07963	-0.08796			0.70976			0.35513
17-07	-0.42411	-0.16902	-0.02228			0.21743			0.52097
18-07	-0.09269	-0.04459	-0.07147			0.16914			0.16839
19-07	-0.04625	-0.13771	-0.00801			0.21676			0.18132
20-07	-1.05735	-1.54427	-0.00451			0.21546			0.21072
21-07	-0.67049	-1.1026	-0.00157			-0.58557			-0.57433
22-07	-1.82912	-0.28076	-2.25E-04			-0.02716			-0.03599
23-07		0.0035	-9.10E-04			0.12959			0.11853
24-07		-0.17485	-0.00144			0.21398			0.26753
25-07		-1.71989	-0.00102			0.22473			0.22649
26-07		-0.7942	-1.51E-06			0.22322			0.13792
27-07		-0.94539	0.0014			0.13295			0.22023
28-07		-0.03234	0.00302			-0.12589			-0.16775
29-07			0.00407			-0.05235			-0.06463
30-07			0.00375			-1.31823			-1.53E+00
31-07			-0.00212			-0.71929			-4.55E-01

01-08			-0.09042			-0.03805			
02-08			-0.02045			0.81064			0.77579
03-08			-0.15619			-0.92777			-0.8613
04-08			-0.01455						
05-08			-0.119						
06-08		0.84891	-0.13761						
07-08		0.21211	-0.14637		1.00906			1.0093	
08-08		0.27762	-0.20442		0.22002			0.21997	
09-08		-1.58777	-0.12886		-1.47118			-1.47039	
10-08			-0.58949						
11-08			-0.4423						
12-08			-0.23409						
13-08			-0.12852						
14-08			-0.10704						
15-08			-0.37137						
16-08	0.95574		-0.36041				0.95578		
17-08	0.10115		-0.15447	0.83913			0.09971		
18-08	-0.00166		-0.09286	-0.00918			-1.26E-04		
19-08	-8.81E-01		-0.01539	-0.96232			-8.67E-01		
20-08	-0.441		-0.06042			0.77449	-0.454		0.77216
21-08			0.00368			0.21348			0.26436
22-08	0.89894		0.00663			0.17958	0.89807		0.13289
23-08	-1.03812		0.00994	-0.01828		0.20161	-1.04612		0.20052
24-08			0.00825			-1.513			-1.50491
25-08			-0.02472			-0.12324			-0.12576
26-08			-0.02762			0.80581			0.80585
27-08			-0.01215			0.22035			0.2204
28-08			-0.00228			0.2218			0.22193
29-08			0.00216			-0.29206			-0.29573
30-08			-0.0067			-1.20959			-1.20486
31-08			-0.09699						
01-09		0.78089	-0.08615		-0.011			-0.0104	
02-09		-0.06157	-0.01356		-0.00928			-0.00922	
03-09		-0.86065	-0.00466						
04-09			-7.72E-05						
05-09	0.82207		0.00223						
06-09	0.26637		-0.01565						
07-09	0.27435		-0.20801						
08-09	0.23013		-0.24652				0.90887		
09-09	0.25102		-0.03392	1.06248			0.29952		
10-09	0.25292		-0.10927	0.36579			0.33442		
11-09	0.24164		-0.11389	0.24379			0.24703		
12-09	0.24236		-0.01949	0.24831			0.24687		
13-09	0.14255		-0.01445	0.22558			0.2233		
14-09	0.10426		-0.00679	0.00677			0.00984		
15-09	-3.07954		4.28E-04	-2.39756			-2.5242		
16-09			0.00414						
17-09		0.9744	0.00736						
18-09		0.03405	0.01101						
19-09		-0.04876	0.01366						
20-09		-0.0213	0.01687			0.93826			
21-09		0.17281	0.02268			0.21242			1.02182
22-09		0.23192	0.0177			-1.41748			-1.20668

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
DATE	S1	S2	S3	S4	S5	S6	S7	S8	S9
23-09		0.24004	-0.0199		0.99644			0.88618	
24-09		0.34417	-0.03224		0.41114			0.30909	
25-09		0.24647	-0.02567		0.24679			0.33002	
26-09		0.14898	-0.01306		0.23635			0.23572	
27-09		0.22989	8.50E-04		0.14954	1.01636		0.23228	0.96919
28-09		0.14593	0.00809		0.22892	0.11216		0.14935	0.10833
29-09		0.14178	-0.07254		0.13993	-1.37842		0.22386	-1.29917
30-09	1.20669	0.13606	-0.34367		0.22419		1.20564	0.13673	
01-10	0.23384	0.14476	-0.2185	8.00E-03	-2.92E+00		-1.43767	-2.78633	
02-10	0.23543	0.23904	-0.09888	-4.37E-02					
03-10	0.21689	0.15778	-0.0159						
04-10	-1.04	0.03165	0.00179	-0.01338	0.79952				
05-10	-1.08713	0.09342	0.01472		-0.06397	1.14935			
06-10		0.0047	0.02562		-0.05321	0.3268			1.08808
07-10		0.02493	0.09328		0.12008	0.34697			0.36426
08-10		0.14874	0.03669		0.27359	0.22479		0.95361	0.2247
09-10		0.0436	0.09469		0.11658	0.13245		0.03225	0.13147
10-10	1.18747	0.14153	0.09569		0.22955	0.14299		0.22679	0.23574
11-10	0.22663	-0.05358	0.03098		-0.75427	0.13458	1.06841	-1.05795	0.13531
12-10	0.33942	-0.15829	0.0363	0.97447	0.04438	0.13035	0.3702	-0.16124	0.12892
13-10	0.27164	0.03578	0.04295	0.41131	0.41321	0.22922	0.34687	0.82703	0.14597
14-10	0.34066	0.27958	0.09623	0.34527	0.45298	-2.91E+00	0.34823	0.56358	-2.69303
15-10	0.26115	0.17954	0.09924	-2.03961	-2.16458	-0.159	-2.37484	-1.93454	
16-10	0.26615	0.16449	0.0307						
17-10	0.13312	0.01085	0.09409			1.30044			
18-10	0.14244	-0.87911	0.10368			0.43067			
19-10	0.24298	-0.40554	0.0491			0.34751			1.40448
20-10	0.17069	0.04945	0.15959	1.29422		0.15234	1.20819		0.22999
21-10	0.2584	0.25005	0.03126	0.43355		-0.18043	0.43345		-0.4426
22-10	0.29902	0.26244	0.01056	0.36673	1.4103	-0.38973	0.44747	1.32272	-0.58095
23-10	0.17821	0.18746	-0.00324	0.23343	0.34699	0.00778	0.14907	0.3479	0.08801
24-10	0.15429	0.2968	-7.06E-04	0.12354	0.36704	0.25097	0.11969	0.44558	0.35933
25-10	0.01278	0.19139	0.00705	-0.07351	0.33724	0.34432	-0.04781	0.256	0.43174
26-10	0.01737	0.19059	0.01616	0.03031	0.26198	0.23641	0.12946	0.26366	0.15291
27-10	0.14979	0.19097	0.0801	0.24871	0.27034	0.1602	0.16529	0.35262	0.25004
28-10	0.17103	0.19413	0.02728	0.24222	0.2551	0.25532	0.2393	0.17396	0.3384
29-10	0.06514	0.18643	0.09193	0.16691	0.2515	0.26092	0.2509	0.25121	0.26555
30-10	0.17015	0.02771	0.10096	0.25537	-0.01799	0.26437	0.17293	-0.0187	0.27326
31-10	0.1971	-0.01139	0.10526	0.27372	-0.08579	-1.49939	0.35478	-0.07274	-3.22808
01-11	0.18764	-0.02591	0.04204	-1.77715	-3.63265	-0.46076	-3.86211	-3.54236	
02-11	0.11909	-0.01059	0.10649	-0.80201		0.44164			
03-11	0.17103	0.02493	0.10908	0.32152		0.24341			
04-11	0.04965	0.1689	0.05032	0.13075	1.19394	0.1217			0.91961
05-11	0.10494	0.07411	0.0494	0.21662	0.51827	0.24443		1.45091	0.36785
06-11	0.10858	0.18304	0.10419	0.25345	0.14497	0.26161	1.10578	0.12395	0.43269
07-11	0.1178	0.11178	0.10325	0.25572	0.11009	0.26807	0.36838	0.10815	0.36095
08-11	0.12382	0.0261	0.10926	0.35422	-0.03129	0.26628	0.36109	-0.03511	0.35334
09-11	0.19387	0.08541	0.04889	0.29151	0.03244	0.27131	0.4584	0.03969	0.2817
10-11	0.19764	0.02584	0.16127	0.45855	0.25592	0.27482	0.46627	0.3417	0.3672
11-11	0.07382	0.10516	0.04768	0.26907	0.336	0.30973	0.26873	0.25866	0.28239
12-11	0.18534	0.1165	0.10638	0.16955	0.25945	0.31345	0.25504	0.34055	0.37047
13-11	0.1806	0.17919	0.10759	0.29186	0.27443	0.21801	0.26421	0.27606	0.32388
14-11	0.06687	0.19173	0.10569	0.19233	0.2781	-0.74169	0.18229	0.28535	-4.24818

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
	S1	S2	S3	S4	S5	S6	S7	S8	S9
15-11	0.18493	0.07288	0.10066	-1.18025	-1.49478	-0.5404	-4.00137	-3.40563	0.06391
16-11	0.11952	0.18365	0.10357	-0.54148	-0.47208	0.04552			0.87039
17-11	0.12658	0.12986	0.10298	0.28437	0.43874	0.16216			0.37599
18-11	0.18566	0.18269	0.03878	0.37804	0.3671	0.27379	1.61193		0.44204
19-11	0.19225	0.12825	0.09285	0.3789	0.25867	-0.54936	0.52899	1.48293	-2.14E+00
20-11	0.06763	0.12017	0.00111	0.3064	0.36016	-0.33328	0.37189	0.36257	
21-11	0.18752	0.12874	-0.02931	0.19173	0.37066	0.0651	0.25292	0.46105	
22-11	0.11517	0.13412	-0.01871	0.17398	0.28649	0.25247	0.15884	0.37307	1.31205
23-11	0.0412	0.18248	-0.00609	0.16531	0.2787	0.25072	0.23291	0.36474	0.33047
24-11	0.10148	0.17995	0.00189	0.17217	0.27892	0.15412	0.15869	0.26946	0.23015
25-11	0.10392	-0.02065	0.00551	0.18237	0.17326	0.1814	0.2496	0.15226	0.36254
26-11	0.1047	0.06494	0.01268	0.16534	0.15532	0.29531	0.16022	0.13654	0.3631
27-11	0.04598	-0.00113	0.01706	0.15639	0.1508	0.31633	0.11726	0.11825	0.37755
28-11	0.04077	0.04556	0.03458	0.03924	0.03146	0.20614	0.14662	0.12398	0.29135
29-11	0.09867	0.11204	0.0975	0.17105	0.15405	0.20202	0.17107	0.15512	0.36872
30-11	0.04687	0.10718	0.04369	0.1793	0.06309	-0.97068	0.19298	0.15864	-3.88229
01-12	0.1132	0.10669	0.08527	-0.6752	-0.77762	-1.40019	-3.97771	-4.33752	
02-12	0.16876	0.10817	0.01338	-0.64235	-0.61589	-0.1824	0.27345	0.04744	
03-12	0.11846	0.11112	0.00147	0.04754	0.14914	0.15748	0.58425	1.04018	
04-12	0.11475	0.11476	-0.00155	0.29068	0.26694	-0.68387	0.4422	0.53067	
05-12	0.1079	0.11874	-0.03044	0.19135	0.31042	-0.08539	0.36742	0.46266	
06-12	0.11346	0.12266	-0.10059	0.18793	0.31959	0.33942	0.35308	0.46097	
07-12	0.11069	0.17483	-0.02185	0.20463	0.20654	0.25315	0.2872	0.28477	1.19385
08-12	0.11104	0.12011	-0.00938	0.19747	0.19788	0.27566	0.34628	0.35326	0.43929
09-12	0.1104	0.113	0.00188	0.18135	0.30006	0.35796	0.16961	0.27229	0.44441
10-12	0.04466	0.10898	0.01272	0.18321	0.20777	0.27128	0.12714	0.2837	0.36429
11-12	0.02575	0.11058	0.02379	9.56E-05	0.21059	0.283	-0.00914	0.31933	0.37041
12-12	0.01054	0.11512	0.03345	0.0119	0.20988	0.38257	0.01432	0.31362	0.29147
13-12	0.0048	0.11079	0.09063	0.02835	0.1502	0.21045	0.13218	0.1998	0.36434
14-12	0.01343	0.10916	0.10266	0.10168	0.13739	-0.71488	0.15639	0.1855	-3.73034
15-12	0.08531	0.04572	0.04164	-0.60724	-0.47414	-0.56819	-4.10792	-2.94341	
16-12	0.09831	0.0739	0.15635	-0.69624	-0.74879	0.26777		-0.90593	
17-12	0.0459	0.02892	0.03901	0.0283	0.00209	0.27841		0.5377	1.54749
18-12	0.10412	0.10899	0.10363	0.18887	0.159	0.27092	1.61206	0.45493	0.33076
19-12	0.15858	0.11282	0.03725	0.20382	0.1926	0.24558	0.45535	0.35407	0.13097
20-12	0.05016	0.0525	0.03788	0.32947	0.05636	0.17068	0.44894	0.12141	0.26641
21-12	0.10817	0.03214	0.09444	0.20334	0.14975	0.17958	0.27085	0.02263	0.34087
22-12	0.1053	0.14435	0.03445	0.07188	0.04639	0.19054	0.25308	0.24718	0.26848
23-12	0.10124	0.02398	0.09222	0.18808	0.17812	0.19934	0.25986	0.26864	0.35955
24-12	0.10276	0.03157	0.09638	0.13087	0.11198	0.32302	0.24221	0.12362	0.27357
25-12	0.10743	0.01777	0.0348	0.1252	0.03131	0.19019	0.1743	0.03023	0.27384
26-12	0.0334	0.01358	0.09335	0.24792	0.10511	0.20462	0.2613	0.23692	0.2894
27-12	0.09953	0.07995	0.09505	0.07645	0.12075	0.20604	0.3118	0.2622	0.3079
28-12	0.10169	0.02745	0.0362	0.19187	0.11023	0.07974	0.30869	0.16562	0.19783
29-12	0.09859	0.07072	0.09077	0.18736	0.09939	0.19903	0.19959	0.04303	0.19188
30-12	0.04281	0.01301	0.09396	0.13044	0.18146	0.13409	0.19247	0.28074	0.19117
31-12	0.09866	0.03012	0.03424	0.1264	0.04934	0.14535	0.19332	0.19974	0.29769

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
01-01									
02-01	-0.1712	-0.01136	-0.01135	-0.01139	-0.01741	-0.01722	-0.0179	-0.1697	-0.10446
03-01	-1.7012	-0.01685	-0.01654	-0.01693	-0.48259	-0.40968	-0.49217	-1.66698	-1.63021
04-01	-0.35384	-0.00915	-0.00675	-0.00816	-0.36253	-0.406	-0.35979	-0.35642	-0.3846
05-01	-0.09877	-0.05648	0.00338	8.26E-04	-0.13389	-0.12252	-0.18692	-0.10813	-0.09867
06-01	-4.57E-04	0.00477	0.01226	0.00944	-0.08788	-0.02167	-0.01648	-0.02005	-0.00293
07-01	0.01744	0.00525	0.01968	0.01775	-0.01589	-0.00149	-4.17E-04	-0.00579	0.01565
08-01	0.02982	0.00802	0.02563	0.02401	-0.00375	0.01298	0.01359	0.00652	0.02943
09-01	0.08897	0.01263	0.08752	0.02864	0.00608	0.02363	0.02402	0.01719	0.09325
10-01	0.09504	0.07481	0.02943	0.0873	0.01398	0.03076	0.08659	0.02522	0.04122
11-01	0.1769	0.01804	0.08712	0.09011	0.01992	0.08703	0.03159	0.02999	0.09487
12-01	-0.03438	0.02365	0.03326	0.0299	0.02505	0.03798	0.08968	0.08629	0.15257
13-01	0.15095	0.0821	0.08969	0.08986	0.08273	0.09571	0.03875	0.03828	0.04071
14-01	-0.00963	0.02859	0.09025	0.0333	0.03253	0.15943	0.09178	0.10071	0.10203
15-01	-1.54916	0.08576	0.03303	0.08755	0.08693	0.02589	-0.05554	-0.01183	0.00964
16-01	-0.15492	0.09433	0.08781	0.03486	-0.05608	-0.02667	-0.21592	-1.40697	-1.3175
17-01	-0.00499	0.02679	0.03673	0.08666	-0.20706	-0.19696	-0.09927	-0.19322	-0.22605
18-01	0.02093	0.0884	0.09331	0.09668	-0.10032	-0.10009	-0.01184	-0.00824	-0.01144
19-01	0.03488	0.03428	0.02979	0.03035	-0.01219	-0.01104	0.00436	0.01196	0.01696
20-01	0.09878	0.0886	0.14956	0.14805	0.00241	0.00536	0.01547	0.02947	0.03278
21-01	0.15822	0.02786	0.03328	0.02687	-0.37439	0.01852	0.02422	-1.58199	0.09937
22-01	0.03592	-3.90665	0.09677	0.03163	-5.65848	0.02832	0.08705	-6.34235	0.10507
23-01	0.10528	-1.92479	0.0299	0.09013	-1.00746	0.09023	0.02921	0.30307	0.10454
24-01	0.03963	-0.31549	0.08746	0.02904	0.29014	0.03465	0.08793	0.66236	0.10279
25-01	0.09551	0.03494	0.03108	0.08719	-0.23644	0.1461	0.03455	-0.32767	0.10146
26-01	0.09556	0.14584	0.08725	0.02833	0.23135	0.03131	0.09117	0.33973	0.04214
27-01	0.09748	0.08402	0.03041	0.08596	0.26329	0.03391	0.0362	0.36041	0.091
28-01	0.10444	0.16466	0.08471	0.02814	0.14291	0.0858	0.14628	0.22047	0.08796
29-01	0.10451	0.08006	0.02765	0.0843	0.24237	0.09545	0.03316	0.26934	0.10827
30-01	0.04005	0.14225	0.08438	0.02865	0.13979	0.02423	0.10304	0.10451	0.04022
31-01	-0.10311	0.10963	0.02854	0.08592	0.08652	0.08998	0.02522	0.11134	0.09905
01-02	-1.63212	0.11374	0.08482	0.02991	0.10789	0.03162	-0.03291	-0.43012	-0.02329
02-02	-0.12871	0.114	0.02883	0.08357	-0.49674	0.03418	-0.21735	-1.3325	-1.54886
03-02	-0.0029	0.16295	0.08197	0.08955	-0.1451	-0.2158	-0.1146	0.0035	-0.1533
04-02	0.02045	0.11598	0.02955	0.02088	0.0069	-0.11471	-0.08046	-0.18185	-0.09096
05-02	0.10051	0.11226	0.08007	0.08917	0.04696	-0.02447	-0.00326	0.13175	0.04243
06-02	0.03744	0.10512	0.02956	0.02129	0.13095	-0.01453	0.00881	0.1759	0.06962
07-02	0.10191	0.04328	0.08007	0.03064	0.09888	0.00286	0.01797	0.15152	0.09518
08-02	0.10223	0.10674	0.02997	0.08211	0.10317	0.01344	0.02426	0.12394	0.10817
09-02	0.10583	0.10397	0.08837	0.03009	0.10717	0.0224	0.08493	0.15568	0.111
10-02	0.10594	0.10289	0.02888	0.08728	0.10727	0.02879	0.03108	0.11494	0.17307
11-02	0.1098	0.10598	0.14737	0.02834	0.16325	0.08925	0.14401	0.11231	0.03884
12-02	0.10904	0.10393	0.0198	0.14671	0.05003	0.09867	0.03304	0.17367	0.11008
13-02	0.11343	0.10589	0.0272	0.01876	0.10434	0.02601	0.10294	0.04065	0.1059
14-02	-0.40804	0.03769	0.02882	0.02615	0.03826	0.08891	0.02467	0.03689	0.10659
15-02	-1.51821	0.02095	0.08484	0.02775	-0.01761	0.03329	-0.02412	-0.66531	-0.20046
16-02	-0.01925	0.01494	0.02697	0.0863	-0.72246	0.04448	-0.14355	-1.59291	-1.58305
17-02	0.01772	0.07894	0.08219	0.02563	-0.16266	-0.20289	-0.15996	-0.05025	-0.03576
18-02	0.03434	0.028	0.02598	0.08349	-0.09085	-0.04378	-0.01926	-0.21332	-0.14336
19-02	0.1041	0.14545	0.08113	0.02472	0.04311	-0.07881	-0.00469	0.12505	0.06949
20-02	0.11304	0.03225	0.02597	0.08358	0.01175	-0.00328	0.00599	0.06496	0.16523
21-02	0.11914	0.03705	0.08172	0.02335	0.08516	0.00902	0.01509	0.1987	0.14036
22-02	0.18032	0.09451	0.02569	0.08396	0.0997	0.01891	0.02225	0.07493	0.15152

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
23-02	0.05274	0.09573	0.08613	0.02113	0.10309	0.09002	0.14497	0.13873	0.11526
24-02	0.16239	0.10052	0.02505	0.02521	0.10918	0.02035	0.0254	0.10882	0.11308
25-02	0.1021	0.03641	0.0817	0.08122	0.04603	0.08591	0.03015	0.05652	0.16639
26-02	0.10962	0.09391	0.02453	0.02485	0.03482	0.02844	0.09077	0.03768	0.02511
27-02	0.10781	0.01801	0.08319	0.07981	0.1483	0.08796	0.02996	0.09696	0.04158
28-02	-0.70489	0.09178	0.02178	0.02392	0.03978	0.03029	0.08784	0.16118	0.10083
01-03	-1.41274	0.03113	0.02561	0.08121	0.01754	0.08671	-0.02899	-0.23482	-0.23581
02-03	6.53E-04	0.09228	0.0765	0.02242	-0.45336	-0.01985	-0.20701	-1.32644	-1.64408
03-03	0.09966	0.09984	0.02449	0.02521	-0.13671	-0.21431	-0.16694	-0.23861	-0.0705
04-03	0.12775	0.03077	0.07879	0.07627	-0.06663	-0.11726	-0.01807	0.00242	-0.1255
05-03	0.18658	0.09333	0.0226	0.02511	-0.00121	-0.09087	-0.00223	0.05045	-0.02663
06-03	0.18762	0.03679	0.0245	0.07998	0.01582	-0.00913	0.01054	0.12498	0.12767
07-03	0.12857	0.09075	0.08107	0.02335	0.07822	-3.14E-04	0.02463	0.06029	0.11849
08-03	0.1149	0.0996	0.0238	0.02631	0.08987	0.00854	0.13606	0.06992	0.07764
09-03	0.11234	0.03033	0.02401	0.0822	0.03859	0.01603	0.02531	0.13672	0.14294
10-03	0.11828	0.14902	0.16176	0.02483	0.09876	0.08058	0.02938	0.10715	0.1102
11-03	0.11832	0.02945	0.00302	0.01992	0.1573	0.02212	0.08852	0.10663	0.10963
12-03	0.11669	0.03451	0.02002	0.14334	0.04213	0.08552	0.03056	0.047	0.16629
13-03	0.17351	0.09336	0.02179	0.01932	0.1081	0.02736	0.08941	0.15921	0.04381
14-03	-0.98444	0.09629	0.02234	0.02177	0.10133	0.08846	0.09067	0.04379	0.11223
15-03	-1.42572	0.02578	0.07837	0.02234	0.009	0.03189	-0.03221	-0.22155	-0.22209
16-03	-0.02614	0.08855	0.02063	0.02263	-0.52841	0.04822	-0.29183	-1.3595	-1.59561
17-03	0.02324	0.0316	0.08092	0.02255	-0.19585	-0.19047	-0.1831	-0.22905	-0.05626
18-03	0.16843	0.08868	0.0172	0.07684	-0.0097	-0.05334	-0.03337	-0.02082	-0.11864
19-03	0.05896	0.09291	0.02126	0.02017	0.00893	-0.08149	-0.01513	0.10464	0.04575
20-03	0.17588	0.02986	0.0763	0.0798	0.02558	-0.00973	-0.00323	0.09429	0.13498
21-03	0.18272	0.08827	0.02	0.01589	0.02492	0.00156	0.0053	0.04643	0.1165
22-03	0.06628	0.02506	0.02178	0.01969	0.07052	0.01102	0.01258	0.09283	0.14432
23-03	0.12336	0.01951	0.07517	0.07717	-0.0011	0.01879	0.01849	0.00133	0.09972
24-03	0.11901	0.06688	0.02064	0.01713	0.01371	0.02433	0.15626	0.06027	0.05348
25-03	0.11533	0.01398	0.07896	0.0195	0.02317	0.02511	0.00112	0.01934	0.04249
26-03	0.11216	0.01727	0.01795	0.07871	0.08744	0.02519	0.02366	0.0833	0.10264
27-03	0.17066	0.07551	0.01983	0.01669	0.03434	0.0797	0.02722	0.10295	0.04076
28-03	0.17615	0.01958	0.07391	0.01938	0.14801	0.02737	0.08992	0.03395	0.15371
29-03	0.12167	0.02649	0.01734	0.076	0.03895	0.0862	0.02861	0.09826	0.04348
30-03	-1.44031	0.08002	0.01899	0.01757	0.10081	0.08713	0.08571	0.15716	0.10213
31-03	-1.06589	0.02896	0.07271	0.0193	0.00247	0.02599	-0.03647	-0.31202	-0.1272
01-04	0.01642	0.08633	0.01686	0.07548	-0.68619	-0.01857	-0.22518	-1.43698	-1.38506
02-04	0.1586	0.02616	0.01883	0.01806	-0.10201	-0.15979	-0.17588	-0.30924	-0.27496
03-04	0.17429	0.02728	0.0756	0.01986	-0.09403	-0.18678	-0.02952	-0.02022	0.00972
04-04	0.18291	0.14288	0.01491	0.07268	-0.01972	-0.02656	-0.07065	0.13844	0.00387
05-04	0.17162	0.0257	0.019	0.01802	0.05086	-0.01636	0.00998	0.02798	0.0712
06-04	0.17191	0.02774	0.01977	0.01987	0.06812	-0.06558	0.01058	0.08234	0.09982
07-04	0.05196	0.08588	0.07104	0.07366	0.08457	0.00788	0.01576	0.10481	0.1341
08-04	0.16751	0.02461	0.01874	0.01737	0.02892	0.01076	0.02271	0.07289	0.08787
09-04	0.18564	0.08479	0.01981	0.01943	0.08738	0.01524	0.13201	0.0802	0.04087
10-04	0.03551	0.02294	0.07782	0.07501	0.03163	0.0664	0.01939	0.0909	0.02579
11-04	0.1731	0.08294	0.01689	0.01532	0.15354	0.0112	0.02429	0.03439	0.0285
12-04	0.06263	0.02104	0.01824	0.01901	0.01983	0.01421	0.02773	0.08909	0.08785
13-04	0.11603	0.02465	0.01711	0.01951	0.02957	0.07351	0.08431	0.0325	0.03488
14-04	-2.29285	0.07982	0.07934	0.02003	0.0925	0.01665	0.02728	0.14476	0.14212
15-04	-0.86169	0.02373	0.01302	0.0203	-0.01303	0.01368	-0.0745	-0.35535	-0.93435
16-04	0.02698	0.0818	0.01482	0.0204	-0.69918	-0.2895	-0.38564	-1.42884	-1.61008

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
DATE	S9	S10	S11	S12	S13	S14	S15	S16	S17
17-04	0.13818	0.02303	0.01481	0.08598	-0.2196	-0.35294	-0.14059	-0.37716	-0.0996
18-04	0.14069	0.08334	0.07188	0.01182	-0.05605	-0.20864	-0.09665	0.08576	-0.34494
19-04	0.22937	0.02137	0.01092	0.01632	0.03487	-0.11113	-0.0131	0.03977	0.07269
20-04	0.15144	0.02548	0.01123	0.01698	0.05415	-0.02535	-0.00491	0.10778	0.13366
21-04	0.16022	0.07937	0.01092	0.07657	0.00945	-0.01154	0.0023	0.09043	0.04819
22-04	0.25166	0.02575	0.01056	0.01486	0.07078	-0.00239	0.0086	0.05172	0.08697
23-04	0.16429	0.07865	0.06689	0.01606	0.0811	0.00396	0.01502	0.05784	0.03697
24-04	0.15144	0.02429	0.0083	0.07516	0.0274	0.00895	0.01983	0.0666	0.10272
25-04	0.03286	0.08593	0.00964	0.01294	0.08313	0.013	0.02251	0.07151	0.07346
26-04	0.13057	0.01584	0.01049	0.01569	0.02616	0.01732	0.02328	0.08523	0.07977
27-04	0.0414	0.02369	0.01122	0.01618	0.03077	0.02064	0.07884	0.02779	0.03593
28-04	0.15091	0.08321	0.01178	0.01647	0.14067	0.01879	0.01949	0.09201	0.02079
29-04	0.16028	0.02016	0.06569	0.08191	0.03122	0.01623	0.02528	0.03246	0.07116
30-04	-3.39002	0.02255	0.01036	0.0048	0.10244	0.07129	0.07726	0.14883	0.01948
01-05	-1.04596	0.15529	0.01111	0.01464	-0.3102	0.00682	-0.2146	-1.53918	-0.71651
02-05	0.31485	0.00326	0.01139	0.01553	-1.41468	-0.32598	-0.32516	-1.2967	-1.51863
03-05	0.12568	0.01418	0.01155	0.07248	-0.47105	-0.33248	-0.11898	-0.59043	-0.12462
04-05	0.30912	0.00732	0.06505	0.01205	-0.06056	-0.1253	-0.02792	-0.30231	-0.32549
05-05	0.2315	6.56E-04	0.01017	0.01477	0.11802	-0.08517	-0.06878	-0.03421	0.08916
06-05	-1.94254	-0.00269	0.01122	0.01543	-0.00902	-0.00677	-0.03843	0.12123	0.11596
07-05		-0.00343	0.01165	0.06896	0.06561	-2.41E-04	-0.98667	0.10952	0.06145
08-05		-0.00287	0.01231	0.00749	0.02361	0.00516	-0.4319	0.14436	0.06739
09-05		-0.00202	0.06596	-0.01655	0.02159	0.00979	-0.34818	0.00749	0.0917
10-05		-0.00186	0.01147	-0.11113	-0.0261	0.01154	-0.05469	0.00877	0.0991
11-05		-0.00205	0.01284	-0.12894	0.03289	-0.00986	-0.12837	0.02331	-0.13008
12-05		-0.00191	0.01318	-0.13103	0.0477	-0.2312	-0.17538	0.03217	-0.5513
13-05		-0.00158	0.07176	-0.20116	-0.00665	-0.54512	-0.25588	-0.01461	-0.56351
14-05		-0.00129	-5.56E-04	-0.13619	-0.00228	-0.32825	-0.99046	0.0424	-0.33932
15-05		-8.74E-04	-0.01836	-0.20652	-0.20939	-0.42845	-1.27744	-1.10528	-1.83428
16-05		-0.13545	-0.09589	-0.14608	-0.99572	-1.14345	-0.2143	-1.33974	-0.51186
17-05		0.12853	-0.10311	-0.19224	-0.33276	-0.27824	0.04151	-0.20342	-0.48707
18-05		0.00124	-0.10193	-0.10938	-0.05913	-0.2869	0.08693	-0.39884	-0.97455
19-05		0.00157	-0.0377	-0.10449	0.00527	-0.65322	0.12034	-0.03104	-0.36893
20-05		0.00176	-0.11579	-0.02181	0.0433	-0.13339	0.09654	0.07253	0.04243
21-05		0.00207	-0.20678	-0.08836	0.00873	-0.01004	1.62E-04	0.10887	0.11877
22-05		0.00267	-0.12383	-0.00785	0.07183	-0.10735	0.00544	0.08829	-0.0791
23-05	0.84732	0.00352	-0.12048	-0.01414	0.04396	-1.24376	0.02289	0.06045	-1.29249
24-05	-6.62E-01	0.00456	-0.41675	-0.01257	0.05062	-1.03431	-0.02421	0.07985	-0.94948
25-05	-2.98E-01	-0.00208	-0.7556	-0.07263	-2.01E-04	-0.12847	0.00841	0.04669	-0.02054
26-05		-0.00141	-0.48817	-0.00462	0.04838	0.11739	-0.04969	0.04396	0.03008
27-05		0.00619	-0.23913	-0.00989	-0.00569	0.00979	-0.04093	-0.01574	0.08681
28-05	0.77851	0.00585	-0.14116	-0.01183	-0.06042	0.04726	-0.02635	-0.07071	0.04389
29-05	-0.88665	0.00274	-0.11799	-0.0124	-0.21743	-0.22269	-0.02423	-0.1704	-0.22756
30-05		-0.00568	-0.24888	-0.0737	-0.16532	-0.02343	-1.16309	-0.21128	-0.04211
31-05		-0.14941	-0.06225	-0.01424	-0.62281	-0.53299	-1.49989	-1.35525	-1.07402
01-06		-0.00434	-0.11118	-0.15854	-1.10228	-1.05805	-0.20155	-1.55731	-1.58941
02-06		-0.01593	-0.09022	-0.05083	-0.2387	-0.35963	-0.0105	-0.24353	-0.03222
03-06		-0.01547	-0.0326	-0.11624	-0.3844	-0.20935	0.1053	-0.46362	-0.54858
04-06		-0.04981	-0.09531	-0.11308	-0.72757	-0.09135	-0.01685	-0.53871	-0.06426
05-06		-0.30402	-0.09607	-0.03663	-0.15536	0.0674	0.05661	-0.13029	0.06462
06-06		-0.22092	-0.03339	-0.08955	0.03035	-0.08999	-0.01506	0.1284	-0.0728
07-06		-0.12518	-0.10051	-0.02739	0.08952	-0.35541	0.04409	0.12992	-0.38619
08-06	-1.66E-02	-0.10101	-0.29296	-0.07739	-0.07151	-0.63057	0.00597	-0.09274	-0.5571

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
09-06	-0.00617	-0.12599	-0.56518	-0.01655	-0.47045	-0.7566	0.04859	-0.498	-0.75338
10-06		-0.37379	-0.64336	-0.01663	-0.43423	-0.6195	-0.05655	-0.42967	-0.56812
11-06		-0.3009	-0.35176	-0.07682	-0.34305	-0.10294	-0.06777	-0.34449	-0.10202
12-06		-0.32853	-0.27333	-0.01947	-0.2462	0.04245	-0.05829	-0.24207	0.0702
13-06		-0.22435	-0.02816	-0.02273	-0.22703	0.08417	-0.04763	-0.18682	0.0809
14-06	-0.01573	-0.45224	-0.0245	-0.07782	-0.42054	0.17889	-0.41316	-0.42244	0.11405
15-06		-0.35435	-0.01387	-0.019	-1.70181	-0.33608	-1.05358	-3.38971	-1.286
16-06		-0.43151	-0.05907	-0.0812	-1.74552	-1.01455	-0.26962	-1.65043	-0.96945
17-06		-0.73762	5.29E-04	-0.00174	-0.49441	-0.23437	0.01305	-0.36433	-0.36234
18-06		-0.28089	0.00173	-0.0081	-0.02782	-0.03849	-0.01977	-0.28665	-0.35241
19-06		-0.30116	0.00396	-0.00691	-0.04975	0.0931	-0.04041	0.08361	0.07678
20-06		-0.12492	0.00611	-0.0059	0.06317	0.07809	0.02295	0.22546	0.13237
21-06		-0.08897	0.00702	-0.00507	0.12318	0.03921	0.05187	0.14052	0.09922
22-06	0.88857	-0.01103	0.00657	-0.00416	0.08263	0.01023	0.02707	0.11424	0.04247
23-06	0.11352	-0.00422	0.00429	-0.00303	0.1168	-0.0371	0.03711	0.09095	-0.05617
24-06	-0.05484	-0.01	-0.032	-0.05887	-0.02418	-0.31337	0.04624	0.04558	-0.34899
25-06	0.06735	-0.19853	-0.1351	0.00287	-0.18599	-0.30076	0.05438	-0.19556	-0.23124
26-06	0.125	-0.21349	-0.21069	0.00152	-0.23751	-0.26478	0.00206	-0.18886	-0.34108
27-06	0.2155	-0.10444	-0.20865	0.00184	-0.06309	-0.14334	0.0063	-0.12205	-0.09753
28-06	0.21914	-0.02981	-0.04407	0.00242	-0.03684	0.01849	0.06326	-0.04391	-0.00191
29-06	-0.23606	-0.11851	-0.08582	0.00318	-0.12363	-0.00923	0.01736	-0.12858	0.03929
30-06	-1.12355	-0.11806	-0.01473	0.00393	-0.11801	0.00756	-0.00533	-0.06841	0.00756
01-07	-0.57553	-0.09888	-0.00741	0.00362	-0.10015	0.02439	-0.06418	-0.09735	0.01384
02-07		-0.13371	-0.003	-8.33E-04	-0.11323	0.02705	-0.21071	-0.11381	0.08178
03-07		-0.13322	-6.49E-04	-0.0118	-0.04269	0.03934	-0.17504	-0.04419	-0.00737
04-07		-0.18222	-0.05271	-0.0268	-0.12878	0.05936	-0.23758	-0.12962	0.04411
05-07		-0.20623	0.00493	-0.09869	-0.16209	-0.00134	-0.10988	-0.16253	0.00267
06-07		-0.23878	-0.00258	-0.10523	-0.2455	-0.04809	-0.0669	-0.24785	-0.04947
07-07	0.00977	-0.24219	-0.22715	-0.16945	-0.24448	-0.50889	0.00401	-0.24183	-0.4565
08-07	-0.034	-0.1257	-0.43787	-0.00892	-0.1307	-0.69223	-0.10987	-0.13037	-0.73505
09-07		-0.04859	-1.25602	-0.04374	-0.11001	-1.31315	-0.40227	-0.04472	-1.30118
10-07		-0.12737	-0.66193	-0.20144	-0.08036	-0.71423	-0.27536	-0.13766	-0.71455
11-07		-0.09881	-0.34126	-0.14343	-0.09696	-0.23162	-0.06284	-0.10257	-0.23047
12-07		-0.01214	-0.24118	-0.12413	-0.01235	-0.2567	-0.04596	-0.01522	-0.25653
13-07		0.05745	-0.50485	-0.17762	0.05554	-0.28225	-0.12628	0.05446	-0.28872
14-07		-0.04658	-0.26414	-0.1062	-0.048	-0.19939	-0.0931	-0.04867	-0.19963
15-07		-0.63536	-0.24449	-0.04218	-0.63886	-0.22178	-0.01203	-0.63376	-0.15998
16-07	0.35513	-1.16786	-0.18353	-0.08796	-1.16888	-0.03847	0.06389	-1.16972	-0.08117
17-07	0.52097	-0.66792	-0.0442	-0.02228	-0.66975	-0.00141	0.03897	-0.66995	-0.0549
18-07	0.16839	-0.15175	-3.75E-04	-0.07147	-0.15297	-0.01308	-0.01238	-0.15293	-0.02364
19-07	0.18132	0.0296	-0.14824	-0.00801	0.03118	-0.1618	0.04785	0.03127	-0.06542
20-07	0.21072	-0.23902	-0.99185	-0.00452	-0.23833	-1.01028	0.06295	-0.23854	-1.06709
21-07	-0.57433	-0.54032	-1.2124	-0.00158	-0.53802	-1.20621	0.01019	-0.5374	-1.20632
22-07	-0.03599	-0.36288	-0.39757	-2.27E-04	-0.35955	-0.39884	-0.00594	-0.35949	-0.39663
23-07	0.11853	-0.38116	-0.03439	-9.12E-04	-0.38185	0.02409	-0.00622	-0.38143	0.02181
24-07	0.26753	-0.19567	-0.00624	-0.00144	-0.20481	-0.00442	-1.45E-04	-0.19614	-0.00864
25-07	0.22649	-0.09452	-0.38412	-0.00103	-0.08678	-0.38427	0.00582	-0.09449	-0.37688
26-07	0.13792	0.05097	-0.61658	6.06E-06	0.05093	-0.61786	0.06376	0.05096	-0.61394
27-07	0.22023	-0.1753	-0.30867	0.0014	-0.17513	-0.26765	0.01739	-0.17531	-0.26112
28-07	-0.16775	-0.19595	-0.0705	0.00302	-0.19606	-0.12307	0.01566	-0.19595	-0.12369
29-07	-0.06463	-0.02184	-0.37431	0.00406	-0.02184	-0.36673	0.00699	-0.02185	-0.36605
30-07	-1.53E+00	-0.02121	-0.70519	0.00375	-0.02001	-0.70491	-0.01078	-0.02108	-0.7045
31-07	-4.55E-01	0.0439	-0.17569	-0.00211	0.04404	-0.12345	-0.15182	0.04392	-0.17585

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
DATE	S9	S10	S11	S12	S13	S14	S15	S16	S17
01-08		0.06675	0.02733	-0.09037	0.06686	-0.02828	-0.12947	0.06675	0.02915
02-08	0.77579	0.01345	0.08157	-0.02046	0.01297	0.08024	-0.05299	0.01345	0.08158
03-08	-0.8613	-0.23822	0.06308	-0.15618	-0.23819	0.12391	-0.04744	-0.23823	0.06376
04-08		-0.09793	0.04041	-0.01455	-0.0979	0.00575	-0.2532	-0.09792	0.04034
05-08		0.0011	0.06132	-0.11904	9.78E-04	0.08111	-0.26498	0.00109	0.06132
06-08		0.02807	0.08757	-0.13759	0.02809	0.03306	-0.15444	0.02808	0.08756
07-08		-0.02204	0.05195	-0.14638	-0.02201	0.05068	-0.23495	-0.02202	0.05196
08-08		-0.00644	0.06192	-0.20443	-0.00647	0.06144	-0.13257	-0.00645	0.0619
09-08		-0.24617	-0.012	-0.13417	-0.2462	0.04045	-0.43584	-0.24619	-0.01199
10-08		-0.20411	-0.29814	-0.65189	-0.20413	-0.34807	-0.8494	-0.20412	-0.29815
11-08		-0.09065	-0.25228	-0.37266	-0.09064	-0.25391	-0.24554	-0.09064	-0.25228
12-08		0.0096	-0.23087	-0.23511	0.00962	-0.17667	-0.14085	0.00961	-0.23086
13-08		0.02386	-0.20201	-0.12893	0.02386	-0.19794	0.06568	0.02384	-0.202
14-08		-0.02504	-0.3373	-0.10713	-0.02503	-0.34236	-0.16422	-0.02503	-0.3373
15-08		0.03434	-0.14207	-0.37191	0.03432	-0.13811	-0.34108	0.03436	-0.14206
16-08		0.05309	0.02102	-0.3604	0.0531	-0.02764	-0.42473	0.05307	0.02101
17-08		0.01063	-0.00482	-0.15434	0.01063	-0.01024	-0.17898	0.01063	-0.00484
18-08		0.06301	-0.02384	-0.09278	0.063	0.03063	0.09262	0.06303	-0.02385
19-08		0.01594	0.00175	-0.01538	0.01594	-0.04897	-0.0097	0.01594	0.00177
20-08	0.77216	-0.00451	-0.05256	-0.06038	-0.00451	-4.61E-04	0.04311	-0.00451	-0.05257
21-08	0.26436	-0.00764	-0.09624	0.00368	-0.00764	-0.09203	0.06669	-0.00764	-0.09625
22-08	0.13289	1.78E-04	-0.08465	0.00661	1.92E-04	-0.08212	0.03736	1.80E-04	-0.08465
23-08	0.20052	-0.31695	-0.0874	0.00994	-0.31694	-0.14531	0.10095	-0.31695	-0.0874
24-08	-1.50491	-0.9246	-0.09374	0.00825	-0.92461	-0.0991	8.02E-04	-0.92461	-0.09373
25-08	-0.12576	-0.173	-0.1061	-0.02472	-0.173	-0.10924	-0.05788	-0.173	-0.10609
26-08	0.80585	-0.05528	-0.15057	-0.02763	-0.05525	-0.09391	-0.04518	-0.05526	-0.1506
27-08	0.2204	0.02626	-0.09476	-0.01215	0.02626	-0.08963	-0.02373	0.02626	-0.09475
28-08	0.22193	0.05232	0.00121	-0.00228	0.05233	-0.06028	-0.01104	0.05233	0.0012
29-08	-0.29573	0.067	-0.04087	0.00216	0.06701	0.02191	-0.00623	0.067	-0.04088
30-08	-1.20486	0.0269	0.02678	-0.00669	0.02688	-0.02516	-0.02471	0.02687	0.02679
31-08		-0.02495	0.03974	-0.09707	-0.02495	0.03774	-0.68155	-0.02495	0.03977
01-09		0.02998	0.05213	-0.08614	-0.34326	-0.22603	-1.12296	-1.26109	-1.07071
02-09		-0.0107	0.00494	-0.01356	-1.11645	-0.99185	-0.29829	-1.25975	-1.35208
03-09		0.04153	-0.08268	-0.00467	-0.28958	-0.88704	0.05525	-0.29955	-1.07895
04-09		0.00137	-0.75705	-7.30E-05	0.00932	-0.85241	0.00342	-0.33958	-1.03861
05-09		0.00311	-0.22685	0.00222	0.06911	-0.08373	0.06594	0.08356	-0.04827
06-09		0.06157	-0.18322	-0.01566	0.04726	-0.17103	-0.07197	0.1016	-0.05766
07-09		0.02179	-0.40117	-0.20799	0.05833	-0.34815	-0.26366	0.14492	-0.35079
08-09		0.08216	-0.21173	-0.24652	0.03367	-0.12413	-0.15167	-0.00151	-0.04786
09-09		0.01935	-0.01955	-0.03393	0.0976	0.0101	-0.05625	0.06485	0.03647
10-09		0.03419	-0.03328	-0.10928	0.07165	-0.00933	-0.12243	0.09248	0.07889
11-09		0.09434	0.04725	-0.1139	0.08088	0.07492	-0.05243	0.116	0.02319
12-09		0.15481	0.00495	-0.01951	0.09675	0.03781	-0.08201	0.08104	0.08693
13-09		0.03064	0.00594	-0.01448	0.04193	0.0448	-0.00531	0.10007	-0.00489
14-09		0.03554	-0.04468	-0.00683	0.03939	-0.04696	-0.3825	0.04276	-0.00115
15-09		-0.13614	0.01605	3.83E-04	-1.47299	-0.38185	-0.99355	-2.91089	-1.45252
16-09		-0.78586	0.03928	0.00408	-1.34455	-1.04274	-0.28538	-1.42568	-1.39153
17-09		-0.46043	-0.00624	0.0073	-0.62936	-0.26365	0.01624	-0.37736	0.05003
18-09		-0.18756	0.05504	0.01094	-0.44568	0.08588	0.00925	-0.47596	-0.27077
19-09		-0.03188	0.01234	0.01356	0.15231	0.01752	0.08059	0.04898	0.04481
20-09		0.05211	0.06044	0.01678	0.05773	0.08538	0.05047	0.23027	0.13473
21-09	1.02182	0.08403	0.01387	0.02261	0.22109	0.00116	0.07569	0.12083	0.05297
22-09	-1.20668	-0.03862	0.01413	0.01765	-0.03384	0.06876	0.04008	0.07168	0.09155

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
DATE	S9	S10	S11	S12	S13	S14	S15	S16	S17
23-09		-0.09627	0.01965	-0.01998	-0.15018	0.0439	-0.06037	-0.07092	0.0599
24-09		-0.38477	0.07762	-0.03232	-0.27545	0.04752	-0.07024	-0.28655	0.08572
25-09		-0.50165	0.03453	-0.02576	-0.55484	0.07146	-0.05744	-0.51624	0.10829
26-09		-0.15898	0.09465	-0.01315	-0.11553	0.08295	-0.04031	-0.12753	0.07813
27-09	0.96919	0.01553	0.15353	7.68E-04	8.97E-04	0.09307	0.0401	-0.00667	0.08842
28-09	0.10833	-0.00114	0.027	0.00801	0.10858	0.03635	-0.01127	0.03579	0.03928
29-09	-1.29917	0.12911	0.03411	-0.08178	0.02719	0.09415	-0.03645	0.07155	0.08636
30-09		-0.00389	0.09455	-0.3352	0.04062	0.16637	-1.2281	0.09784	0.09863
01-10		0.12019	0.02998	-0.25493	-0.0313	-0.15434	-1.32471	-0.76636	-0.31811
02-10		0.08175	0.08967	-0.15451	-0.77297	-0.61347	-0.31776	-1.54543	-1.69886
03-10		0.08953	0.09316	-0.07542	-0.28409	-0.22701	0.12118	0.10955	-0.0097
04-10		0.02559	0.03281	0.00849	-0.10686	-0.12234	0.07007	-0.41009	-0.15788
05-10		-0.07817	-0.02825	0.08601	-0.35705	0.00104	0.11577	-0.49749	-0.01262
06-10	1.08808	-0.41455	0.02876	0.06312	-0.52716	0.01132	0.10965	-0.47353	0.07246
07-10	0.36426	-0.2123	0.02475	0.07733	-0.1932	0.02723	0.13934	-0.01249	-0.00442
08-10	0.2247	-0.07183	0.02495	0.09125	0.08838	0.04492	0.07092	0.13849	0.05705
09-10	0.13147	0.01979	0.02811	0.03933	0.04375	-0.00246	0.07008	0.01921	0.07914
10-10	0.23574	0.09471	0.0314	0.08617	0.05688	0.0573	0.08261	0.14634	0.0464
11-10	0.13531	0.07019	0.09138	0.03552	0.08267	0.00795	0.0867	0.0737	-0.00592
12-10	0.12892	0.08405	-0.00157	0.03632	0.10539	-0.01441	0.03559	0.09443	0.02538
13-10	0.14597	0.03323	0.00273	0.16537	0.07889	-0.01108	0.02921	0.12322	-0.01479
14-10	-2.69303	0.09859	0.00844	0.0143	0.14605	0.0039	0.03489	0.09036	-0.00134
15-10		0.10924	0.01859	0.03512	0.00395	-0.05593	-0.84	-0.30681	-0.81454
16-10		0.17936	0.01894	0.09425	-0.60646	-0.83552	-0.20127	-1.35	-1.45568
17-10		0.01117	0.06191	0.03527	-0.23744	-0.30495	-0.02177	-0.33508	-0.10752
18-10		0.02676	-0.01347	0.09516	-0.08667	-0.52486	0.01125	0.07769	-0.96175
19-10	1.40448	0.10464	-0.32537	0.10194	0.00624	-0.64496	0.08886	0.01527	-0.57273
20-10	0.22999	0.04201	-0.13697	0.10383	0.08225	-0.15392	0.06435	0.09562	-0.04504
21-10	-0.4426	0.10321	-0.07437	0.03196	0.06312	0.09418	0.07024	0.07412	0.15248
22-10	-0.58095	0.10733	0.00397	0.01365	0.08191	0.13543	0.05359	0.17299	0.22398
23-10	0.08801	0.10693	0.0168	2.33E-04	0.15265	0.08788	-0.01509	0.08845	0.07144
24-10	0.35933	0.04469	0.02865	-3.25E-04	0.05393	0.0973	-0.00966	0.07617	0.13381
25-10	0.43174	0.02356	0.09494	0.06518	0.02479	0.12723	0.00325	0.01029	0.16669
26-10	0.15291	0.06933	0.09932	0.00836	0.0164	0.14726	0.01608	0.06923	0.13187
27-10	0.25004	0.02181	0.10331	0.01874	0.02824	0.11415	0.0262	0.0243	0.10389
28-10	0.3384	0.08722	0.10688	0.09049	0.03593	0.11438	0.08395	0.09736	0.11369
29-10	0.26555	0.03006	0.04436	0.02375	0.14765	0.16734	0.10206	0.03029	0.11336
30-10	0.27326	0.09162	0.09283	0.09554	0.03845	0.03273	0.04443	0.15881	0.03738
31-10	-3.22808	0.09831	0.01806	0.10449	0.10632	0.01579	0.00462	0.03994	0.0202
01-11		0.04469	0.0087	0.04179	0.01371	-0.25156	-0.52763	-0.38926	-1.12728
02-11		0.09687	0.00274	0.10453	-0.55043	-1.09542	-0.10425	-1.63241	-1.48204
03-11		0.10077	0.06505	0.11216	-0.20934	-0.27488	-0.03608	-0.0596	-0.11225
04-11	0.91961	0.0367	-0.00136	0.04579	-0.05155	0.01101	-0.01464	-0.27391	-0.33675
05-11	0.36785	0.02187	0.01744	0.04068	-0.02192	0.07281	0.04702	0.10289	0.14052
06-11	0.43269	0.1383	0.02195	0.15287	-0.0098	0.02543	0.06689	0.04739	0.13074
07-11	0.36095	0.03083	0.00991	0.03922	0.05999	0.0266	0.08916	0.06885	0.16255
08-11	0.35334	0.0419	0.0037	0.10193	0.02094	0.03447	0.10468	0.0894	0.07833
09-11	0.2817	0.10284	0.00181	0.10961	0.09229	-0.0118	0.04592	0.1214	0.03481
10-11	0.3672	0.10324	0.06616	0.03637	0.11196	0.05696	0.1099	0.1476	0.0458
11-11	0.28239	0.1032	0.03117	0.10306	0.1173	0.08336	0.16731	0.12394	0.06197
12-11	0.37047	0.1052	0.0948	0.10322	0.16148	0.09648	0.11728	0.11688	0.07683
13-11	0.32388	0.04165	0.1127	0.10507	0.04943	0.10809	0.11738	0.16695	0.09263
14-11	-4.24818	0.10161	0.03499	0.10411	0.10843	0.11059	0.08987	0.04987	0.1067

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)								
	S9	S10	S11	S12	S13	S14	S15	S16	S17
15-11	0.06391	0.09773	0.15575	0.10063	0.07855	0.02267	-0.49099	-0.26967	-0.38304
16-11	0.87039	0.10001	0.04561	0.04253	-0.49074	-0.52219	-0.13921	-1.49422	-1.56623
17-11	0.37599	0.10252	0.10654	0.09789	-0.13354	-0.09971	-0.06777	-0.13021	0.05128
18-11	0.44204	0.03854	0.09973	0.09721	-0.0047	-0.03304	0.00693	-0.16941	-0.25968
19-11	-2.14E+00	0.099	0.09957	0.03922	0.02342	-0.00455	-0.00868	0.09754	0.11967
20-11		0.10431	0.10965	0.06294	0.04601	0.06968	-0.25345	0.20274	0.10822
21-11		0.16715	0.03601	-0.02352	0.10888	0.0937	-0.17545	0.12281	0.1486
22-11	1.31205	0.02485	0.10375	-0.07873	0.16005	0.11126	-0.0389	0.14171	0.1307
23-11	0.33047	0.03887	0.10004	0.00135	0.04222	0.11734	0.04376	0.09721	0.15643
24-11	0.23015	0.09476	0.09883	0.00135	0.1019	0.17025	0.05655	0.10515	0.17502
25-11	0.36254	0.09293	-0.02401	0.00463	0.10026	0.0413	0.01885	0.10588	0.04215
26-11	0.3631	0.03135	0.05905	0.01112	0.10811	0.01305	0.07121	0.15995	0.00913
27-11	0.37755	0.03492	0.08586	0.01551	0.02202	0.00291	0.10506	0.02106	0.00176
28-11	0.29135	0.08422	0.02283	0.08721	0.02043	0.09267	0.18156	0.0196	0.08612
29-11	0.36872	0.02747	0.08201	0.03231	0.0881	0.03774	0.06142	0.03434	0.15908
30-11	-3.88229	0.0841	0.03496	0.16476	0.09961	0.10137	0.07001	0.10092	0.04138
01-12		0.03041	0.09184	0.01336	0.0246	0.07147	-1.05554	-0.2105	-0.05506
02-12		0.08706	0.16759	0.01487	-0.34459	-0.57231	-0.59793	-1.55496	-1.60426
03-12		0.09167	0.01322	0.00393	-0.19274	-0.07992	-0.03536	-0.03985	-0.04046
04-12		0.03459	0.03586	1.41E-04	-0.01117	-0.01094	-0.13297	-0.10373	-0.04337
05-12		0.09022	0.09992	-0.02114	0.01087	0.01498	-0.19688	0.0539	0.00317
06-12		0.093	0.03683	-0.15137	0.02641	0.03618	-0.04656	0.10117	0.1497
07-12	1.19385	0.03405	0.09658	-0.02097	0.09365	0.18437	-0.00961	0.12082	0.13104
08-12	0.43929	0.09202	0.09716	-0.01065	0.10173	0.03262	0.0738	0.14569	0.15332
09-12	0.44441	0.03718	0.10389	-7.71E-04	0.10584	0.11588	0.10352	0.11248	0.11926
10-12	0.36429	0.09342	0.02986	0.00892	0.0442	0.10936	0.0852	0.05751	0.11976
11-12	0.37041	0.02886	0.09547	0.01874	0.02496	0.11213	0.16404	0.0392	0.1718
12-12	0.29147	0.01931	0.09747	0.01755	0.00904	0.11323	0.11978	0.02542	0.118
13-12	0.36434	0.13432	0.03591	0.14954	0.00375	0.1123	0.11897	-0.03151	0.11533
14-12	-3.73034	0.01022	0.0947	0.03487	0.01453	0.11198	0.02471	0.02904	0.10653
15-12		0.01247	0.03841	0.09455	0.06843	0.03153	-0.3972	-0.16016	-0.21566
16-12		0.01762	0.08473	0.03794	-0.43814	-0.38703	-0.12247	-1.59477	-1.65654
17-12	1.54749	0.02196	0.02597	0.09651	-0.19729	-0.21031	-0.07634	0.01031	-0.1431
18-12	0.33076	0.08457	0.08023	0.09603	-0.01182	-0.13771	0.05654	-0.1206	-0.17017
19-12	0.13097	0.02471	0.03221	0.0385	0.0158	0.00857	0.0745	0.10912	0.09803
20-12	0.26641	0.08696	0.03606	0.03758	0.03663	0.07184	0.01922	0.15275	0.06879
21-12	0.34087	0.02836	0.08995	0.09181	0.15835	0.00334	0.09585	0.11935	0.02916
22-12	0.26848	0.08771	0.02397	0.09203	0.04566	0.01171	0.1102	0.14257	0.04637
23-12	0.35955	0.02998	0.02149	0.03157	0.10258	0.02864	0.18299	0.15887	0.13866
24-12	0.27357	0.08974	0.13703	0.09136	0.10417	0.03718	0.03383	0.11597	0.02265
25-12	0.27384	0.02983	0.01856	0.03578	0.10348	0.03091	0.11222	0.16548	0.05417
26-12	0.2894	0.08588	0.01595	0.09102	0.10785	0.03034	0.11075	0.04454	0.02301
27-12	0.3079	0.02999	0.01529	0.09384	0.10994	0.09653	0.10982	0.11305	0.09552
28-12	0.19783	0.0852	0.01736	0.03534	0.10509	0.02557	0.10857	0.11211	0.02857
29-12	0.19188	0.03124	0.07479	0.09706	0.04782	0.00903	0.11084	0.10916	0.00695
30-12	0.19117	0.0832	0.01141	0.03462	0.10919	0.07623	0.10378	0.11133	0.08283
--	0.29769	0.08999	0.01407	0.14603	0.10379	0.10406	0.1072	0.10899	0.1685

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)									
DATE	**S18**	**S19**	**S20**	**S21**	**S22**	**S23**	**S24**	**S25**	**S26**	**S27**
01-01										
02-01	-0.1712	-0.48588	-0.01135	-0.01139	-0.01741	-0.01722	-0.0179	-0.48588	-0.48509	-0.48802
03-01	-1.7012	-0.08418	-0.84673	-0.84713	-1.15411	-1.14254	-1.21185	-0.08418	-0.04461	0.01022
04-01	-0.35384	-1.42849	0.00746	0.00665	-0.35308	-0.38598	-0.34507	-1.42849	-1.36897	-1.54808
05-01	-0.09877	-0.98597	0.17072	0.16673	-0.066	-0.00741	-0.07661	-0.98597	-0.95858	-0.96088
06-01	-4.57E-04	-0.12404	0.10341	0.10146	-0.0189	-0.01971	-0.03327	-0.12404	-0.06814	-0.04486
07-01	0.01744	0.14083	0.11462	0.05582	-0.03575	0.081	0.09671	0.14083	0.01739	0.00997
08-01	0.02982	0.05562	-0.02109	0.00294	0.02759	0.04874	0.04936	0.05562	0.06407	0.06148
09-01	0.08897	0.04242	-0.0063	0.05423	-0.02939	-0.0511	-0.047	0.04242	0.04395	0.08269
10-01	0.09504	-0.025	0.02974	-0.01481	-0.03575	-0.02683	-0.02526	-0.025	0.11515	-0.00612
11-01	0.1769	-0.03239	0.02225	0.00606	-0.00306	0.01697	0.01795	-0.03239	-0.04717	0.03948
12-01	-0.03438	0.00796	0.04353	0.02112	-0.02229	-0.00698	-0.00882	0.00796	0.02118	0.0197
13-01	0.15095	-0.02261	0.00205	0.07034	0.00376	0.01047	0.08675	-0.02261	-0.0103	-0.00119
14-01	-0.00576	0.07541	0.00974	0.01264	0.01732	-0.00219	-0.06543	0.07541	0.03586	0.12326
15-01	-1.45502	0.06579	0.02165	-0.03488	-0.00434	0.07299	-0.00155	0.06579	0.05833	0.00993
16-01	-0.21609	-0.09285	0.03351	0.03136	0.00592	0.02489	0.0164	-0.09285	-0.01065	-0.28048
17-01	-0.00702	-0.19436	-0.01328	0.04011	0.01259	-0.03817	0.00389	-0.19436	-0.15427	-0.43517
18-01	0.02009	-0.42819	0.04269	-0.00601	-0.0484	0.01925	-0.05583	-0.42819	-0.38364	-0.32868
19-01	0.03476	-0.32601	0.00122	0.04938	-0.0583	-0.03973	-0.05986	-0.32601	-0.25349	-0.18961
20-01	0.1741	-0.18907	0.05603	0.00598	-0.05929	-0.04279	-0.05629	-0.18907	-0.1669	-0.10027
21-01	0.02188	-0.08333	0.012	0.00637	-0.05381	-0.04094	-0.05051	-0.08333	-0.13517	-0.07136
22-01	0.0431	-2.0361	0.01214	0.06395	-1.28373	-0.03691	-0.04421	-2.0361	-0.11274	-4.73E-04
23-01	0.10251	-3.54803	0.07178	0.01458	-3.73012	-0.0318	0.01689	-3.54803	0.00778	-0.01133
24-01	0.09941	-0.98776	0.01046	0.01248	-1.11613	-0.02658	-0.02477	-0.98776	-0.00492	-0.00197
25-01	0.09878	-0.12523	0.01405	0.01389	-0.24786	0.03298	-0.02248	-0.12523	-0.06131	-0.05981
26-01	0.09585	0.04848	0.01547	0.07118	-0.0161	-0.00996	0.03608	0.04848	0.00496	0.00788
27-01	0.03922	0.00895	0.07623	0.01322	0.05079	-0.00851	-0.00619	0.00895	0.02091	0.02426
28-01	0.10102	0.05014	0.01077	0.01453	0.01882	-0.00463	-0.00534	0.05014	-0.02576	-0.0231
29-01	0.0997	0.05541	0.01533	0.01529	0.0214	0.05213	0.05333	0.05541	0.03481	0.03469
30-01	0.1022	0.00329	0.01634	0.07053	0.08243	0.00891	0.00702	0.00329	-0.01038	-0.00807
31-01	-0.10298	-0.0039	0.07227	0.01437	-0.08866	0.0081	0.00753	-0.0039	0.04265	0.04813
01-02	-1.62709	0.10963	0.01432	0.01614	0.03028	0.01038	0.01016	0.10963	0.00135	0.00165
02-02	-0.07252	0.03595	0.01584	0.0166	0.07976	0.06861	0.00996	0.03595	4.83E-04	-0.0249
03-02	-0.11639	-0.35083	0.01648	0.06995	-0.09343	0.00658	0.0037	-0.35083	0.03246	-0.13736
04-02	0.02329	-0.50955	0.06928	0.01539	-0.03427	0.00405	-0.00534	-0.50955	-0.12192	-0.16686
05-02	0.05634	-0.29767	0.01539	0.01666	-0.09098	-0.00352	-0.01183	-0.29767	-0.21317	-0.17277
06-02	0.13013	-0.20388	0.01662	0.07282	-0.02648	-0.00939	-0.0142	-0.20388	-0.16667	-0.1617
07-02	0.0954	-0.05444	0.07754	0.01233	-0.07521	-0.01196	-0.0141	-0.05444	-0.09621	-0.09247
08-02	0.10519	-0.07788	0.00729	0.01621	-0.06767	-0.01157	-0.01478	-0.07788	-0.08189	-0.07641
09-02	0.10635	0.0666	0.01604	0.01699	2.61E-04	-0.00968	-0.01218	0.0666	-0.0706	-0.00649
10-02	0.16866	-0.09281	0.01697	0.07083	-0.04237	-0.06129	-0.00938	-0.09281	-0.06026	-0.05045
11-02	0.04144	-0.01528	0.07112	0.01407	0.01991	-0.00299	-0.00631	-0.01528	-0.05083	0.01357
12-02	0.10926	0.00145	0.0126	0.01654	-0.02389	-0.00289	-0.0031	0.00145	0.01198	-0.03123
13-02	0.10914	0.01508	0.01677	0.0175	0.0303	7.77E-04	7.53E-05	0.01508	-0.02767	0.03129
14-02	-0.21746	-0.03497	0.01755	0.06942	-0.00941	0.0038	0.00317	-0.03497	0.03162	-0.01794
15-02	-1.57255	0.02902	0.07062	0.01534	0.04647	0.00659	0.00594	0.02902	0.04807	0.04118
16-02	-0.03787	-0.0223	0.01411	0.01661	0.00127	0.0091	0.00679	-0.0223	-0.01187	-0.12775
17-02	-0.15407	-0.09733	0.01672	0.01733	-0.00457	0.00862	0.00239	-0.09733	-0.13325	-0.27093
18-02	0.05443	-0.29178	0.0175	0.07424	-0.02235	0.00326	-0.00543	-0.29178	-0.27428	-0.28356
19-02	0.08047	-0.30143	0.08273	0.015	-0.04121	-0.0043	-0.01095	-0.30143	-0.27826	-0.2012
20-02	0.17261	-0.21517	0.01178	0.01674	-0.10922	-0.00953	-0.01464	-0.21517	-0.14742	-0.12968
21-02	0.08762	-0.13974	0.01635	0.01746	-0.05325	-0.01108	-0.01484	-0.13974	-0.12028	-0.10813
22-02	0.09974	-0.11677	0.01589	0.01774	-0.04746	-0.01041	-0.01372	-0.11677	-0.10112	-0.02725

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)									
DATE	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
23-02	0.11741	-0.03978	0.01611	0.07967	-0.04244	-0.01006	-0.01157	-0.03978	-0.08614	-0.0757
24-02	0.10455	-0.01758	0.07672	0.01373	-0.03696	-0.00744	-0.0088	-0.01758	-0.01669	-0.00988
25-02	0.15518	-0.06571	0.01406	0.01497	-0.03122	-0.00438	-0.00576	-0.06571	0.00554	0.00832
26-02	0.03831	1.11E-04	0.01495	0.07954	-0.02575	-0.00123	-0.00269	1.11E-04	-0.04291	-0.03746
27-02	0.10593	0.0139	0.0763	0.00958	-0.02085	0.00172	2.47E-04	0.0139	0.01946	0.01813
28-02	-0.34232	-0.03266	0.01156	0.01384	-0.01681	0.00449	0.00311	-0.03266	0.04038	0.04406
01-03	-1.50818	0.02793	0.01417	0.01457	-0.01332	0.00699	0.00565	0.02793	-0.02258	-0.02578
02-03	-0.05246	0.12017	0.01471	0.07382	0.04314	0.00911	0.00604	0.12017	0.12888	-0.15329
03-03	-0.18145	-0.31855	0.07093	0.01102	-0.00363	0.00769	2.00E-04	-0.31855	-0.22905	-0.31596
04-03	0.09762	-0.38313	0.01197	0.0133	-0.01501	3.79E-04	-0.00907	-0.38313	-0.36914	-0.29869
05-03	0.14305	-0.29807	0.01376	0.01417	-0.0262	-0.0101	-0.01584	-0.29807	-0.30603	-0.16362
06-03	0.11885	-0.17069	0.01443	0.07157	-0.03231	-0.01683	-0.01839	-0.17069	-0.21954	-0.13036
07-03	0.14164	-0.1394	0.07058	0.01115	-0.03355	-0.019	-0.01818	-0.1394	-0.14047	-0.1098
08-03	0.15556	-0.11866	0.01219	0.01375	-0.0895	-0.02127	-0.0159	-0.11866	-0.11845	-0.02893
09-03	0.11904	-0.03761	0.0135	0.01438	-0.03553	-0.01913	-0.01282	-0.03761	-0.04135	-0.07566
10-03	0.03919	-0.02221	0.01367	0.06962	-0.02929	-0.01645	-0.00945	-0.02221	-0.0207	-0.00396
11-03	0.15698	-0.07167	0.06797	0.01069	-0.02518	-0.0133	-0.00605	-0.07167	-0.00639	0.00829
12-03	0.04393	-0.00679	0.01138	0.01325	-0.02101	-0.00989	-0.0028	-0.00679	-0.05495	0.02291
13-03	0.10402	0.01185	0.01324	0.0139	-0.01681	-0.00634	2.87E-04	0.01185	0.00977	-0.02798
14-03	-0.24338	-0.03485	0.0139	0.07186	0.04201	-0.00292	0.00329	-0.03485	0.02703	0.0422
15-03	-1.65679	0.08997	0.06891	0.00925	-0.002	3.02E-04	0.00587	0.08997	0.03479	-0.02499
16-03	-0.16445	-0.03383	0.01065	0.01315	-0.00182	0.00337	0.00608	-0.03383	-0.02475	-0.16148
17-03	-0.21256	-0.22691	0.013	0.0138	-0.00189	0.00428	-0.00163	-0.22691	-0.13522	-0.38466
18-03	0.13592	-0.39291	0.01351	0.01387	-0.01057	-5.47E-04	-0.01484	-0.39291	-0.29052	-0.31748
19-03	0.01331	-0.3112	0.07486	0.06575	-0.02268	-0.00895	-0.0249	-0.3112	-0.29515	-0.17855
20-03	0.07706	-0.17305	0.0039	0.01232	-0.02995	-0.01551	-0.02884	-0.17305	-0.21023	-0.14478
21-03	0.10566	-0.14058	0.01248	0.01311	-0.03163	-0.01837	-0.08254	-0.14058	-0.13607	-0.12211
22-03	0.12826	-0.11855	0.01327	0.01335	-0.03018	-0.01845	-0.03375	-0.11855	-0.11347	-0.1075
23-03	0.093	-0.04023	0.01373	0.0674	-0.02778	-0.01671	-0.02748	-0.04023	-0.0341	-0.02895
24-03	0.09356	-0.02406	0.06846	0.01087	-0.0255	-0.01403	-0.02388	-0.02406	-0.01565	-0.0203
25-03	0.09463	-0.01282	0.01198	0.01248	-0.07745	-0.01098	-0.02009	-0.01282	0.00289	-0.0053
26-03	0.03902	-0.06442	0.01307	0.01287	-0.02842	-0.00802	-0.01619	-0.06442	-0.05623	0.00915
27-03	0.15048	-3.57E-04	0.01348	0.01299	-0.02244	-0.00545	-0.01246	-3.57E-04	0.01045	-0.03808
28-03	0.04131	-0.04506	0.07059	0.06907	-0.01953	-0.00303	-0.00888	-0.04506	-0.03252	0.02015
29-03	0.10639	0.01425	0.00998	0.01126	0.04697	-5.99E-04	-0.00541	0.01425	0.02574	-0.02101
30-03	-0.34931	-0.02904	0.01235	0.01248	-0.01367	0.00192	0.05134	-0.02904	-0.01708	0.04622
31-03	-1.51627	0.03724	0.01298	0.01288	-0.00778	0.00444	0.00753	0.03724	0.04853	-0.02028
01-04	-0.14441	-0.03335	0.01326	0.071	-0.00419	0.0067	0.00453	-0.03335	-0.0169	-0.15703
02-04	-0.2002	-0.18736	0.06669	0.00821	-0.00531	0.00659	-0.00343	-0.18736	-0.15121	-0.31814
03-04	0.07972	-0.47524	0.01137	0.01207	-0.01768	-7.75E-04	-0.01553	-0.47524	-0.35722	-0.30588
04-04	0.11863	-0.34441	0.01235	0.01272	-0.03295	-0.01209	-0.02396	-0.34441	-0.30052	-0.22735
05-04	0.10733	-0.18344	0.01272	0.01301	-0.04166	-0.01931	-0.02669	-0.18344	-0.16643	-0.14201
06-04	0.06873	-0.1507	0.01283	0.06545	-0.09863	-0.02467	-0.08205	-0.1507	-0.13603	-0.11949
07-04	0.0746	-0.12771	0.06364	0.01081	-0.04653	-0.02435	-0.03103	-0.12771	-0.11681	-0.03803
08-04	0.13725	-0.05824	0.01156	0.01237	-0.04005	-0.07808	-0.02513	-0.05824	-0.10127	-0.01858
09-04	0.04344	-0.03216	0.01247	0.01288	-0.03569	-0.02762	-0.02185	-0.03216	-0.02919	-0.0711
10-04	0.09316	-0.02095	0.01286	0.01317	-0.03165	-0.02123	-0.01833	-0.02095	-0.01164	-0.00992
11-04	0.0393	-0.00856	0.0132	0.06389	-0.02767	-0.01794	-0.01487	-0.00856	0.00128	0.01127
12-04	0.15034	0.00778	0.06319	0.01159	-0.02353	-0.01531	-0.01146	0.00778	-0.0493	-0.03661
13-04	0.03755	-0.04192	0.01165	0.01269	-0.01958	-0.01288	-0.00805	-0.04192	0.01415	0.02191
14-04	-0.24088	0.01908	0.01234	0.01291	-0.01591	-0.01032	0.05098	0.01908	-0.03245	0.03934
15-04	-1.8572	0.02823	0.01249	0.01301	0.04109	-0.00769	0.00359	0.02823	0.03541	-0.02904
16-04	-0.0248	-0.03568	0.01248	0.01304	-0.00273	0.04723	-7.12E-04	-0.03568	-0.03799	-0.27623

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)									
DATE	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
17-04	-0.16001	-0.27325	0.06206	0.01308	-0.00773	-0.00888	-0.01598	-0.27325	-0.2838	-0.475
18-04	7.68E-04	-0.465	0.01049	0.01318	-0.02176	-0.04484	-0.03543	-0.465	-0.42112	-0.35933
19-04	0.09103	-0.28864	0.01138	0.01326	-0.03778	-0.13372	-0.10214	-0.28864	-0.35868	-0.19437
20-04	0.06489	-0.24641	0.01163	0.06538	-0.04513	-0.15792	-0.05489	-0.24641	-0.24991	-0.16008
21-04	0.08669	-0.15907	0.01155	0.01004	-0.10195	-0.1463	-0.10276	-0.15907	-0.17364	-0.07063
22-04	0.11922	-0.07589	0.01132	0.01237	-0.05046	-0.08711	-0.05184	-0.07589	-0.09038	-0.1175
23-04	0.08	0.00344	0.06045	0.01289	-0.04271	-0.07436	-0.04391	0.00344	0.00838	-0.05047
24-04	0.08791	-0.08749	0.00882	0.01297	-0.03826	-0.06574	-0.03907	-0.08749	-0.11201	-0.02156
25-04	0.03538	-0.0228	0.00954	0.01296	-0.03396	-0.05865	-0.0341	-0.0228	-0.09368	-0.01609
26-04	0.03085	0.00257	0.00967	0.01274	-0.02998	-0.05215	-0.02959	0.00257	-0.02	0.00248
27-04	0.03101	-0.06121	0.0096	0.06233	-0.02623	-0.04606	-0.02562	-0.06121	-0.00623	-0.04547
28-04	0.09095	0.00541	0.00975	0.01094	-0.02241	0.01546	0.03298	0.00541	0.00601	0.01592
29-04	0.03043	-0.03755	0.01001	0.01219	-0.01872	-0.02802	-0.01162	-0.03755	-0.04492	-0.02943
30-04	-0.31728	0.02095	0.06331	0.01254	-0.01522	0.03051	-0.01161	0.02095	0.01708	0.02878
01-05	-1.41603	0.03782	0.00528	0.0127	0.04288	-0.01936	-0.00884	0.03782	0.02194	0.13827
02-05	-0.38426	-0.22294	0.00909	0.01272	-0.00356	-0.01838	-0.01135	-0.22294	-0.05017	-0.4138
03-05	0.07972	-0.83914	0.00974	0.0679	-0.05472	-0.02555	-0.02703	-0.83914	-0.45835	-0.47686
04-05	0.01808	-0.72961	0.00997	0.0109	-0.25725	-0.05126	-0.04452	-0.72961	-0.45948	-0.29701
05-05	0.04793	-0.42973	0.01001	0.01167	-0.36322	-0.07101	-0.05243	-0.42973	-0.35074	-0.29839
06-05	-0.38604	-0.21359	0.01007	0.01187	-0.2312	-0.13447	-0.11886	-0.21359	-0.25441	-0.11768
07-05	-1.15055	-0.16309	0.01023	0.01229	-0.14892	-0.1468	-0.06125	-0.16309	-0.12	-0.16536
08-05	-0.45699	-0.0787	0.07366	0.01231	-0.12622	-0.06848	-0.27649	-0.0787	-0.09119	-0.36681
09-05	-0.09339	-0.04611	0.00697	0.01049	-0.11056	-0.06424	-0.437	-0.04611	-0.0597	-0.51095
10-05	-0.07702	-0.01781	0.00816	0.00253	-0.03792	-0.0583	-0.42743	-0.01781	-0.03144	-0.36209
11-05	-0.08622	-0.05141	0.00884	-0.013	-0.0129	-0.0521	-0.29961	-0.05141	-0.02719	-0.27317
12-05	-0.07675	-0.03139	0.00924	-0.03017	-0.07762	0.00763	-0.2167	-0.03139	-0.07821	-0.24112
13-05	-0.25427	-0.01987	0.00946	-0.04425	-0.00862	-0.04636	-0.19636	-0.01987	-0.02686	-0.16557
14-05	-2.37633	-0.0054	0.00909	-0.10524	-0.05708	-0.08862	-0.20237	-0.0054	-0.12298	-0.16164
15-05	-0.24037	0.04975	0.06715	-0.11914	-0.05332	-0.25924	-0.4604	0.04975	-0.31561	-1.21806
16-05	-0.57805	-0.26942	-3.10E-04	-0.12638	0.00484	-0.35601	-0.82756	-0.26942	-0.92578	-1.17612
17-05	-0.36374	-0.6985	-0.00821	-0.12775	-0.08011	-0.67428	-0.51385	-0.6985	-1.14408	-0.54939
18-05	0.09273	-0.70769	-0.01662	-0.18304	-0.27424	-0.5723	-0.27619	-0.70769	-0.63047	-0.22406
19-05	0.16438	-0.42968	-0.08412	-0.11358	-0.23692	-0.41568	-0.15336	-0.42968	-0.43873	-0.09753
20-05	0.09163	-0.2175	-0.02807	-0.1015	-0.22521	-0.42728	-0.05511	-0.2175	-0.37744	-0.0487
21-05	0.04574	-0.10941	-0.09085	-0.03743	-0.1503	-0.3302	-0.11523	-0.10941	-0.25031	0.00782
22-05	0.01271	-0.12282	-0.10333	-0.08634	-0.12843	-0.21848	-0.0491	-0.12282	-0.18577	-0.06514
23-05	0.04607	-0.04561	-0.10852	-0.08463	-0.11305	-0.11832	-0.0147	-0.04561	-0.10651	-0.04417
24-05	0.01646	-0.07722	-0.13022	-0.02099	-0.03728	-0.51669	-0.05134	-0.07722	-0.55871	-0.01042
25-05	0.00287	-0.05704	-0.45764	-0.02103	-0.01789	-0.85567	-0.03106	-0.05704	-0.76942	-0.05113
26-05	-0.06627	0.00556	-0.50582	-0.07451	-0.07172	-0.45021	-0.0234	0.00556	-0.48482	-0.03097
27-05	-0.05243	-0.0119	-0.38132	-0.01548	-0.00934	-0.287	-0.07702	-0.0119	-0.24048	-0.02356
28-05	-0.03586	-0.0702	-0.31008	-0.01607	-0.05287	-0.12303	-0.01758	-0.0702	-0.12197	-0.07678
29-05	0.02313	-0.00768	-0.2122	-0.07526	0.00522	-0.1324	-0.0643	-0.00768	-0.13276	-0.01781
30-05	-2.71682	0.00342	-0.14076	-0.01241	-0.0454	-0.11601	-0.00746	0.00342	-0.11962	-0.02112
31-05	-0.90946	-0.06003	-0.20426	-0.01457	-0.05321	-0.09773	-0.18303	-0.06003	-0.08625	-0.95932
01-06	-0.27183	-0.32058	-0.12144	-0.01838	-0.07769	-0.22701	-0.72236	-0.32058	-0.62246	-1.27509
02-06	-0.45917	-0.97584	-0.12026	-0.08665	-0.32726	-0.48575	-0.64053	-0.97584	-1.04676	-0.83028
03-06	0.04403	-0.60806	-0.13675	-0.10148	-0.43796	-0.4956	-0.32218	-0.60806	-0.61067	-0.27624
04-06	0.12102	-0.50939	-0.07626	-0.04045	-0.4607	-0.41636	-0.25366	-0.50939	-0.43191	-0.2124
05-06	0.12279	-0.55741	-0.07462	-0.10656	-0.53159	-0.30861	-0.16379	-0.55741	-0.24617	-0.10829
06-06	0.00741	-0.3794	-0.13326	-0.09464	-0.44045	-0.15014	-0.07726	-0.3794	-0.1386	-0.0658
07-06	0.07237	-0.19329	-0.08253	-0.09403	-0.28678	-0.16585	-0.095	-0.19329	-0.09614	-0.03187
08-06	0.03324	-0.19967	-0.09132	-0.03152	-0.17511	-0.12729	-0.08286	-0.19967	-0.15907	-0.05214

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)									
	S18	**S19**	**S20**	**S21**	**S22**	**S23**	**S24**	**S25**	**S26**	**S27**
09-06	-0.01229	-0.06027	-0.21069	-0.08414	-0.14458	-0.35571	-0.0102	-0.06027	-0.32216	-0.08022
10-06	-0.07863	-0.22869	-0.50664	-0.02338	-0.10986	-0.57569	-0.03012	-0.22869	-0.58869	0.00269
11-06	-0.08305	-0.2802	-0.56362	-0.02386	-0.25367	-0.53312	-0.09182	-0.2802	-0.54009	-0.04047
12-06	-0.01257	-0.30004	-0.364	-0.07579	-0.33306	-0.41011	-0.03033	-0.30004	-0.37097	-0.09781
13-06	-0.05253	-0.28188	-0.31475	-0.02261	-0.32867	-0.24247	-0.07902	-0.28188	-0.24455	-0.03739
14-06	-1.32721	-0.27049	-0.16387	-0.08259	-0.27057	-0.07903	-0.01964	-0.27049	-0.08659	0.03694
15-06	-1.49851	-0.47805	-0.12379	-0.0191	-0.36513	-0.08365	-0.07849	-0.47805	0.08572	-0.31576
16-06	0.03904	-2.14656	-0.04364	-0.02188	-1.26419	-0.14	-0.23339	-2.14656	-0.49015	-1.01526
17-06	-0.31167	-1.49441	-0.07603	-0.07636	-1.44775	-0.29348	-0.35109	-1.49441	-1.12255	-0.75417
18-06	1.64E-04	-1.20419	-0.05353	-0.01554	-0.74586	-0.36786	-0.32633	-1.20419	-0.8168	-0.3861
19-06	0.01624	-0.3068	-0.04819	-0.01448	-0.41172	-0.32129	-0.20175	-0.3068	-0.33352	-0.2325
20-06	0.0844	-0.19061	-0.01736	-0.01293	-0.20992	-0.1723	-0.17031	-0.19061	-0.09422	-0.13651
21-06	0.02698	-0.09636	-0.01329	-0.06728	-0.08591	-0.13063	-0.14998	-0.09636	-0.02369	-0.03782
22-06	0.041	-0.02594	0.00176	-0.0085	-0.08854	-0.04641	-0.07645	-0.02594	0.01932	-0.07316
23-06	0.06404	-0.07377	-0.04951	-0.00818	-0.09312	-0.07956	-0.0566	-0.07377	-0.10743	-0.04009
24-06	0.08197	0.03457	0.01081	-0.00737	-0.04498	-0.06143	-0.03199	0.03457	-0.03872	-0.06356
25-06	0.04394	-0.05981	-0.03983	-0.00627	-0.06744	-0.06459	-0.08411	-0.05981	-0.08904	0.00513
26-06	0.05573	-0.11151	-0.0487	-0.00521	-0.05466	-0.12969	-0.01811	-0.11151	-0.15556	-0.08369
27-06	-0.00127	-0.06495	-0.06269	-0.05735	-0.10177	-0.15092	-0.00474	-0.06495	-0.17307	-0.01822
28-06	0.06238	-0.15758	-0.0773	-0.00188	-0.09663	-0.15636	-0.05284	-0.15758	-0.17508	-0.00767
29-06	0.01305	-0.0954	-0.08413	-0.0018	-0.14047	-0.14941	0.00826	-0.0954	-0.10549	-0.05491
30-06	-0.00552	-0.08137	-0.14226	-0.00127	-0.07803	-0.13559	-0.03935	-0.08137	-0.1411	0.00752
01-07	-0.0661	-0.13149	-0.08579	-6.98E-04	-0.12654	-0.12164	-0.03761	-0.13149	-0.12685	-0.03919
02-07	-0.21418	-0.07591	-0.07535	-5.56E-04	-0.05887	-0.04521	0.0208	-0.07591	-0.05926	0.01635
03-07	-0.22609	-0.12029	-0.06849	-0.00191	-0.1181	-0.09142	-0.02824	-0.12029	-0.03231	-0.03274
04-07	-0.20181	-0.05447	-0.0622	-0.00591	-0.11736	-0.02754	-0.03701	-0.05447	-0.0199	-0.04141
05-07	-0.10766	-0.11479	-0.05664	-0.01303	-0.11646	-0.00119	-0.04636	-0.11479	-0.07243	-0.05081
06-07	-0.06808	-0.12142	0.00404	-0.07956	-0.12171	-0.06557	-0.05686	-0.12142	-0.00932	-0.06156
07-07	0.00388	-0.13168	-0.04068	-0.02712	-0.13189	-0.05789	-0.06283	-0.13168	-0.05522	-0.06653
08-07	-0.11133	-0.14435	-0.04942	-0.10022	-0.14572	-0.00588	-0.12109	-0.14435	-0.0628	-0.06647
09-07	-0.40078	-0.2057	-0.09676	-0.04731	-0.14866	-0.16656	-0.06998	-0.2057	-0.11482	-0.0662
10-07	-0.27571	-0.1477	-0.66036	-0.05771	-0.14018	-0.58576	-0.07992	-0.1477	-0.61981	-0.13658
11-07	-0.06626	-0.13748	-0.67928	-0.13508	-0.13345	-0.78742	-0.16328	-0.13748	-0.74304	-0.17232
12-07	-0.04428	-0.13097	-0.52071	-0.15973	-0.12904	-0.47434	-0.18992	-0.13097	-0.5352	-0.12006
13-07	-0.12665	-0.12417	-0.39187	-0.16937	-0.12187	-0.39538	-0.11458	-0.12417	-0.34708	-0.17944
14-07	-0.0346	-0.0425	-0.32937	-0.10908	-0.11178	-0.33334	-0.11553	-0.0425	-0.3292	-0.12332
15-07	-0.00285	-0.10518	-0.31206	-0.10573	-0.1028	-0.3159	-0.11356	-0.10518	-0.31371	-0.11556
16-07	0.01894	-0.12324	-0.29812	-0.10167	-0.06578	-0.30085	-0.10757	-0.12324	-0.30018	-0.10918
17-07	0.0339	-0.47842	-0.21622	-0.09386	-0.52806	-0.21996	-0.09916	-0.47842	-0.22051	-0.10082
18-07	-0.01807	-0.65364	-0.18158	-0.08535	-0.6539	-0.12339	-0.09009	-0.65364	-0.18509	-0.09156
19-07	0.04516	-0.43514	-0.15855	-0.07716	-0.40442	-0.15206	-0.08134	-0.43514	-0.09902	-0.02012
20-07	0.06067	-0.28255	-0.08682	-0.06989	-0.27893	-0.13905	-0.07348	-0.28255	-0.13813	-0.06978
21-07	0.00901	-0.20709	-0.42257	-0.00674	-0.26274	-0.36782	-0.00706	-0.20709	-0.43202	-0.06458
22-07	-0.00689	-0.29537	-0.85029	-0.05047	-0.24284	-0.89327	-0.05182	-0.29537	-0.85362	-0.00284
23-07	-0.00696	-0.31573	-0.61372	0.00984	-0.36954	-0.5509	0.00429	-0.31573	-0.58422	-0.04481
24-07	-7.98E-04	-0.38808	-0.31697	-0.03935	-0.3324	-0.37006	-0.03867	-0.38808	-0.25773	0.0121
25-07	0.06515	-0.31321	-0.19301	-0.03777	-0.36036	-0.18766	0.02076	-0.31321	-0.22975	-0.03364
26-07	0.00563	-0.27285	-0.20432	-0.03432	-0.27923	-0.25429	-0.03134	-0.27285	-0.25371	-0.03368
27-07	0.01558	-0.18829	-0.3547	0.02315	-0.12288	-0.3639	-0.02976	-0.18829	-0.36462	0.02646
28-07	0.01615	-0.16573	-0.40223	-0.02147	-0.16187	-0.34878	-0.02696	-0.16573	-0.34813	-0.02346
29-07	0.00703	-0.15335	-0.31511	-0.02238	-0.15257	-0.31021	-0.02435	-0.15335	-0.30846	-0.02275
30-07	-0.01081	-0.13795	-0.26557	-0.02029	-0.13529	-0.26465	0.03441	-0.13795	-0.319	-0.02027
31-07	-0.1471	-0.11724	-0.36388	-0.01819	-0.11327	-0.4264	-0.01392	-0.11724	-0.37135	-0.0181

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)									
DATE	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
01-08	-0.12534	-0.09566	-0.3409	0.04002	-0.09472	-0.34174	-0.01585	-0.09566	-0.34257	-0.0175
02-08	-0.05364	-0.06924	-0.29107	-0.01594	-0.06655	-0.2348	-0.01839	-0.06924	-0.29248	-0.02012
03-08	-0.04761	-0.05462	-0.18794	-0.02168	-0.11435	-0.18784	-0.02287	-0.05462	-0.13486	-0.02445
04-08	-0.24742	-0.03891	-0.10306	-0.02551	-0.04629	-0.09781	-0.0268	-0.03891	-0.14392	-0.02828
05-08	-0.26498	-0.09948	-0.06523	-0.03089	-0.03887	-0.07359	-0.0324	-0.09948	-0.07021	-0.03394
06-08	-0.20438	-0.0304	-0.04709	-0.09909	-0.09581	-0.04211	-0.04456	-0.0304	-0.03944	-0.04602
07-08	-0.2341	-0.09434	-0.06686	-0.06552	-0.09271	-0.06953	-0.11772	-0.09434	-0.07014	-0.06113
08-08	-0.13099	-0.08395	-0.05019	-0.13469	-0.02783	-0.0561	-0.14316	-0.08395	-0.00417	-0.13446
09-08	-0.42989	-0.01926	-0.02673	-0.15766	-0.0719	-0.02817	-0.09738	-0.01926	-0.01866	-0.15795
10-08	-0.82316	-0.07162	-0.00996	-0.1892	-0.07566	-0.0099	-0.17396	-0.07162	-0.01364	-0.18576
11-08	-0.24796	-0.08203	-0.0186	-0.34436	-0.02794	-0.01841	-0.39822	-0.08203	-0.07015	-0.34438
12-08	-0.07974	-0.08887	-0.07552	-0.37345	-0.08325	-0.0756	-0.37768	-0.08887	-0.0237	-0.37504
13-08	-0.04008	-0.08917	-0.08969	-0.34601	-0.08728	-0.08979	-0.34649	-0.08917	-0.085	-0.3457
14-08	-0.07747	-0.08465	-0.1038	-0.22211	-0.08287	-0.1039	-0.22317	-0.08465	-0.10117	-0.22144
15-08	-0.46071	-0.07775	-0.1242	-0.19352	-0.07585	-0.12428	-0.1946	-0.07775	-0.1865	-0.19298
16-08	-0.38344	-0.07042	-0.19841	-0.21176	-0.06868	-0.19764	-0.21225	-0.07042	-0.21011	-0.21135
17-08	-0.06721	-0.06352	-0.13788	-0.24328	-0.062	-0.13786	-0.24378	-0.06352	-0.13811	-0.24302
18-08	-0.00248	0.00159	-0.12254	-0.23501	-0.05604	-0.12256	-0.23551	0.00159	-0.12435	-0.23483
19-08	0.0193	-0.0472	-0.1105	-0.20694	-0.05078	-0.11052	-0.20761	-0.0472	-0.11307	-0.20654
20-08	0.04447	-0.0442	-0.10253	-0.17694	0.01022	-0.10254	-0.17755	-0.0442	-0.10385	-0.17661
21-08	0.06766	0.02486	-0.09474	-0.10007	-0.03591	-0.09474	-0.099	0.02486	-0.03235	-0.0974
22-08	0.03321	-0.03651	-0.09067	-0.07894	-0.03513	-0.09066	-0.07911	-0.03651	-0.08761	-0.07234
23-08	0.10116	-0.0312	-0.03242	-0.05512	0.02579	-0.03276	-0.00859	-0.0312	-0.08861	-0.05337
24-08	0.00107	-0.03107	-0.08271	-0.03446	-0.02847	-0.08272	-0.01492	-0.03107	-0.08838	-0.03082
25-08	-0.05771	-0.06185	-0.08675	-0.01876	-0.06045	-0.08676	-0.08594	-0.06185	-0.03078	-0.01644
26-08	-0.04497	-0.17266	-0.08928	-0.00986	-0.16593	-0.0893	-0.01821	-0.17266	-0.08392	-0.07296
27-08	-0.0236	-0.19111	-0.0919	-0.064	-0.26826	-0.09194	-0.00241	-0.19111	-0.08935	-0.01364
28-08	-0.01095	-0.18698	-0.0927	-0.00584	-0.12801	-0.09271	-0.05967	-0.18698	-0.09057	-0.05947
29-08	-0.00618	-0.11641	-0.09134	-0.05401	-0.11104	-0.09134	-0.05791	-0.11641	-0.08935	-0.00374
30-08	-0.02469	-0.09998	-0.08628	-0.05254	-0.09886	-0.08633	0.00329	-0.09998	-0.08503	-0.048
31-08	-1.43643	-0.08924	-0.08	0.01054	-0.0884	-0.07998	-0.04394	-0.08924	-0.07855	-0.04341
01-09	-1.71097	-0.01255	-0.01145	-0.04189	-0.07991	-0.01496	-0.05998	-0.01255	-0.01722	-0.21544
02-09	0.14679	-0.3429	-0.06127	-0.04392	-0.0835	-0.06499	-0.30141	-0.3429	-0.23539	-0.90617
03-09	-0.29825	-0.91221	-0.05676	-0.04445	-0.24032	-0.11911	-0.42485	-0.91221	-0.86142	-0.59511
04-09	0.03836	-0.75401	-0.05297	-0.04384	-0.34838	-0.56512	-0.28511	-0.75401	-1.04811	-0.41821
05-09	0.13539	-0.38379	-0.01254	-0.0419	-0.27205	-0.66575	-0.25389	-0.38379	-0.82259	-0.08505
06-09	-0.08222	-0.22284	-0.15321	-0.03952	-0.19226	-0.52462	-0.1692	-0.22284	-0.49289	-0.20879
07-09	-0.24344	-0.12469	-0.18671	-0.03745	-0.16053	-0.31773	-0.09691	-0.12469	-0.26407	-0.07442
08-09	-0.17036	-0.03164	-0.2254	0.01941	-0.13701	-0.30655	-0.14217	-0.03164	-0.29437	-0.11992
09-09	-0.02914	-0.04553	-0.24058	-0.04174	-0.06145	-0.29036	-0.0906	-0.04553	-0.21635	-0.12013
10-09	-0.03486	-0.03078	-0.23198	-0.05073	-0.03672	-0.19669	-0.14188	-0.03078	-0.15934	-0.16165
11-09	-0.11718	-0.04634	-0.16272	-0.11446	-0.02612	-0.16197	-0.13953	-0.04634	-0.12169	-0.10399
12-09	-0.03677	0.0151	-0.14191	-0.0689	-0.07325	-0.07728	-0.13476	0.0151	-0.14541	-0.14292
13-09	-0.00964	-0.07092	-0.12399	-0.06893	-0.00472	-0.10241	-0.0633	-0.07092	-0.06785	-0.07928
14-09	-0.99313	-0.00257	-0.04926	-0.06821	0.00918	-0.03463	-0.11274	-0.00257	-0.03919	0.01273
15-09	-1.71576	0.05232	-0.02387	-0.12289	-0.03229	-0.05922	-0.12299	0.05232	0.118	-0.51754
16-09	0.13763	-0.96675	-0.09167	-0.06885	-0.11552	-0.12272	-0.27857	-0.96675	-0.54665	-1.02246
17-09	-0.2851	-1.42252	-0.02058	-0.06038	-0.82314	-0.22541	-0.383	-1.42252	-0.9006	-0.77683
18-09	0.04162	-1.01058	-0.06954	-0.05526	-0.73994	-0.35855	-0.34847	-1.01058	-0.76645	-0.35475
19-09	0.08317	-0.38436	-0.06457	-0.05029	-0.45439	-0.27904	-0.21229	-0.38436	-0.34279	-0.17866
20-09	0.11513	-0.13827	-0.00132	0.00824	-0.28968	-0.19602	-0.12009	-0.13827	-0.17047	-0.08025
21-09	0.10091	-0.07352	-0.04515	-0.03436	-0.12547	-0.16442	-0.08933	-0.07352	-0.07164	-0.03619
22-09	0.05803	-0.07358	0.01421	-0.03388	-0.06981	-0.08986	-0.06553	-0.07358	-0.02765	-0.05611

DATE	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)									
	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27
23-09	-0.08173	-0.03169	-0.03386	0.02743	-0.10609	-0.05992	0.0073	-0.03169	-0.04783	-0.02822
24-09	-0.08733	-0.06524	-0.03257	-0.02331	-0.03833	-2.20E-04	-0.08705	-0.06524	-0.07541	0.06896
25-09	-0.00595	-0.06175	-0.02917	-0.02297	-0.08954	-0.08243	-0.02511	-0.06175	0.07431	-0.10573
26-09	-0.05187	-0.19536	0.02941	-0.02232	-0.18112	-0.01792	-0.0799	-0.19536	-0.09812	-0.09866
27-09	0.02337	-0.21552	-0.0145	-0.02227	-0.20201	-0.00449	-0.01706	-0.21552	-0.02417	-0.03493
28-09	0.0445	-0.19438	-0.0145	-0.02222	-0.18339	-0.05181	-0.06944	-0.19438	-0.00683	-0.0189
29-09	-0.03625	-0.16912	-0.01125	-0.02171	-0.15942	0.01133	-0.0655	-0.16912	-0.05601	-0.06981
30-09	-2.7427	-0.09483	0.04383	-0.02104	-0.1368	-0.03379	-0.00349	-0.09483	0.00994	-0.00278
01-10	-0.63566	-0.0628	0.0022	-0.02402	-0.06545	0.02597	-0.18524	-0.0628	0.02981	-1.0211
02-10	-0.45892	-0.08677	0.0017	-0.03662	-0.04048	-0.01923	-0.7095	-0.08677	0.11764	-1.16546
03-10	-0.4878	-0.47738	0.0041	-0.0519	-0.12501	0.03095	-0.57517	-0.47738	-0.4332	-0.82541
04-10	0.1885	-0.4951	0.00645	-0.06103	-0.16421	-0.03526	-0.4004	-0.4951	-0.42829	-0.26513
05-10	0.10751	-0.33804	0.06761	-0.11999	-0.22338	-0.05309	-0.19264	-0.33804	-0.33197	-0.19796
06-10	0.21624	-0.3033	0.00658	-0.06565	-0.25763	-0.11366	-0.14118	-0.3033	-0.24512	-0.09832
07-10	0.15459	-0.3907	0.00835	-0.05717	-0.30873	-0.06657	-0.05956	-0.3907	-0.16654	-0.05237
08-10	0.13803	-0.35704	0.00964	-0.05153	-0.30622	-0.05949	-0.08444	-0.35704	-0.09074	-0.01252
09-10	0.05885	-0.20089	0.00971	-0.04567	-0.26637	-0.11153	-0.00777	-0.20089	-0.06016	-0.03471
10-10	0.11457	-0.15269	0.00975	-0.04013	-0.18865	-0.05823	-0.02706	-0.15269	-0.03931	-0.00754
11-10	0.0836	-0.06135	0.00966	-0.03476	-0.10091	-0.0501	-0.01978	-0.06135	-0.02288	0.0256
12-10	0.03445	-0.09412	0.06686	-0.02971	-0.06806	-0.04557	-0.00827	-0.09412	-0.07806	-0.01835
13-10	0.03728	-0.01607	0.00699	0.02949	-0.00813	0.01275	0.00654	-0.01607	-0.01375	-0.0052
14-10	-0.32334	0.01109	0.00812	-0.01386	-0.02176	-0.03161	-0.04266	0.01109	-0.05866	0.0108
15-10	-1.54509	0.0522	0.00827	-0.01365	-0.01444	-0.03273	0.01282	0.0522	0.00343	0.02977
16-10	-0.29246	-0.10919	0.00811	0.04532	-0.06495	-0.03212	-0.03599	-0.10919	-0.06545	-0.40753
17-10	-0.0294	-0.44249	0.00781	-0.00131	-0.01289	-0.05057	-0.06028	-0.44249	-0.35278	-0.52328
18-10	0.10713	-0.46689	0.00762	-7.67E-04	-0.07874	-0.09287	-0.07649	-0.46689	-0.4824	-0.3507
19-10	0.15014	-0.36304	0.00725	0.0021	-0.09295	-0.27546	-0.07891	-0.36304	-0.54382	-0.21064
20-10	0.13871	-0.2211	0.05941	0.00485	-0.09201	-0.42775	-0.07343	-0.2211	-0.54654	-0.11469
21-10	0.04658	-0.12707	-0.00281	0.0618	-0.08554	-0.36262	-0.06636	-0.12707	-0.43883	-0.08518
22-10	0.08486	-0.03174	-0.0096	0.01043	-0.07711	-0.327	-0.05911	-0.03174	-0.22611	-0.05852
23-10	-0.0253	-0.06467	-0.01422	0.00932	-0.06838	-0.13708	-0.05235	-0.06467	-0.11343	-0.03258
24-10	-0.02057	0.00982	-0.07639	0.01057	-0.0598	-0.09402	-0.04751	0.00982	-0.07552	-0.0254
25-10	-0.00604	-0.07997	-0.00943	0.01077	0.00656	-0.06935	-0.04383	-0.07997	-0.04441	-0.07538
26-10	0.06399	-0.01671	-0.01074	0.01034	-0.03947	-0.10512	-0.04062	-0.01671	-0.0727	-0.00853
27-10	0.02223	7.93E-04	-0.00846	0.06597	-0.03675	0.0388	-0.03767	7.93E-04	-0.0016	7.46E-04
28-10	0.08359	-0.04893	-0.0055	0.00755	0.02342	-0.00258	0.02157	-0.04893	-0.0179	-0.04835
29-10	0.09892	0.01362	-0.00252	0.00785	-0.0209	-0.06306	-0.02437	0.01362	-0.01101	0.01443
30-10	0.04498	0.03388	2.86E-04	0.00802	-0.02055	0.00634	-0.02392	0.03388	0.00838	-0.03571
31-10	-0.40043	-0.03029	0.00277	0.00831	0.036	0.02196	-0.02022	-0.03029	0.00971	0.0321
01-11	-1.49947	0.03395	0.00467	0.00876	-0.00599	-0.02521	0.03916	0.03395	0.03973	-0.0348
02-11	-0.04227	-0.02425	0.00584	0.06773	-0.00595	0.03117	-0.01136	-0.02425	-0.08823	-0.24496
03-11	-0.1552	-0.23428	0.0064	0.00539	-0.00686	-0.04416	-0.02408	-0.23428	-0.61793	-0.40527
04-11	0.01008	-0.46083	0.00649	0.00994	-0.01856	-0.15593	-0.03566	-0.46083	-0.60829	-0.26231
05-11	0.09296	-0.27105	0.00632	0.01142	-0.03345	-0.18553	-0.04107	-0.27105	-0.38091	-0.23147
06-11	0.19566	-0.18009	0.00605	0.0124	-0.04219	-0.17554	-0.09749	-0.18009	-0.23016	-0.14796
07-11	0.06385	-0.14787	0.00585	0.01302	-0.04387	-0.11084	-0.04614	-0.14787	-0.13022	-0.06498
08-11	0.07484	-0.12667	0.00574	0.01358	-0.04191	-0.09397	-0.03902	-0.12667	-0.04211	-0.106
09-11	0.14312	-0.03892	0.0056	0.01397	-0.0937	-0.08253	-0.03444	-0.03892	-0.07422	-0.02713
10-11	0.11554	-0.09395	0.00529	0.06897	-0.04228	-0.07355	-0.02983	-0.09395	-0.05067	-0.02
11-11	0.11835	-0.02206	0.00502	0.01152	-0.03406	-0.06605	-0.02491	-0.02206	0.00862	-0.00378
12-11	0.17291	-0.00747	0.00493	0.01406	-0.02885	-0.00299	-0.01979	-0.00747	-0.00442	0.01282
13-11	0.05862	0.00683	0.0053	0.01485	-0.02358	-0.04553	0.04051	0.00683	-0.07078	-0.03493
14-11	-0.26568	-0.03859	0.00609	0.07677	0.03624	0.01371	-0.00478	-0.03859	-0.00422	0.02371

	EXCHANGE IN UNSATURATED AND SATURATED ZONES (mm/h)									
DATE	**S18**	**S19**	**S20**	**S21**	**S22**	**S23**	**S24**	**S25**	**S26**	**S27**
15-11	-1.53486	0.07325	0.06166	0.00596	-0.00746	-0.02929	-0.00313	0.07325	0.02194	-0.01877
16-11	-0.06623	-0.03177	0.0059	0.01509	-0.0062	0.02919	-0.00193	-0.03177	0.04914	-0.05624
17-11	-0.13928	-0.15918	0.00848	0.01603	-0.00523	-0.02048	-0.00831	-0.15918	-0.25937	-0.17924
18-11	-0.02415	-0.46119	0.01002	0.01651	-0.01182	-0.03265	-0.01874	-0.46119	-0.46578	-0.19588
19-11	0.00949	-0.1911	0.01107	0.06622	-0.02159	-0.04335	-0.02576	-0.1911	-0.26702	-0.19552
20-11	-0.27492	-0.15844	0.01211	0.01567	-0.02712	-0.04752	-0.02865	-0.15844	-0.22802	-0.12094
21-11	-0.12044	-0.13209	0.06736	0.01638	-0.02818	-0.04653	-0.03411	-0.13209	-0.15156	-0.11665
22-11	0.04047	-0.11125	0.01034	0.01617	-0.02628	-0.04265	-0.04465	-0.11125	-0.06506	-0.12207
23-11	0.07747	-0.03057	0.01326	0.06477	-0.02276	-0.03762	-0.10826	-0.03057	-0.03357	-0.11726
24-11	0.04656	-0.01042	0.01426	0.01146	-0.01849	-0.03188	-0.05925	-0.01042	-0.0225	-0.10664
25-11	0.05842	-0.06093	0.01492	0.01065	-0.01428	-0.02606	-0.05242	-0.06093	-0.00915	-0.09524
26-11	0.11853	5.66E-04	0.06912	0.00938	-0.01028	-0.02047	-0.04796	5.66E-04	0.01204	-0.0848
27-11	0.05192	0.01755	0.01259	0.00827	-0.00652	-0.01582	-0.04322	0.01755	-0.04736	-0.0127
28-11	0.18435	-0.02646	0.01523	0.00754	-0.0031	-0.01234	-0.03842	-0.02646	0.01764	-0.06188
29-11	0.18327	0.03173	0.01577	0.00724	-1.44E-04	0.04301	-0.0329	0.03173	-0.02616	0.00257
30-11	-0.52572	-0.01202	0.06997	0.00749	0.05622	-5.38E-04	-0.02718	-0.01202	0.03107	0.0155
01-12	-2.02834	0.04661	0.00979	0.06734	0.01084	-0.00148	-0.02189	0.04661	-0.01438	-0.06015
02-12	-0.37148	-0.01178	0.01364	0.00712	0.00778	5.93E-04	-0.03447	-0.01178	0.03644	-0.52081
03-12	-0.33189	-0.06534	0.01426	0.00861	0.00737	1.62E-04	-0.16466	-0.06534	-0.14553	-0.73046
04-12	-0.07367	-0.27777	0.01457	0.00907	0.00189	0.04527	-0.19834	-0.27777	-0.37267	-0.48243
05-12	-0.20949	-0.28006	0.0657	0.00822	-0.00604	-0.01434	-0.21212	-0.28006	-0.30443	-0.28092
06-12	0.07349	-0.26981	0.01217	0.00746	-0.01123	-0.0803	-0.21952	-0.26981	-0.212	-0.24462
07-12	0.14397	-0.13591	0.01428	0.00548	-0.01274	-0.02102	-0.21009	-0.13591	-0.1374	-0.16572
08-12	0.00307	-0.04885	0.01503	0.00261	-0.01169	-0.02978	-0.14439	-0.04885	-0.11472	-0.07558
09-12	0.0782	-0.02024	0.01553	-1.35E-04	-0.00963	-0.02366	-0.12425	-0.02024	-0.03512	-0.10507
10-12	0.16975	-0.07126	0.07464	-0.00198	-0.00853	-0.01923	-0.1088	-0.07126	-0.0169	-0.0824
11-12	0.13753	-0.00262	0.01368	-0.0029	-0.00541	-0.01471	-0.03145	-0.00262	-0.00244	-0.06356
12-12	0.11822	-0.04549	0.01552	-0.00287	-0.06084	-0.01029	-0.01779	-0.04549	0.01384	0.00673
13-12	0.12267	0.01433	0.01496	-0.00201	-0.00567	-0.00604	-0.00159	0.01433	-0.03625	-0.01125
14-12	-0.26166	0.03357	0.01531	-6.28E-04	-0.00207	-0.00218	-0.05012	0.03357	0.02423	0.05586
15-12	-1.60437	-0.03155	0.01533	0.00108	-9.53E-04	0.00143	0.01322	-0.03155	0.05105	0.06111
16-12	0.08135	0.1354	0.01549	0.00287	-4.30E-05	0.00452	-0.033	0.1354	-0.01755	-0.29858
17-12	-0.13246	-0.41439	0.01536	0.00462	-0.00248	0.05882	0.01367	-0.41439	-0.14153	-0.40411
18-12	0.03324	-0.40879	0.01553	0.00631	0.0393	8.52E-04	-0.04452	-0.40879	-0.38799	-0.33334
19-12	0.1056	-0.33678	0.07462	0.00764	-0.02171	-0.01338	-0.04909	-0.33678	-0.30528	-0.18268
20-12	0.0852	-0.18285	0.01308	0.00873	-0.08252	-0.01982	-0.04699	-0.18285	-0.16897	-0.146
21-12	0.11702	-0.14382	0.01452	0.0718	-0.03836	-0.07543	-0.04314	-0.14382	-0.18788	-0.0672
22-12	0.14165	-0.05909	0.01476	0.00737	-0.03178	-0.03041	-0.03872	-0.05909	-0.12176	0.00858
23-12	0.11012	-0.03256	0.07048	0.00981	-0.08201	-0.02559	-0.03359	-0.03256	-0.0458	-0.07917
24-12	0.1149	-0.01923	0.01301	0.01078	-0.02966	-0.02337	-0.02844	-0.01923	-0.02581	-0.01551
25-12	0.11456	0.00394	0.01331	0.01134	-0.02081	-0.02094	-0.02313	0.00394	-0.01387	7.15E-04
26-12	0.16696	-0.05605	0.01338	0.07394	-0.0158	-0.0183	-0.01793	-0.05605	-0.06047	0.02384
27-12	0.11468	0.0102	0.06926	0.00653	0.0434	-0.01609	0.04001	0.0102	-7.05E-04	-0.03818
28-12	0.11284	0.02709	0.01031	0.01083	-5.26E-04	-0.01405	-0.00165	0.02709	0.01551	0.02707
29-12	0.10831	-0.01961	0.0117	0.01204	-6.53E-05	-0.0118	-0.00114	-0.01961	-0.03581	-0.0158
30-12	0.1109	0.03771	0.01183	0.01271	0.00323	-0.0096	0.05648	0.03771	-0.03257	0.04411
--	0.11111	-0.00461	0.0117	0.07081	0.05919	-0.00764	0.01199	-0.00461	0.02576	-0.00202

APPENDIX 4
(DEPTH OF OVER LAND FLOW IN METRE)

OVERLAND FLOW (m)									
Date	S1	S2	S3	S4	S5	S6	S7	S8	S9
01-01									
02-01				0.0038137	0.0035363	0.0035363	0.0031014	0.0031014	0.0031016
03-01				5.77E-06	4.58E-11	4.33E-11		6.54E-13	
04-01					4.58E-11	4.33E-11		6.54E-13	
05-01					4.58E-11	4.33E-11		6.54E-13	
06-01					4.58E-11	4.33E-11		6.54E-13	
07-01					4.58E-11	4.33E-11		6.54E-13	
08-01					4.58E-11	4.33E-11		6.54E-13	
09-01					4.58E-11	4.33E-11		6.54E-13	
10-01					4.58E-11	4.33E-11		6.54E-13	
11-01					4.58E-11	4.33E-11		6.54E-13	
12-01					4.58E-11	4.33E-11		6.54E-13	
13-01					4.58E-11	4.33E-11		6.54E-13	
14-01					4.58E-11	0.0035364		6.54E-13	0.0031014
15-01				0.0038137	0.0035363		0.0031014	0.0007483	5.93E-13
16-01					6.39E-14			5.61E-13	5.93E-13
17-01					6.39E-14			5.61E-13	5.93E-13
18-01					6.39E-14			5.61E-13	5.93E-13
19-01					6.39E-14			5.61E-13	5.93E-13
20-01					6.39E-14			5.61E-13	5.93E-13
21-01	5.57E-08			1.42E-07	6.39E-14		1.52E-07	5.61E-13	5.93E-13
22-01	5.48E-07				6.39E-14		0.0060835	5.61E-13	5.93E-13
23-01	5.48E-07				6.39E-14		0.0008442	5.61E-13	5.93E-13
24-01	5.48E-07				6.39E-14			5.61E-13	5.93E-13
25-01	5.48E-07				6.39E-14			5.61E-13	5.93E-13
26-01	5.48E-07				6.39E-14			5.61E-13	5.93E-13
27-01	5.48E-07				6.39E-14			5.61E-13	5.93E-13
28-01	5.48E-07				6.39E-14			5.61E-13	5.93E-13
29-01	5.48E-07				6.39E-14			5.61E-13	5.93E-13
30-01	5.48E-07				6.39E-14			5.61E-13	5.93E-13
31-01	5.48E-07				6.39E-14	0.0035364		5.61E-13	0.0002912
01-02	5.48E-07			0.0044257	0.0035364	2.94E-07	0.0064999	0.0003692	
02-02	5.48E-07				1.02E-07	2.94E-07	0.0011343	3.51E-12	
03-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
04-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
05-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
06-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
07-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
08-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
09-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
10-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
11-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
12-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
13-02	5.48E-07				1.02E-07	2.94E-07		3.51E-12	
14-02	5.48E-07			1.03E-13	1.02E-07	0.0035365	1.70E-11	3.51E-12	0.0002912
15-02	5.48E-07			0.0044897	0.0035382	6.18E-11	0.0063101	0.0002033	2.91E-12
16-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12
17-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12
18-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12
19-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12
20-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12
21-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12
22-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12
23-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12

OVERLAND FLOW (m)									
Date	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
24-02	5.48E-07					6.18E-11		2.72E-12	2.91E-12
25-02	5.48E-07			2.03E-06		6.18E-11		2.72E-12	2.91E-12
26-02	5.48E-07			8.53E-14		6.18E-11		2.72E-12	2.91E-12
27-02	5.48E-07			8.53E-14		6.18E-11		2.72E-12	2.91E-12
28-02	5.48E-07			8.53E-14		0.0035361		2.72E-12	0.0023491
01-03	5.48E-07			0.0037901	0.0002386	7.95E-12	0.0023065	0.0020737	
02-03	5.48E-07			6.38E-07		7.95E-12			
03-03	5.48E-07			6.38E-07		7.95E-12			
04-03	5.48E-07			6.38E-07		7.95E-12			
05-03	5.48E-07			6.38E-07		7.95E-12			
06-03	5.48E-07			6.38E-07		7.95E-12			
07-03	5.48E-07			6.38E-07		7.95E-12			
08-03	5.48E-07			6.38E-07		7.95E-12			
09-03	5.48E-07			6.38E-07		7.95E-12			
10-03	5.48E-07			6.38E-07		7.95E-12			
11-03	5.48E-07			6.38E-07		7.95E-12			
12-03	5.48E-07			6.38E-07		7.95E-12			
13-03	5.48E-07			6.38E-07		7.95E-12			
14-03	5.48E-07			6.38E-07		0.001666			0.0035636
15-03	5.48E-07			0.0037889	0.0013068	2.80E-08	0.0078472	0.0029137	1.45E-08
16-03	5.48E-07			1.46E-13	1.07E-14	2.80E-08		1.12E-12	1.45E-08
17-03	5.48E-07			1.46E-13	1.07E-14	2.80E-08		1.12E-12	1.45E-08
18-03	5.48E-07			1.46E-13	1.07E-14	2.80E-08		1.12E-12	1.45E-08
19-03	5.48E-07			1.46E-13	1.07E-14	2.80E-08		1.12E-12	1.45E-08
20-03	5.48E-07			1.46E-13	1.07E-14	2.80E-08		1.12E-12	1.45E-08
21-03	5.48E-07			1.46E-13	1.07E-14	2.80E-08	0.0003661	1.12E-12	1.45E-08
22-03	5.48E-07			1.11E-06	1.07E-14	2.80E-08	6.17E-07	1.12E-12	1.45E-08
23-03	5.48E-07			4.62E-14	1.07E-14	2.80E-08	6.17E-07	1.12E-12	1.45E-08
24-03	5.48E-07			4.62E-14	1.07E-14	2.80E-08	6.17E-07	1.12E-12	1.45E-08
25-03	5.48E-07			4.62E-14	1.07E-14	2.80E-08	6.17E-07	1.12E-12	1.45E-08
26-03	5.48E-07			4.62E-14	1.07E-14	2.80E-08	6.17E-07	1.12E-12	1.45E-08
27-03	5.48E-07			4.62E-14	1.07E-14	2.80E-08	6.17E-07	1.12E-12	1.45E-08
28-03	5.48E-07			4.62E-14	1.07E-14	2.80E-08	6.17E-07	1.12E-12	1.45E-08
29-03	5.48E-07			4.62E-14	1.07E-14	2.80E-08	6.17E-07	1.12E-12	1.45E-08
30-03	5.48E-07			4.62E-14	1.07E-14	0.0035363	6.17E-07	1.12E-12	0.0023141
31-03	5.48E-07			0.0037892	0.0035363	1.75E-11	0.0064061	0.0029732	5.33E-13
01-04	5.48E-07			5.68E-07		1.75E-11	0.0020777	1.92E-13	5.33E-13
02-04	5.48E-07			5.68E-07		1.75E-11	4.04E-05	1.92E-13	5.33E-13
03-04	5.48E-07			5.68E-07		1.75E-11		1.92E-13	5.33E-13
04-04	5.48E-07			5.68E-07		1.75E-11		1.92E-13	5.33E-13
05-04	5.48E-07			5.68E-07		1.75E-11		1.92E-13	5.33E-13
06-04	5.48E-07			5.68E-07		1.75E-11		1.92E-13	5.33E-13
07-04	5.48E-07			5.68E-07		1.75E-11		1.92E-13	5.33E-13
08-04	5.48E-07			5.68E-07		1.75E-11		1.92E-13	5.33E-13
09-04	5.48E-07			5.68E-07		1.75E-11		1.35E-13	5.33E-13
10-04	5.48E-07			5.68E-07		1.75E-11		1.35E-13	5.33E-13
11-04	5.48E-07			5.68E-07		1.75E-11		1.35E-13	5.33E-13
12-04	5.48E-07			5.68E-07		1.75E-11		1.35E-13	5.33E-13
13-04	5.48E-07			5.68E-07		1.75E-11		1.35E-13	5.33E-13
14-04	5.48E-07			5.68E-07		0.0009074		1.35E-13	0.0026441
15-04	5.48E-07		1.59E-12	0.0038205	0.0009075		0.0077002	0.0026449	
16-04	5.48E-07		1.59E-12	1.35E-13	5.01E-13		0.0023826	3.66E-13	
17-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07		4.77E-05	0.0002777	
18-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				

OVERLAND FLOW (m)									
Date	S1	S2	S3	S4	S5	S6	S7	S8	S9
19-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
20-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
21-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
22-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
23-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
24-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
25-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
26-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
27-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
28-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
29-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07				
30-04	5.48E-07		1.59E-12	1.35E-13	1.82E-07	0.0035363			0.0035213
01-05	2.24E-13		1.59E-12	0.0011248	0.0002387	9.63E-11	0.0114731	0.0075441	7.11E-14
02-05	2.24E-13		1.59E-12	7.56E-07	2.74E-13	9.63E-11	0.0031474	4.65E-06	7.11E-14
03-05	9.17E-07		1.59E-12		2.74E-13	9.63E-11	0.0031171		7.11E-14
04-05	9.17E-07		1.59E-12		2.74E-13	9.63E-11	0.0001608		7.11E-14
05-05	9.17E-07		1.59E-12		2.74E-13	9.63E-11	7.56E-05		7.11E-14
06-05	9.17E-07		7.39E-07		2.74E-13	6.70E-08			0.0073216
07-05	9.17E-07		2.33E-06		2.74E-13	9.93E-07			0.0037731
08-05	9.17E-07		7.82E-07		2.74E-13	1.21E-06	0.0015231		0.003009
09-05	1.17E-06		7.82E-07	1.14E-06	2.74E-13	3.91E-14			0.0001562
10-05			7.82E-07	7.11E-15	2.74E-13	3.91E-14		0.0007541	0.0026823
11-05	7.95E-07		7.82E-07	7.11E-15	2.74E-13	3.91E-14	2.64E-07	0.0027984	0.0002756
12-05	7.95E-07	1.07E-07	7.82E-07	7.11E-15	3.10E-07	2.09E-06	5.95E-07	0.0049819	0.0029109
13-05	7.95E-07	8.66E-07	1.39E-08	7.11E-15	1.96E-06		5.95E-07	0.0026407	0.0029923
14-05	7.95E-07	8.66E-07	1.39E-08	7.11E-15	7.11E-14	0.0018791	5.95E-07	0.0002226	0.0118129
15-05	7.95E-07	8.66E-07	1.39E-08	0.003859	0.0004701		0.0112554	0.0097824	0.0041409
16-05	7.95E-07	8.66E-07	1.39E-08	1.16E-06	3.41E-13		0.0046391	0.0033342	0.0006257
17-05	7.95E-07	8.66E-07	1.39E-08	1.42E-14	6.65E-07		0.002187	0.0018752	0.0007016
18-05	7.95E-07		1.39E-08	1.42E-14	0.0007829		0.0008451	0.004741	8.40E-05
19-05	7.95E-07		1.39E-08	1.42E-14	3.09E-13		0.0003044	0.0004217	5.58E-06
20-05	7.95E-07		1.39E-08	1.42E-14	3.09E-13	7.96E-13	3.47E-05	0.0003075	0.0013052
21-05	7.95E-07		1.39E-08	1.42E-14	3.09E-13	3.67E-07		0.0001298	0.000983
22-05	7.95E-07		1.39E-08	1.42E-14	0.0007248	3.67E-07		0.0042069	
23-05	7.95E-07	5.42E-08	1.39E-08	1.42E-14	0.0009495	3.67E-07		0.0075757	
24-05	7.95E-07	5.09E-06	1.39E-08	1.42E-14	1.50E-07	1.71E-13	1.20E-07	0.0036354	0.0018712
25-05	7.95E-07	3.99E-06	1.39E-08	1.42E-14	2.58E-06	0.0001815	2.60E-07	0.0010022	0.0010562
26-05	7.95E-07		1.39E-08	3.82E-07	1.81E-13		2.60E-07	0.0004502	3.22E-05
27-05	7.95E-07		1.39E-08	0.0007416	1.81E-13		0.0015283	6.28E-05	
28-05	7.95E-07		1.39E-08	0.0008406	1.26E-05		0.0020678	0.0031388	
29-05	7.95E-07	2.32E-06	1.39E-08	0.0004997	2.32E-06		0.0019209	0.000659	0.001639
30-05	3.25E-06	9.95E-14	1.39E-08	3.99E-07		0.0001038	0.0003996	7.89E-05	0.013348
31-05	1.42E-14	9.95E-14	4.20E-06	0.0101215	0.0045571	1.30E-06	0.0107837	0.0106458	0.0032078
01-06	1.42E-14	9.95E-14	2.62E-06	0.004318	0.001097	7.52E-07	0.0023225	0.0047886	0.0040163
02-06	1.42E-14		4.34E-09	0.0006744	0.0027535	7.52E-07	0.0028783	0.0046325	0.0016812
03-06		1.18E-06	4.34E-09	0.0093647	0.0004936	7.52E-07	0.0067284	0.0009342	0.0007986
04-06		6.75E-14	4.34E-09	0.0049571	4.32E-05	7.52E-07	0.003435	0.0004568	0.0013679
05-06		6.75E-14	4.34E-09	0.0010748	0.0011766	7.52E-07	0.0001637	0.0020914	0.0004741
06-06		6.75E-14	4.34E-09	0.0004478	0.0026956	7.52E-07	7.23E-05	0.0033017	3.68E-05
07-06		2.33E-07	4.34E-09	0.001688	0.0035932	7.52E-07	0.0008759	0.0039257	
08-06		2.38E-07	4.34E-09	0.0055963	0.0041423	0.0005272	0.004397	0.0043847	0.002565
09-06	1.24E-07	2.38E-07	4.34E-09	0.0053282	0.0052557	0.0003251	0.0036113	0.0053629	0.0008218
10-06	8.83E-07	2.38E-07	4.36E-09	0.0054291	0.0024275	1.67E-05	0.0035543	0.0030325	0.001203
11-06	1.43E-06	2.38E-07	1.46E-06	0.0037858	0.0002276	1.81E-13	0.002395	0.0002884	0.0006822
12-06	7.73E-07	2.38E-07	8.36E-07	0.0028327	0.0001114	1.81E-13	0.001699	0.0002749	0.0008098
13-06	7.73E-07	2.38E-07	8.36E-07	0.0058866	2.97E-05	1.81E-13	0.0043404	4.75E-05	
14-06	1.16E-06	2.38E-07	8.36E-07	0.0055666		0.0068946	0.0037455	8.58E-06	0.008497
15-06	6.19E-07	2.38E-07	7.50E-07	0.014061	0.0064224	0.0024879	0.0130051	0.0106294	0.002846
16-06	6.19E-07	2.38E-07	7.50E-07	0.0101605	0.0017477	0.0001282	0.0072036	0.0043361	0.000324
17-06	2.85E-06	2.38E-07	7.50E-07	0.0068882	8.21E-05	0.0019549	0.0041142	0.000487	0.0022407
18-06		2.38E-07	7.50E-07	0.0064975	1.19E-05	7.15E-05	0.0039757	0.000594	9.03E-05
19-06	4.93E-06	2.38E-07	7.50E-07	0.0038224		0.0006354	0.0010759	7.83E-05	0.0008533
20-06	1.99E-13	2.38E-07	7.50E-07	0.0012702	1.09E-06		0.0007839	0.001082	1.47E-05
21-06	1.99E-13	2.38E-07	7.50E-07	0.0012113	9.78E-08		0.0004917	0.0006949	
22-06	1.99E-13	2.38E-07	7.50E-07	0.0002185	2.49E-07		3.72E-05	0.000445	
23-06	6.51E-07	1.81E-13	7.50E-07	0.0005678	0.0029701		4.71E-05	0.0032165	
24-06	6.51E-07	1.17E-06	7.50E-07	0.0039756	0.0018537	3.14E-07	0.0027596	0.0018765	1.64E-07
25-06			7.50E-07	0.0039322	0.0028771	3.14E-07	0.0028619	0.0029878	1.64E-07
26-06		2.00E-06	7.50E-07	0.0010952	0.0010319	3.14E-07	0.0006284	0.0010468	1.64E-07
27-06			7.50E-07	0.0007072	0.0008004	3.14E-07	0.0002223	0.0008407	1.64E-07
28-06	8.72E-05		7.50E-07	0.0033266	9.96E-05	3.14E-07	0.0025199	0.000141	1.64E-07
29-06	4.68E-05		7.50E-07	0.0030185	2.07E-05	0.000602	0.0023955	2.68E-05	0.000693
30-06			7.50E-07	0.0007323		0.0008326	0.0004344		0.0007919
01-07	0.0001338		7.50E-07	0.0032968		0.0012576	0.0026365		0.0014374
02-07	1.63E-13	7.95E-07	1.26E-06	0.0006702	8.62E-07	0.0013059	0.0004065	2.09E-07	0.0014397
03-07	0.0001823	7.95E-07		0.0033319	8.62E-07	0.0020452	0.003097	2.09E-07	0.0021431
04-07	0.0001716	7.95E-07	1.17E-06	0.0035436	8.62E-07	0.0012311	0.0035544	2.09E-07	0.0012577
05-07	0.0002178	7.95E-07		0.0037548	2.55E-07	5.26E-05	0.0041947	8.44E-07	6.16E-05
06-07	0.0003584			0.0042203	0.0047748		0.0055271	0.0048016	
07-07		5.70E-07		0.0015781	0.0025099	0.0018893	0.0026779	0.0025323	0.0018556
08-07		2.09E-08	2.88E-12	0.0010541	0.0065794	0.0034246	0.0016419	0.0068284	0.0029571
09-07	0.0002489	4.57E-07	2.77E-06	0.003716	0.0061482	0.0020965	0.0055937	0.0064494	0.0019512
10-07	1.19E-06	1.20E-06		0.0014896	0.0028134	0.0002197	0.0025805	0.0034237	0.0002953
11-07		7.17E-05	1.76E-06	0.0004568	0.0031107	0.0007455	0.0011449	0.0034634	0.0008122
12-07	1.16E-06	1.68E-05		0.0001122	0.0041501	0.0022515	0.0006945	0.0060235	0.0023366
13-07	0.0002049	9.84E-05		0.0020672	0.0027665	8.88E-05	0.0032929	0.0045625	9.63E-05
14-07		0.0004117		0.0020948	0.0033365	4.25E-05	0.0033637	0.0068006	5.15E-05
15-07	0.0002866	1.43E-06		0.0108313	0.001482		0.0149709	0.0041783	
16-07	1.20E-06	0.0001948		0.0109635	0.002267		0.013281	0.0051519	
17-07	7.99E-13	3.91E-14		0.0082696	0.0002401		0.0078112	0.0018583	
18-07	7.99E-13	1.25E-05		0.0049814	0.0022559		0.002981	0.0051829	
19-07	1.97E-05	0.0004103		0.0077654	0.0028136		0.006442	0.0063131	
20-07	7.74E-09	0.0004658		0.0149403	0.011545		0.0113289	0.0172082	
21-07	7.98E-07	1.24E-06		0.0092495	0.0100379	0.0006163	0.0054697	0.0121514	0.0007124
22-07	0.003211	4.48E-13		0.0150384	0.0062647		0.0107846	0.0044555	
23-07	0.0042907	4.48E-13		0.0111242	0.0040185		0.0070544	0.0037636	
24-07	0.0033874	2.38E-07		0.008188	0.0072909		0.0048509	0.0086787	
25-07	0.004764	2.28E-05		0.0101382	0.0115853		0.0068159	0.0129715	
26-07	0.0040325	9.87E-06		0.0076056	0.0066729		0.0045146	0.008751	
27-07	0.0066987	0.0019474		0.011223	0.0064311		0.0076824	0.0060692	
28-07	0.0026776	0.0021199		0.0058982	0.0059206	0.0003781	0.0029165	0.0059809	0.0004403
29-07	0.0017177	0.0100123	7.72E-07	0.004495	0.0126051	6.45E-07	0.0021122	0.0126492	4.14E-07
30-07	0.0006673	0.0054251		0.0030787	0.0057594	0.0007048	0.0009693	0.0057604	0.0015257
31-07	8.42E-05	0.0047609	6.20E-07	0.0017952	0.0055324	0.0012683	0.000112	0.0055532	0.0008319
01-08	0.0013388	0.0027961	6.20E-07	0.0034562	0.0033038		0.0016818	0.0033188	
02-08	0.006472	0.0013669	6.20E-07	0.0094682	0.0018497		0.0066883	0.0018611	
03-08	0.0024225	0.0005637	6.20E-07	0.0062959	0.0009783	0.0021736	0.0025127	0.000988	0.0022257
04-08	0.0009712	7.11E-05	7.85E-07	0.0027996	0.000111	0.0024385	0.0010743	0.0001121	0.0024761
05-08	0.0001162		1.71E-06	0.0016023	2.76E-05	0.0009004	0.0001304	2.86E-05	0.0009091
06-08	5.50E-05			0.0010618		0.002702	6.45E-05		0.0027408

OVERLAND FLOW (m)									
Date	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
12-06	7.73E-07	2.38E-07	8.36E-07	0.0028327	0.0001114	1.81E-13	0.001699	0.0002749	0.0008098
13-06	7.73E-07	2.38E-07	8.36E-07	0.0058866	2.97E-05	1.81E-13	0.0043404	4.75E-05	
14-06	1.16E-06	2.38E-07	8.36E-07	0.0055666		0.0068946	0.0037455	8.58E-06	0.008497
15-06	6.19E-07	2.38E-07	7.50E-07	0.014061	0.0064224	0.0024879	0.0130051	0.0106294	0.002846
16-06	6.19E-07	2.38E-07	7.50E-07	0.0101605	0.0017477	0.0001282	0.0072036	0.0043361	0.000324
17-06	2.85E-06	2.38E-07	7.50E-07	0.0068882	8.21E-05	0.0019549	0.0041142	0.000487	0.0022407
18-06		2.38E-07	7.50E-07	0.0064975	1.19E-05	7.15E-05	0.0039757	0.000594	9.03E-05
19-06	4.93E-06	2.38E-07	7.50E-07	0.0038224		0.0006354	0.0010759	7.83E-05	0.0008533
20-06	1.99E-13	2.38E-07	7.50E-07	0.0012702	1.09E-06		0.0007839	0.001082	1.47E-05
21-06	1.99E-13	2.38E-07	7.50E-07	0.0012113	9.78E-08		0.0004917	0.0006949	
22-06	1.99E-13	2.38E-07	7.50E-07	0.0002185	2.49E-07		3.72E-05	0.000445	
23-06	6.51E-07	1.81E-13	7.50E-07	0.0005678	0.0029701		4.71E-05	0.0032165	
24-06	6.51E-07	1.17E-06	7.50E-07	0.0039756	0.0018537	3.14E-07	0.0027596	0.0018765	1.64E-07
25-06			7.50E-07	0.0039322	0.0028771	3.14E-07	0.0028619	0.0029878	1.64E-07
26-06		2.00E-06	7.50E-07	0.0010952	0.0010319	3.14E-07	0.0006284	0.0010468	1.64E-07
27-06			7.50E-07	0.0007072	0.0008004	3.14E-07	0.0002223	0.0008407	1.64E-07
28-06	8.72E-05		7.50E-07	0.0033266	9.96E-05	3.14E-07	0.0025199	0.000141	1.64E-07
29-06	4.68E-05		7.50E-07	0.0030185	2.07E-05	0.000602	0.0023955	2.68E-05	0.000693
30-06			7.50E-07	0.0007323		0.0008326	0.0004344		0.0007919
01-07	0.0001338		7.50E-07	0.0032968		0.0012576	0.0026365		0.0014374
02-07	1.63E-13	7.95E-07	1.26E-06	0.0006702	8.62E-07	0.0013059	0.0004065	2.09E-07	0.0014397
03-07	0.0001823	7.95E-07		0.0033319	8.62E-07	0.0020452	0.003097	2.09E-07	0.0021431
04-07	0.0001716	7.95E-07	1.17E-06	0.0035436	8.62E-07	0.0012311	0.0035544	2.09E-07	0.0012577
05-07	0.0002178	7.95E-07		0.0037548	2.55E-07	5.26E-05	0.0041947	8.44E-07	6.16E-05
06-07	0.0003584			0.0042203	0.0047748		0.0055271	0.0048016	
07-07		5.70E-07		0.0015781	0.0025099	0.0018893	0.0026779	0.0025323	0.0018556
08-07		2.09E-08	2.88E-12	0.0010541	0.0065794	0.0034246	0.0016419	0.0068284	0.0029571
09-07	0.0002489	4.57E-07	2.77E-06	0.003716	0.0061482	0.0020965	0.0055937	0.0064494	0.0019512
10-07	1.19E-06	1.20E-06		0.0014896	0.0028134	0.0002197	0.0025805	0.0034237	0.0002953
11-07		7.17E-05	1.76E-06	0.0004568	0.0031107	0.0007455	0.0011449	0.0034634	0.0008122
12-07	1.16E-06	1.68E-05		0.0001122	0.0041501	0.0022515	0.0006945	0.0060235	0.0023366
13-07	0.0002049	9.84E-05		0.0020672	0.0027665	8.88E-05	0.0032929	0.0045625	9.63E-05
14-07		0.0004117		0.0020948	0.0033365	4.25E-05	0.0033637	0.0068006	5.15E-05
15-07	0.0002866	1.43E-06		0.0108313	0.001482		0.0149709	0.0041783	
16-07	1.20E-06	0.0001948		0.0109635	0.002267		0.013281	0.0051519	
17-07	7.99E-13	3.91E-14		0.0082696	0.0002401		0.0078112	0.0018583	
18-07	7.99E-13	1.25E-05		0.0049814	0.0022559		0.002981	0.0051829	
19-07	1.97E-05	0.0004103		0.0077654	0.0028136		0.006442	0.0063131	
20-07	7.74E-09	0.0004658		0.0149403	0.011545		0.0113289	0.0172082	
21-07	7.98E-07	1.24E-06		0.0092495	0.0100379	0.0006163	0.0054697	0.0121514	0.0007124
22-07	0.003211	4.48E-13		0.0150384	0.0062647		0.0107846	0.0044555	
23-07	0.0042907	4.48E-13		0.0111242	0.0040185		0.0070544	0.0037636	
24-07	0.0033874	2.38E-07		0.008188	0.0072909		0.0048509	0.0086787	
25-07	0.004764	2.28E-05		0.0101382	0.0115853		0.0068159	0.0129715	
26-07	0.0040325	9.87E-06		0.0076056	0.0066729		0.0045146	0.008751	
27-07	0.0066987	0.0019474		0.011223	0.0064311		0.0076824	0.0060692	
28-07	0.0026776	0.0021199		0.0058982	0.0059206	0.0003781	0.0029165	0.0059809	0.0004403
29-07	0.0017177	0.0100123	7.72E-07	0.004495	0.0126051	6.45E-07	0.0021122	0.0126492	4.14E-07
30-07	0.0006673	0.0054251		0.0030787	0.0057594	0.0007048	0.0009693	0.0057604	0.0015257
31-07	8.42E-05	0.0047609	6.20E-07	0.0017952	0.0055324	0.0012683	0.000112	0.0055532	0.0008319
01-08	0.0013388	0.0027961	6.20E-07	0.0034562	0.0033038		0.0016818	0.0033188	
02-08	0.006472	0.0013669	6.20E-07	0.0094682	0.0018497		0.0066883	0.0018611	
03-08	0.0024225	0.0005637	6.20E-07	0.0062959	0.0009783	0.0021736	0.0025127	0.000988	0.0022257
04-08	0.0009712	7.11E-05	7.85E-07	0.0027996	0.000111	0.0024385	0.0010743	0.0001121	0.0024761

OVERLAND FLOW (m)									
Date	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
05-08	0.0001162		1.71E-06	0.0016023	2.76E-05	0.0009004	0.0001304	2.86E-05	0.0009091
06-08	5.50E-05			0.0010618		0.002702	6.45E-05		0.0027408
07-08	0.0036694		6.52E-07	0.0055909		0.0009656	0.0039627		0.0009741
08-08	0.0055706		1.40E-06	0.0078782		0.0010842	0.005538		0.0011046
09-08	0.006419	0.0070565	1.29E-07	0.0092193	0.0072601	0.0062643	0.0064139	0.0072816	0.0062469
10-08	0.0017425	0.0057351	1.29E-07	0.0043985	0.0057851	0.0031606	0.0017699	0.0058079	0.0026084
11-08	0.0011787	0.0034423	1.29E-07	0.0031657	0.0034997	0.0024433	0.001166	0.0035097	0.0025093
12-08	0.0004389	0.0061199	2.42E-06	0.0021841	0.0061924	0.0010056	0.000436	0.0062087	0.0009678
13-08	0.0001784	0.0086016	1.05E-06	0.0016486	0.0086889	0.0012262	0.0001852	0.0087409	0.0012226
14-08	5.95E-05	0.0025473		0.0013292	0.0026184	0.0033118	6.01E-05	0.0026903	0.0035908
15-08		0.0022081		8.38E-05	0.0022665	0.0037168		0.0023067	0.0040767
16-08		0.0010733	3.45E-06		0.0011179	0.0007057		0.0011525	0.0007561
17-08	6.74E-07	0.0050433		4.93E-07	0.0050907	0.0004021	9.54E-07	0.0051389	0.000367
18-08	1.65E-07	0.0014894		3.74E-07	0.0015378	5.24E-05	3.39E-07	0.0015577	4.94E-05
19-08	0.0014458	0.0014247		0.0019956	0.001469		0.0015177	0.00148	
20-08	0.0003821	0.005704		0.0018454	0.0057447		0.0002411	0.0057699	
21-08		0.0025297		4.10E-05	0.0025789			0.0025982	
22-08		0.0047193			0.00476			0.0047783	
23-08	0.0145208	0.0040423		0.0180492	0.0040911		0.0146324	0.0041073	
24-08	0.0078553	0.005424	9.39E-07	0.0113389	0.005478	0.0034447	0.0079908	0.0054989	0.0034331
25-08	0.0024201	0.0031054	9.39E-07	0.0055701	0.0031697		0.0025126	0.0031827	
26-08	0.0016837	0.0050637	9.39E-07	0.0041605	0.0051164		0.0017637	0.005131	
27-08	0.0006067	0.0010079	9.39E-07	0.0027681	0.0010582		0.0006681	0.0010654	
28-08	0.001858	0.0002824	9.39E-07	0.0038363	0.0003089		0.0019219	0.0003149	
29-08	0.0032783	0.0007054	9.39E-07	0.0054785	0.0007326	0.0006754	0.0033504	0.0007383	0.0006768
30-08	0.0013583	5.02E-05		0.0032432	5.25E-05	0.0016897	0.001413	5.31E-05	0.0016894
31-08	0.0014845			0.0031364		0.0071483	0.001536		0.0106071
01-09	0.0003831			0.0108191	0.0106585	0.0024537	0.0100198	0.0157619	0.0035765
02-09	0.0012067	9.33E-07		0.0059057	0.0019658	0.0001899	0.0043612	0.002443	0.0004746
03-09	1.51E-05	0.0120059	6.14E-07	0.0033268	0.0134578	0.0007177	0.0020646	0.0115611	0.0010716
04-09		0.007913	6.14E-07	0.0031436	0.0088896	2.14E-05	0.0021392	0.0064915	6.95E-05
05-09		0.0022514	6.14E-07	0.0013102	0.0026157	0.0011995	0.0005161	0.0028416	0.0016033
06-09		0.0100307	6.14E-07	0.0001382	0.0104875	0.002935	7.99E-05	0.0102936	0.0032793
07-09		0.0071271	1.07E-06	4.36E-05	0.0072265	0.0014033		0.0072315	0.0016089
08-09		0.0028415	3.68E-06		0.0029974	0.0004942		0.002958	0.000627
09-09		0.0045608	1.10E-13		0.0046804	0.002028		0.0046669	0.002361
10-09		0.0015513	1.56E-09		0.0016422	0.0019351		0.0016271	0.0023482
11-09		0.0005117	1.56E-09		0.0005948	6.86E-05		0.0005787	9.67E-05
12-09		0.0037554	1.46E-06		0.0038697	0.0006683		0.0038568	0.0008777
13-09		0.0029007	1.31E-06		0.0028848	7.01E-05		0.0028895	0.0001341
14-09		0.0017847			0.001831	0.0058333		0.0018311	0.008018
15-09	0.0049545	0.0001076	1.76E-06	0.0184791	0.0075601	0.0009613	0.0196362	0.0101474	0.0015484
16-09	0.0075914			0.0158926	0.0009304	0.0009287	0.013395	0.0018562	0.0016743
17-09	0.0027648			0.007475	0.0008585	0.0001039	0.0042461	0.0015159	0.0006616
18-09	0.0020176	1.09E-07	1.40E-06	0.0063835	0.0006961	5.60E-05	0.0040451	0.001209	0.0005494
19-09	0.0001399	1.74E-07	9.58E-07	0.0031969	0.0013569	1.17E-13	0.0012199	0.0021121	5.94E-05
20-09	6.89E-05	9.85E-07	9.58E-07	0.0028713	0.000461		0.0012177	0.0010889	
21-09	0.0018068	9.85E-07	9.58E-07	0.0055691	1.12E-05		0.0037133	6.70E-05	
22-09	0.0048194	9.85E-07		0.0083555		0.002048	0.006012		0.002359
23-09	0.0054731	9.85E-07	1.43E-06	0.0089118		0.0011415	0.0062778		0.0015943
24-09	0.0098961	9.85E-07	1.11E-06	0.0145015		0.0008324	0.0104699		0.0013053
25-09	0.0042257	9.85E-07	1.58E-06	0.0081792		0.0002002	0.0043993		0.0005232
26-09	0.001783	9.85E-07		0.0047991			0.0020135		
27-09	0.0007531	9.85E-07		0.0033348			0.0009477		

OVERLAND FLOW (m)									
Date	S1	S2	S3	S4	S5	S6	S7	S8	S9
21-11	6.29E-13			6.96E-13					
22-11	6.29E-13			6.96E-13					
23-11	6.29E-13			6.96E-13					
24-11	6.29E-13			6.96E-13		7.97E-07			1.31E-06
25-11	6.29E-13			6.96E-13		7.97E-07			
26-11	6.29E-13			6.96E-13	8.02E-07	8.95E-07		5.88E-07	1.02E-06
27-11	6.29E-13			2.31E-12	8.02E-07	8.95E-07	4.97E-14	5.88E-07	
28-11	6.29E-13			2.31E-12	8.02E-07	8.95E-07	4.97E-14	5.88E-07	
29-11	6.29E-13			2.31E-12	8.02E-07	8.95E-07	4.97E-14	5.88E-07	
30-11	6.29E-13			2.31E-12	8.02E-07	0.0037622	4.97E-14	5.88E-07	0.0089938
01-12	6.29E-13			0.0002389	0.0041205	2.84E-07	0.0043485	0.0098488	0.0052699
02-12	6.29E-13			8.74E-12		2.84E-07			0.0017532
03-12	6.29E-13			8.74E-12		2.84E-07			6.92E-05
04-12	6.29E-13			8.74E-12		3.70E-06			0.0030836
05-12	6.29E-13			8.74E-12					7.58E-05
06-12	6.29E-13			8.74E-12					
07-12	6.29E-13			8.74E-12					
08-12	6.29E-13			8.74E-12					
09-12	6.29E-13			8.74E-12					
10-12	6.29E-13			0.0001768					
11-12	6.29E-13			3.63E-11					
12-12	6.29E-13			1.77E-06			1.42E-06		
13-12	6.29E-13			5.83E-07			1.33E-06		
14-12	6.29E-13			5.83E-07		0.0039022			0.0080423
15-12	6.29E-13			0.0044185	0.0035765		0.0071392	0.0030313	0.0011089
16-12	6.29E-13				6.69E-06		0.0013053	7.11E-14	
17-12	6.29E-13				1.92E-13			7.11E-14	
18-12	6.29E-13				1.92E-13			7.11E-14	
19-12	6.29E-13				1.92E-13			7.11E-14	9.10E-07
20-12	6.29E-13				1.92E-13			1.11E-06	9.10E-07
21-12	6.29E-13				1.92E-13			9.57E-07	9.10E-07
22-12	6.29E-13				1.92E-13			9.57E-07	9.10E-07
23-12	6.29E-13				1.92E-13			9.57E-07	9.10E-07
24-12	6.29E-13				5.46E-08			9.57E-07	9.10E-07
25-12	6.29E-13				5.46E-07			1.86E-06	9.10E-07
26-12	6.29E-13				5.46E-07			7.11E-14	9.10E-07
27-12	6.29E-13				5.46E-07			7.11E-14	9.10E-07
28-12	6.29E-13				5.46E-07			7.11E-14	9.10E-07
29-12	6.29E-13				5.46E-07			2.38E-07	9.10E-07
30-12	6.29E-13				5.46E-07			2.38E-07	9.10E-07
31-12	6.29E-13				5.46E-07			2.38E-07	9.10E-07

Date	OVERLAND FLOW (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
01/01									
02/01				0.003536	0.003536	0.003536	0.003101	0.003101	0.003102
03/01				1.03E-05	4.58E-11	4.33E-11		6.54E-13	
04/01					4.58E-11	4.33E-11		6.54E-13	
05/01					4.58E-11	4.33E-11		6.54E-13	
06/01					4.58E-11	4.33E-11		6.54E-13	
07/01					4.58E-11	4.33E-11		6.54E-13	
08/01					4.58E-11	4.33E-11		6.54E-13	
09/01					4.58E-11	4.33E-11		6.54E-13	
10/01					4.58E-11	4.33E-11		6.54E-13	
11/01					4.58E-11	4.33E-11		6.54E-13	
12/01					4.58E-11	4.33E-11		6.54E-13	
13/01					4.58E-11	4.33E-11		6.54E-13	
14/01					4.58E-11	0.003536		6.54E-13	0.002868
15/01				0.003536	0.003536		0.002868	0.002868	1.39E-13
16/01					6.39E-14			5.61E-13	1.39E-13
17/01					6.39E-14			5.61E-13	1.39E-13
18/01					6.39E-14			5.61E-13	1.39E-13
19/01					6.39E-14			5.61E-13	1.39E-13
20/01					6.39E-14			5.61E-13	1.39E-13
21/01	5.57E-08			4.09E-09	6.39E-14		1.70E-07	5.61E-13	1.39E-13
22/01	5.48E-07			3.26E-07	6.39E-14		3.25E-07	5.61E-13	1.39E-13
23/01	5.48E-07				6.39E-14		3.25E-07	5.61E-13	1.39E-13
24/01	5.48E-07				6.39E-14		3.25E-07	5.61E-13	1.39E-13
25/01	5.48E-07				6.39E-14		3.25E-07	5.61E-13	1.39E-13
26/01	5.48E-07				6.39E-14		3.25E-07	5.61E-13	1.39E-13
27/01	5.48E-07				6.39E-14		3.25E-07	5.61E-13	1.39E-13
28/01	5.48E-07				6.39E-14		3.25E-07	5.61E-13	1.39E-13
29/01	5.48E-07				6.39E-14		3.25E-07	5.61E-13	1.39E-13
30/01	5.48E-07				6.39E-14		3.25E-07	5.61E-13	1.39E-13
31/01	5.48E-07				6.39E-14	0.003536	3.25E-07	5.61E-13	0.002868
01/02	5.48E-07			0.003536	0.003536	2.94E-07	0.003105	0.002868	4.94E-13
02/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
03/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
04/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
05/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
06/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
07/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
08/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
09/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
10/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
11/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
12/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
13/02	5.48E-07				1.02E-07	2.94E-07	1.95E-13		4.94E-13
14/02	5.48E-07				1.02E-07	0.003537	1.95E-13		0.002868
15/02	5.48E-07			0.003536	0.003538		0.003101	0.002868	6.93E-13
16/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
17/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
18/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
19/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13

	OVERLAND FLOW (m)								
Date	S10	S11	S12	S13	S14	S15	S16	S17	S18
20/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
21/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
22/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
23/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
24/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
25/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
26/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
27/02	5.48E-07			4.21E-11	1.10E-10			8.56E-13	6.93E-13
28/02	5.48E-07			4.21E-11	1.10E-10	0.003536		8.56E-13	0.002868
01/03	5.48E-07			0.003536	0.003536	8.14E-12	0.005374	0.002868	2.59E-13
02/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
03/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
04/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
05/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
06/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
07/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
08/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
09/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
10/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
11/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
12/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
13/03	5.48E-07			1.03E-10	9.61E-11	8.14E-12		6.89E-13	2.59E-13
14/03	5.48E-07			1.03E-10	9.61E-11	0.003536		6.89E-13	0.002868
15/03	5.48E-07			0.003536	0.003536	5.45E-06	0.005374	0.002868	2.30E-08
16/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
17/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
18/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
19/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
20/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
21/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
22/03	5.48E-07			1.24E-06	5.44E-11		1.56E-06	9.70E-13	2.30E-08
23/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
24/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
25/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
26/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
27/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
28/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
29/03	5.48E-07				5.44E-11			9.70E-13	2.30E-08
30/03	5.48E-07				5.44E-11	0.003536		9.70E-13	0.002868
31/03	5.48E-07			0.003536	0.003536	1.61E-10	0.005374	0.005374	1.78E-13
01/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
02/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
03/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
04/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
05/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
06/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
07/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
08/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
09/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
10/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13

Date	OVERLAND FLOW (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
11/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
12/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
13/04	5.48E-07					1.61E-10	1.63E-10	1.12E-07	1.78E-13
14/04	5.48E-07					0.003536	1.63E-10	1.12E-07	0.001102
15/04	5.48E-07		1.59E-12	0.003536	0.003536	9.57E-07	0.005374	0.003404	
16/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	9.24E-14	
17/04	5.48E-07		1.59E-12	1.49E-10	1.32E-06	9.57E-07	1.40E-07	1.95E-06	
18/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
19/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
20/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
21/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
22/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
23/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
24/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
25/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
26/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
27/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
28/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
29/04	5.48E-07		1.59E-12	1.49E-10		9.57E-07	1.40E-07	7.82E-14	
30/04	5.48E-07		1.59E-12	1.49E-10		0.003536	1.40E-07	7.82E-14	0.005374
01/05	1.12E-06		1.59E-12	0.003536	0.003536		0.003558	0.003444	1.04E-07
02/05	2.49E-14		1.59E-12	9.51E-05			7.28E-07		1.04E-07
03/05	2.62E-06		1.59E-12	2.77E-06			3.49E-07		1.04E-07
04/05	8.53E-14		1.59E-12	7.11E-15			3.49E-07		1.04E-07
05/05	8.53E-14		1.59E-12	7.11E-15			3.49E-07		1.04E-07
06/05	8.53E-14		7.38E-07	7.11E-15			3.49E-07		3.39E-10
07/05	8.53E-14		2.33E-06	7.11E-15		9.51E-07	3.49E-07		1.03E-06
08/05	8.53E-14		7.81E-07	7.11E-15		9.99E-07	5.89E-05		1.00E-06
09/05	1.95E-06		7.81E-07	1.68E-06		9.99E-07	8.99E-07		
10/05			7.81E-07		2.46E-07	9.99E-07	8.99E-07	3.55E-15	
11/05	9.21E-07		7.81E-07	4.52E-08	2.46E-07	9.99E-07	5.51E-09	6.58E-07	
12/05	9.21E-07	1.10E-07	7.81E-07	4.52E-08	2.46E-07	9.99E-07	5.52E-09	2.39E-06	1.50E-11
13/05	9.21E-07	8.70E-07	8.80E-09	4.52E-08	1.23E-06	9.50E-07	5.52E-09	0.000117	0.000138
14/05	9.21E-07	8.70E-07	8.80E-09	4.52E-08		0.004225	5.52E-09		0.00309
15/05	9.21E-07	8.70E-07	8.80E-09	0.003536	0.003536		0.003091	0.003087	
16/05	9.21E-07	8.70E-07	8.80E-09	1.49E-06	1.68E-10		9.04E-09		
17/05	9.21E-07	8.70E-07	8.80E-09	1.28E-06	9.55E-07		4.73E-07	4.33E-07	
18/05	9.21E-07		8.80E-09		0.000405		4.73E-07	0.000401	
19/05	9.21E-07		8.80E-09				4.73E-07		
20/05	9.21E-07		8.80E-09				4.73E-07		1.43E-11
21/05	9.21E-07		8.79E-09			6.75E-07	4.73E-07		2.54E-07
22/05	9.21E-07		8.79E-09		3.66E-06	6.75E-07	4.73E-07	9.95E-14	2.54E-07
23/05	9.21E-07	5.50E-08	8.79E-09		0.00049	6.75E-07	4.73E-07	0.000499	2.54E-07
24/05	9.21E-07	5.09E-06	8.79E-09		3.39E-06	6.75E-07	4.73E-07	3.32E-06	2.54E-07
25/05	9.21E-07	3.99E-06	8.76E-09	1.28E-11	1.94E-06	6.75E-07	4.73E-07	2.36E-06	2.54E-07
26/05	9.21E-07	1.42E-14	8.76E-09	1.28E-11		6.75E-07	4.73E-07	1.78E-14	2.54E-07
27/05	9.21E-07	1.42E-14	8.76E-09			6.75E-07	4.73E-07	1.78E-14	2.54E-07
28/05	9.21E-07	1.42E-14	8.76E-09	5.12E-11	5.49E-06	6.75E-07	4.73E-07	1.14E-13	2.54E-07
29/05	9.21E-07	2.32E-06	8.76E-09	4.09E-07	1.34E-06	6.75E-07	1.68E-06	1.48E-06	2.54E-07
30/05	2.24E-06	1.14E-13	8.76E-09	2.08E-06		0.003532	7.64E-07	2.84E-14	0.003301

Date	OVERLAND FLOW (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
31/05		1.14E-13	4.20E-06	0.003534	0.00355	6.02E-06	0.005457	0.000482	
01/06		1.14E-13	2.62E-06	2.62E-10	1.41E-12	1.18E-06			7.58E-07
02/06		1.42E-14	2.47E-09	2.62E-10	0.000255	4.66E-07		0.000409	9.55E-08
03/06	1.54E-07	1.18E-06	2.47E-09	0.000902	5.14E-06	4.66E-07		3.08E-06	9.55E-08
04/06	1.54E-07		2.47E-09	3.87E-13	1.14E-13	4.66E-07		1.56E-13	4.24E-07
05/06	1.54E-07		2.47E-09	3.87E-13		4.66E-07			4.24E-07
06/06	1.54E-07		2.47E-09	3.87E-13	8.16E-11	4.66E-07			4.24E-07
07/06	1.54E-07		2.47E-09	3.87E-13	0.000337	4.66E-07		0.000302	4.24E-07
08/06	1.54E-07		2.47E-09		0.00051	4.66E-07	9.17E-06	0.000491	4.24E-07
09/06	3.90E-07		2.47E-09	0.000238	0.000718	4.66E-07	0.000257	0.000614	8.21E-07
10/06	9.36E-07		2.49E-09	2.14E-06	3.98E-13	4.66E-07	0.000273		8.21E-07
11/06	1.07E-06		1.46E-06	5.78E-07	3.98E-13	1.27E-06	1.94E-06		1.38E-06
12/06	1.58E-06		8.34E-07	2.07E-06	3.98E-13	2.35E-07	1.76E-06		1.57E-06
13/06	7.97E-11		8.34E-07	0.000333	3.98E-13	2.35E-07	0.000334		3.55E-15
14/06	5.14E-07		8.34E-07	0.00028	3.98E-13	0.00351	0.000287		0.002961
15/06	6.46E-07		7.55E-07	0.003546	0.003484	7.18E-06	0.003618	0.003111	1.20E-07
16/06	6.46E-07		7.55E-07	0.000666			0.000331	4.12E-13	1.20E-07
17/06	4.32E-06		7.55E-07	3.71E-06		8.69E-05	1.91E-06	4.12E-13	0.000183
18/06			7.55E-07	0.000373			1.26E-05	4.12E-13	9.73E-07
19/06	2.12E-06		7.55E-07	2.11E-06		1.38E-06	2.46E-06	4.12E-13	1.35E-06
20/06			7.55E-07				2.84E-14	4.12E-13	5.68E-14
21/06			7.55E-07				2.84E-14	4.12E-13	5.68E-14
22/06			7.55E-07		3.84E-07		2.84E-14	4.78E-07	5.68E-14
23/06	5.02E-07		7.55E-07	1.03E-06			7.19E-07	0.000181	5.68E-14
24/06	5.02E-07	1.17E-06	7.55E-07	1.31E-13	2.53E-06		7.19E-07	1.63E-06	5.68E-14
25/06	6.66E-07		7.55E-07	8.46E-05	1.50E-06		9.93E-05	0.000131	5.68E-14
26/06	6.66E-07	2.02E-06	7.55E-07		2.03E-06		2.84E-14	3.14E-07	5.68E-14
27/06	6.66E-07		7.55E-07				2.84E-14	3.14E-07	5.68E-14
28/06	6.66E-07		7.55E-07	3.54E-07			2.84E-14	3.14E-07	5.68E-14
29/06	1.19E-06		7.55E-07	5.82E-07			5.14E-07	3.14E-07	5.68E-14
30/06			7.55E-07	5.82E-07			5.14E-07	3.14E-07	5.68E-14
01/07			7.55E-07	5.82E-07			6.01E-07	3.14E-07	5.68E-14
02/07		8.02E-07	1.26E-06	5.82E-07	1.13E-08	1.28E-06	6.01E-07	4.82E-07	1.36E-06
03/07		8.02E-07	2.13E-14	5.82E-07	1.13E-08		6.01E-07	4.82E-07	5.68E-14
04/07		8.02E-07	1.17E-06	5.19E-05	1.13E-08	7.88E-07	5.26E-05	4.82E-07	1.08E-06
05/07	4.88E-05	8.02E-07		5.88E-05	1.13E-08	7.88E-07	5.94E-05	4.82E-07	
06/07	1.52E-07	2.32E-07		9.68E-05	1.99E-13	7.88E-07	9.79E-05	3.03E-08	
07/07	1.52E-07	6.87E-07		7.11E-14	4.93E-07	7.88E-07	1.99E-13	6.78E-07	
08/07	1.52E-07	9.11E-08	2.88E-12	7.11E-14		7.88E-07	1.99E-13	0.000615	
09/07	1.52E-07	3.68E-07	2.77E-06	2.71E-07	0.000587	4.06E-05	1.99E-13	0.000606	4.12E-05
10/07	5.90E-07	1.24E-06		1.43E-06	4.72E-06		1.40E-06	3.31E-06	
11/07	5.90E-07	3.82E-07	1.77E-06		9.02E-08	1.11E-06		8.81E-08	1.20E-06
12/07	2.21E-06	0.000184		7.12E-07	7.91E-06		7.74E-07	8.08E-06	
13/07	1.99E-13	1.97E-06		7.12E-07	1.05E-06		7.74E-07	9.98E-07	
14/07	1.99E-13	5.60E-06		7.12E-07	2.84E-14		7.74E-07		
15/07		2.86E-06		7.64E-11	1.59E-06			2.46E-06	
16/07	0.000749	4.91E-07		0.000801	9.52E-07		0.000735	1.10E-06	
17/07	4.37E-13	4.91E-07			9.52E-07		8.53E-14		
18/07	4.37E-13	7.39E-05					8.53E-14		
19/07	3.23E-12								

Date	OVERLAND FLOW (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
20/07	0.000475	0.00081		0.000466	0.000861		0.000469	0.00077	
21/07	1.94E-06	0.000336		2.00E-06	0.000262		1.93E-06	0.000264	
22/07	1.01E-10	1.07E-13		4.01E-06			4.08E-06		
23/07	1.27E-06	1.07E-13		2.64E-06			1.22E-06		
24/07	1.24E-06	1.52E-11		2.77E-06	1.69E-12		1.22E-06	1.00E-11	
25/07		0.00072		4.26E-14	0.000712			0.000691	
26/07	1.51E-06	0.000165		1.50E-06	0.00017		1.50E-06	0.000169	
27/07		1.50E-06		5.20E-11	1.14E-06		9.55E-12	1.11E-06	
28/07		1.39E-06		5.20E-11	1.27E-06		9.55E-12	1.21E-06	
29/07		0.000667	7.73E-07	5.20E-11	0.000669	1.79E-07	9.55E-12	0.000668	1.28E-07
30/07		3.11E-06		5.20E-11	3.16E-06	6.52E-07	9.55E-12	2.97E-06	
31/07		1.62E-06	6.19E-07	5.20E-11	1.69E-06	1.02E-06	9.55E-12	1.58E-06	1.11E-06
01/08		7.11E-15	6.19E-07	5.20E-11			9.55E-12	4.97E-14	
02/08		7.11E-15	6.19E-07	7.46E-14				4.97E-14	
03/08		7.11E-15	6.19E-07	7.46E-14				4.97E-14	
04/08		7.11E-15	7.83E-07	7.46E-14		8.07E-07		4.97E-14	8.03E-07
05/08		7.11E-15	1.70E-06	7.46E-14		1.42E-06		4.97E-14	1.54E-06
06/08		7.11E-15		7.46E-14		9.67E-05		4.97E-14	0.000102
07/08		7.11E-15	7.24E-07	7.46E-14		4.20E-06		4.97E-14	6.85E-07
08/08		7.11E-15	1.39E-06	7.46E-14		1.69E-06		4.97E-14	9.76E-07
09/08		7.11E-15	7.59E-08	7.46E-14		0.000542		4.97E-14	0.000549
10/08		2.12E-06	7.59E-08	7.46E-14	2.17E-06			2.12E-06	7.07E-13
11/08		2.09E-06	7.59E-08	7.46E-14	2.13E-06			2.09E-06	7.07E-13
12/08		7.11E-15	2.64E-06	7.46E-14		2.38E-06			2.28E-06
13/08		0.000165	1.20E-06	7.46E-14	0.000157	7.61E-07		0.000165	7.12E-07
14/08	7.84E-07			7.79E-07	2.86E-12		7.83E-07	3.91E-14	1.00E-07
15/08	7.84E-07			7.79E-07	2.86E-12	0.000274	7.83E-07	3.91E-14	1.72E-11
16/08	7.84E-07		3.53E-06	7.79E-07	2.86E-12	3.44E-06	7.83E-07	3.91E-14	2.40E-06
17/08	5.38E-07		7.11E-15	1.18E-06	2.86E-12	9.24E-14	5.37E-07	3.91E-14	
18/08	5.38E-07		7.11E-15		2.86E-12	9.24E-14	5.37E-07	3.91E-14	
19/08	5.38E-07		7.11E-15		2.86E-12	9.24E-14	5.37E-07	3.91E-14	
20/08	1.38E-06		7.11E-15	1.37E-06	2.86E-12	9.24E-14	1.39E-06	3.91E-14	
21/08	8.53E-14		7.11E-15		2.86E-12	9.24E-14		3.91E-14	
22/08	8.53E-14		7.11E-15		2.86E-12	9.24E-14		3.91E-14	
23/08	3.30E-13	4.35E-07	7.11E-15	2.34E-13	3.52E-07	9.24E-14		4.37E-07	
24/08	3.30E-13	4.35E-07	8.11E-07	2.34E-13	3.53E-07			4.37E-07	
25/08	3.30E-13	1.32E-06	8.11E-07	2.34E-13	1.34E-06			1.32E-06	
26/08	3.30E-13		8.11E-07	2.34E-13	6.04E-14			3.91E-14	
27/08	3.30E-13		8.11E-07	2.34E-13	6.04E-14			3.91E-14	
28/08	3.30E-13		8.11E-07	2.34E-13	6.04E-14			3.91E-14	
29/08	3.30E-13		8.11E-07	2.34E-13	6.04E-14			3.91E-14	
30/08	2.03E-06		7.11E-15	2.03E-06	6.04E-14	5.74E-07	2.04E-06	3.91E-14	
31/08	1.38E-06		7.11E-15	1.38E-06	6.04E-14	0.003537	1.38E-06	3.91E-14	0.001506
01/09			7.11E-15	0.003537	0.003536	6.32E-11	0.003772	0.003664	6.75E-14
02/09			7.11E-15	5.37E-06	2.58E-06	6.32E-11	1.34E-08		6.75E-14
03/09			6.17E-07	2.77E-13	1.00E-06	1.44E-06	1.34E-08	0.000363	1.83E-06
04/09		2.54E-06	6.17E-07	2.77E-13	1.91E-06		1.34E-08	4.09E-06	
05/09		1.99E-13	6.17E-07	2.77E-13	1.49E-13		1.34E-08	3.34E-13	1.28E-11
06/09		0.000245	6.17E-07	2.77E-13	4.05E-06	9.53E-07	1.34E-08		
07/09		2.00E-06	1.06E-06	2.77E-13	1.40E-06	3.95E-07	1.34E-08	7.02E-07	3.47E-06

Date	OVERLAND FLOW (m)								
	S10	S11	S12	S13	S14	S15	S16	S17	S18
08/09		6.39E-14	3.67E-06	2.77E-13	5.68E-14	1.15E-06	1.34E-08	7.02E-07	2.31E-06
09/09		1.09E-06	1.85E-13	2.77E-13	3.45E-07		1.34E-08	1.03E-06	
10/09			2.05E-09	2.77E-13	3.45E-07	8.07E-08	1.34E-08	2.13E-14	4.13E-07
11/09			2.05E-09	2.77E-13	3.45E-07	8.07E-08	1.34E-08	2.13E-14	4.13E-07
12/09			2.02E-06	2.77E-13	3.25E-12	1.65E-06	1.34E-08		1.63E-06
13/09		2.34E-07	1.33E-06	2.77E-13	7.39E-07	1.79E-06	1.34E-08	2.47E-07	5.96E-07
14/09		1.65E-06	8.53E-14	2.77E-13	1.54E-06	0.003551	1.34E-08	2.20E-06	0.001445
15/09	1.42E-14		1.77E-06	0.001987	0.003511	1.28E-06	0.003652	0.002991	
16/09	3.98E-07			3.48E-07	7.64E-13	7.11E-14		1.74E-13	
17/09	3.98E-07				7.64E-13	7.11E-14		1.74E-13	
18/09	4.94E-06	5.48E-07	1.40E-06	1.57E-06	1.65E-06	8.49E-07	3.85E-06	1.20E-06	1.52E-06
19/09	2.06E-13	5.48E-07	9.35E-07			7.76E-07	7.11E-15		2.45E-06
20/09	2.06E-13	5.48E-07	9.35E-07		1.86E-06	7.76E-07	7.11E-15	1.02E-06	6.39E-14
21/09	2.06E-13	5.48E-07	9.35E-07	6.00E-05		7.76E-07			6.39E-14
22/09	2.06E-13	5.48E-07				7.76E-07			6.39E-14
23/09	2.06E-13	5.48E-07	1.42E-06			6.81E-07	1.53E-09		1.64E-06
24/09	1.04E-05	5.48E-07	1.10E-06	0.000318		1.50E-06	0.000363		1.37E-06
25/09	4.64E-06	5.48E-07	1.54E-06	2.82E-06		2.17E-06	1.27E-06		1.20E-06
26/09		5.48E-07							
27/09		5.48E-07							
28/09		5.48E-07							
29/09		5.48E-07	1.09E-07			7.11E-15			
30/09		5.48E-07	6.34E-07			0.00358			0.003139
01/10		5.48E-07	2.57E-06	0.003536	0.003536	1.79E-06	0.002349	0.000748	1.93E-08
02/10		5.48E-07	1.34E-06		1.24E-10	2.83E-06			6.82E-07
03/10		5.48E-07			1.24E-10				6.82E-07
04/10	9.02E-07	5.48E-07			1.24E-10		2.84E-14	6.35E-05	6.82E-07
05/10		5.48E-07		0.000411	1.35E-06		0.000456	2.07E-06	6.82E-07
06/10		5.48E-07		6.93E-13	7.02E-08		2.13E-13	6.03E-07	6.82E-07
07/10	4.20E-06	5.48E-07		4.05E-06	7.02E-08		3.45E-06	6.03E-07	6.82E-07
08/10	9.95E-14	5.48E-07			7.02E-08		1.42E-14	6.03E-07	6.82E-07
09/10	9.95E-14	5.48E-07			2.79E-07		1.42E-14	8.14E-07	6.82E-07
10/10	9.95E-14	5.48E-07			2.79E-07		1.42E-14	8.14E-07	6.82E-07
11/10	9.95E-14	5.49E-07			2.80E-07		1.42E-14	8.19E-10	6.82E-07
12/10	9.95E-14	5.49E-07			2.80E-07		1.42E-14	8.19E-10	6.82E-07
13/10	9.95E-14	5.49E-07			2.80E-07		1.42E-14	8.19E-10	6.82E-07
14/10	9.95E-14	5.49E-07			2.80E-07	0.003536	1.42E-14	8.19E-10	0.005374
15/10	9.95E-14	5.49E-07		0.003536	0.003536		0.005374	0.003134	4.26E-08
16/10	9.95E-14	5.49E-07			9.32E-06		4.31E-11	4.99E-09	4.26E-08
17/10	9.95E-14	5.49E-07		2.27E-06			1.56E-06	1.99E-06	4.26E-08
18/10	9.95E-14	5.41E-07			0.000568				4.26E-08
19/10	9.95E-14	4.09E-06			4.28E-06			5.68E-06	4.26E-08
20/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
21/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
22/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
23/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
24/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
25/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
26/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
27/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08

	OVERLAND FLOW (m)								
Date	S10	S11	S12	S13	S14	S15	S16	S17	S18
28/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
29/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
30/10	9.95E-14	2.24E-13						7.11E-14	4.26E-08
31/10	9.95E-14	2.24E-13				0.003536		7.11E-14	0.002868
01/11	9.95E-14	2.24E-13		0.003536	0.003536	8.66E-11	0.002868	0.003599	6.64E-13
02/11	9.95E-14	2.24E-13				8.66E-11	1.08E-12	5.97E-12	6.64E-13
03/11	9.95E-14	2.24E-13				8.66E-11	1.08E-12	5.97E-12	6.64E-13
04/11	9.95E-14	2.24E-13		8.04E-07		1.53E-06	1.89E-06	5.97E-12	1.26E-06
05/11	9.95E-14	2.24E-13		1.30E-06		3.20E-14	2.05E-06	5.97E-12	6.39E-14
06/11	9.95E-14	2.24E-13				3.20E-14	1.78E-13	1.06E-07	6.39E-14
07/11	9.95E-14	2.24E-13				3.20E-14	1.78E-13	1.06E-07	6.39E-14
08/11	9.95E-14	2.24E-13				3.20E-14	1.78E-13	1.06E-07	6.39E-14
09/11	9.95E-14	2.24E-13				3.20E-14	1.78E-13	1.44E-06	6.39E-14
10/11	9.95E-14	2.24E-13				3.20E-14	1.78E-13	8.17E-14	6.39E-14
11/11	9.95E-14	2.24E-13				3.20E-14	1.78E-13	8.17E-14	6.39E-14
12/11	9.95E-14	2.24E-13				3.20E-14	1.78E-13	8.17E-14	6.39E-14
13/11	9.95E-14	2.24E-13				3.20E-14	1.78E-13	8.17E-14	6.39E-14
14/11	9.95E-14	2.24E-13				0.003536	1.78E-13	8.17E-14	0.002868
15/11	9.95E-14	2.24E-13		0.003536	0.003536	3.16E-07	0.002868	0.002868	9.20E-13
16/11	9.95E-14	2.24E-13			8.90E-11	3.16E-07		1.78E-13	9.20E-13
17/11	9.95E-14	2.24E-13			8.90E-11	3.16E-07		1.78E-13	9.20E-13
18/11	9.95E-14	2.24E-13			8.90E-11	3.16E-07		1.78E-13	9.20E-13
19/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	
20/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	
21/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	
22/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	
23/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	
24/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	4.98E-07
25/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	4.98E-07
26/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	4.98E-07
27/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	4.98E-07
28/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	4.98E-07
29/11	9.95E-14	2.24E-13			8.90E-11			1.78E-13	4.98E-07
30/11	9.95E-14	2.24E-13			8.90E-11	0.003536		1.78E-13	0.002868
01/12	9.95E-14	2.24E-13	1.60E-12	0.003536	0.003536	2.36E-06	0.002868	0.000381	2.77E-07
02/12	9.95E-14	2.24E-13	1.60E-12			6.75E-14	4.09E-13	5.79E-13	
03/12	9.95E-14	2.24E-13	1.60E-12			6.75E-14	4.09E-13	5.79E-13	
04/12	9.95E-14	2.24E-13					4.09E-13	5.79E-13	
05/12	9.95E-14	2.24E-13					4.09E-13	5.79E-13	
06/12	9.95E-14	2.24E-13					4.09E-13	5.79E-13	
07/12	9.95E-14	2.24E-13					4.09E-13	5.79E-13	
08/12	9.95E-14	2.24E-13					4.09E-13	5.79E-13	
09/12	9.95E-14	2.24E-13					4.09E-13	5.79E-13	
10/12	9.95E-14	2.24E-13					4.09E-13	5.79E-13	
11/12	9.95E-14	2.24E-13					4.09E-13	5.79E-13	
12/12	9.95E-14	2.24E-13					7.11E-15	5.79E-13	
13/12	9.95E-14	2.24E-13					7.11E-15	5.79E-13	
14/12	9.95E-14	2.24E-13				0.003536	7.11E-15	5.79E-13	0.002868
15/12	9.95E-14	2.24E-13		0.003536	0.003536	4.97E-11	0.000748	0.002868	
16/12	9.95E-14	2.24E-13		1.04E-10	7.78E-06	4.97E-11	2.58E-12	2.96E-08	
17/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
18/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
19/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
20/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
21/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
22/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
23/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
24/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
25/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
26/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
27/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
28/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
29/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
30/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	
31/12	9.95E-14	2.24E-13		1.04E-10	4.62E-14	4.97E-11	2.58E-12	2.96E-08	

Date	OVERLAND FLOW (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
20/02	4.24E-07				1.63E-10	6.62E-11	6.52E-11		2.95E-13
21/02	4.24E-07				1.63E-10	6.62E-11	6.52E-11		2.95E-13
22/02	4.24E-07				1.63E-10	6.62E-11	6.52E-11		2.95E-13
23/02	4.24E-07				1.63E-10	6.62E-11	6.52E-11		2.95E-13
24/02	4.24E-07				1.63E-10	6.62E-11	6.52E-11		2.95E-13
25/02	4.24E-07				1.63E-10	6.62E-11	6.52E-11		2.95E-13
26/02	4.24E-07				1.63E-10	6.62E-11	6.52E-11		2.95E-13
27/02	4.24E-07				1.63E-10	6.62E-11	6.52E-11		2.95E-13
28/02	4.24E-07				1.63E-10	0.003536	6.52E-11		0.002868
01/03	4.24E-07			0.003536	0.003538		0.002868	0.002868	1.42E-14
02/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
03/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
04/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
05/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
06/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
07/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
08/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
09/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
10/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
11/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
12/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
13/03	4.24E-07			9.95E-14	1.27E-07		4.80E-13		1.42E-14
14/03	4.24E-07			9.95E-14	1.27E-07	0.003536	4.80E-13		0.002868
15/03	4.24E-07			0.003536	0.003536	4.96E-06	0.002868	0.002868	3.69E-08
16/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
17/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
18/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
19/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
20/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
21/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
22/03	4.24E-07			1.13E-06	1.07E-10	1.24E-13	1.00E-06	2.95E-13	3.69E-08
23/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
24/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
25/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
26/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
27/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
28/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
29/03	4.24E-07				1.07E-10	1.24E-13		2.95E-13	3.69E-08
30/03	4.24E-07				1.07E-10	0.003536		2.95E-13	0.002868
31/03	4.24E-07			0.003536	0.003536	3.65E-11	0.002868	0.002868	3.55E-15
01/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
02/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
03/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
04/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
05/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
06/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
07/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
08/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
09/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
10/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
11/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
12/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
13/04	4.24E-07				1.04E-11	3.65E-11		7.96E-13	3.55E-15
14/04	4.24E-07				1.04E-11	0.003536		7.96E-13	0.002868
15/04	4.24E-07		1.59E-12	0.003536	0.003536	4.30E-06	0.002868	0.005374	6.33E-08

Date	OVERLAND FLOW (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
16/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	1.09E-10	6.33E-08
17/04	4.24E-07		1.59E-12	1.31E-10	1.35E-06		1.74E-13	8.74E-07	6.33E-08
18/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
19/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
20/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
21/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
22/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
23/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
24/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
25/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
26/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
27/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
28/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
29/04	4.24E-07		1.59E-12	1.31E-10			1.74E-13	8.74E-07	6.33E-08
30/04	4.24E-07		1.59E-12	1.31E-10		0.003536	1.74E-13	8.74E-07	0.002868
01/05	7.01E-06		1.59E-12	0.003536	0.003537	4.92E-11	0.003323	0.002868	7.25E-13
02/05	3.55E-15		1.59E-12	5.02E-06	8.63E-12	4.92E-11		1.42E-14	7.25E-13
03/05	2.51E-06		1.59E-12	1.74E-06	8.63E-12	4.92E-11	2.11E-06	1.42E-14	7.25E-13
04/05			1.59E-12	6.04E-14	8.63E-12	4.92E-11		1.42E-14	7.25E-13
05/05			1.59E-12	6.04E-14	8.63E-12	4.92E-11		1.42E-14	7.25E-13
06/05				6.04E-14	8.63E-12	3.77E-08		1.42E-14	
07/05			2.52E-06	6.04E-14	8.63E-12	1.54E-06		1.42E-14	1.33E-06
08/05			1.51E-06	6.04E-14	8.63E-12	7.32E-07		1.42E-14	7.74E-07
09/05	1.00E-06			1.04E-06	8.63E-12	7.32E-07	2.29E-06	1.42E-14	7.74E-07
10/05				7.82E-14	6.36E-13	7.32E-07		4.61E-07	7.74E-07
11/05	1.65E-07			3.07E-07	6.36E-13	7.32E-07	1.39E-06	4.61E-07	7.74E-07
12/05	1.65E-07			3.07E-07	6.36E-13	7.32E-07	1.28E-11	8.00E-07	7.74E-07
13/05	1.65E-07	2.34E-06	4.66E-07	3.07E-07	2.00E-06	2.77E-07	1.28E-11	2.00E-06	2.89E-07
14/05	1.65E-07		4.66E-07	3.07E-07	3.55E-14	0.003536	1.28E-11	1.42E-14	0.005374
15/05	1.65E-07		4.66E-07	0.003536	0.003536		0.003101	0.005374	7.81E-08
16/05	1.65E-07		4.66E-07	6.43E-07	1.10E-10			2.04E-07	7.81E-08
17/05	1.65E-07		4.66E-07	1.70E-06	5.86E-07		1.43E-06	9.06E-07	7.81E-08
18/05	1.65E-07		4.66E-07		5.86E-07			2.17E-07	7.81E-08
19/05	1.65E-07		4.66E-07		5.86E-07			2.17E-07	7.81E-08
20/05	1.65E-07		4.66E-07		5.86E-07			2.17E-07	7.81E-08
21/05	1.65E-07		4.66E-07		5.86E-07	5.90E-07		2.17E-07	4.17E-07
22/05	1.65E-07		4.66E-07		4.58E-07	5.90E-07		2.52E-07	4.17E-07
23/05	1.65E-07	2.25E-07	4.66E-07		5.83E-07	5.90E-07		4.04E-07	4.17E-07
24/05	1.65E-07	4.98E-06	4.66E-07		5.08E-06	5.90E-07		5.08E-06	4.17E-07
25/05	1.65E-07	3.72E-06	4.66E-07	1.28E-11	4.14E-06	5.90E-07	1.28E-11	4.14E-06	4.17E-07
26/05	1.65E-07	9.95E-14	4.66E-07	1.28E-11	9.59E-14	5.90E-07	1.28E-11	1.42E-14	4.17E-07
27/05	3.70E-07	9.95E-14	4.66E-07		9.59E-14	5.90E-07		1.42E-14	4.17E-07
28/05	3.70E-07		4.66E-07	5.12E-11	5.92E-07	5.90E-07	5.12E-11	1.64E-07	4.17E-07
29/05	3.70E-07	2.32E-06	4.66E-07	7.54E-07	2.32E-06	5.90E-07	4.19E-07	2.32E-06	4.17E-07
30/05	2.79E-06	6.39E-14	4.66E-07	2.59E-06		0.003536	3.58E-06		0.003323
31/05	1.42E-14	6.39E-14	2.32E-06	0.003536	0.003536	4.35E-06	0.005374	0.005374	7.11E-15
01/06	1.42E-14	6.39E-14	2.19E-06	1.23E-10	8.20E-12	3.42E-06	1.48E-07	4.98E-08	2.01E-06
02/06	1.42E-14	6.39E-14	1.48E-09	1.23E-10	8.20E-12	9.53E-08	1.48E-07	4.98E-08	1.07E-06
03/06		3.92E-06	1.48E-09		2.26E-06	9.53E-08	8.88E-08	3.47E-06	
04/06			2.57E-09		8.17E-14	6.77E-07	8.88E-08		2.12E-07

	OVERLAND FLOW (m)								
Date	S19	S20	S21	S22	S23	S24	S25	S26	S27
05/06			2.57E-09		8.17E-14	6.77E-07	8.88E-08		2.12E-07
06/06			2.57E-09		8.17E-14	6.77E-07	8.88E-08	6.30E-07	2.12E-07
07/06		1.54E-07	2.57E-09		8.17E-14	6.77E-07	8.88E-08	6.30E-07	2.12E-07
08/06		1.54E-07	2.57E-09	7.03E-07	8.17E-14	6.77E-07		6.30E-07	2.12E-07
09/06	1.29E-06	1.62E-07	2.57E-09	4.25E-07	8.17E-14	6.88E-07	3.76E-07	6.30E-07	2.12E-07
10/06	8.76E-07	1.62E-07	2.60E-09	9.66E-07	8.17E-14	6.88E-07	6.85E-07	6.30E-07	2.12E-07
11/06	1.35E-06	1.62E-07	1.48E-06	1.66E-06	8.17E-14	1.52E-06	1.37E-06	6.30E-07	1.26E-06
12/06	2.50E-06	1.62E-07	8.18E-07	9.91E-07	8.17E-14	4.42E-07	8.51E-07	6.30E-07	1.41E-06
13/06	4.12E-11	1.62E-07	8.18E-07	9.91E-07	8.17E-14	4.42E-07	8.51E-07	6.30E-07	
14/06	1.41E-06	1.62E-07	8.18E-07	4.13E-07	8.17E-14	0.003536	4.19E-07	6.30E-07	0.003102
15/06	3.36E-07	1.62E-07	1.17E-06	0.003536	0.003536	3.11E-06	0.003101	0.003102	
16/06	3.36E-07	1.62E-07	2.13E-14	6.82E-07	2.13E-11		7.54E-07		
17/06	3.39E-06	1.62E-07	2.13E-14	9.35E-07	2.13E-11		1.14E-06		
18/06		1.62E-07	2.13E-14	9.35E-07	2.13E-11		2.31E-11		
19/06	2.52E-06	1.62E-07	2.13E-14	3.51E-06	2.13E-11	1.08E-06	3.94E-06		1.16E-06
20/06		1.62E-07	2.13E-14		2.13E-11		1.56E-13		
21/06		1.62E-07	2.13E-14		2.13E-11		1.56E-13		
22/06		1.62E-07	2.13E-14		6.36E-07		1.56E-13	3.37E-07	
23/06	1.27E-06		2.13E-14	1.08E-06	6.36E-07		8.92E-07	1.07E-13	
24/06	3.70E-07	1.41E-06	2.13E-14		2.46E-06			1.93E-06	
25/06	4.50E-07	1.64E-07	2.13E-14	1.62E-07				7.11E-15	
26/06	4.50E-07	2.02E-06	2.13E-14	1.62E-07	4.00E-06			4.52E-06	
27/06	4.50E-07		2.13E-14	1.62E-07				7.11E-15	
28/06	4.50E-07		2.13E-14	1.62E-07				7.11E-15	
29/06	7.85E-07		2.13E-14	6.82E-07			7.30E-07	7.11E-15	
30/06	7.85E-07		2.13E-14	6.82E-07			7.30E-07	7.11E-15	
01/07	7.85E-07		2.13E-14	6.82E-07			7.30E-07	7.11E-15	
02/07	7.85E-07	5.49E-08	3.52E-07	6.82E-07	2.02E-07	4.43E-07	7.30E-07	3.09E-07	6.11E-07
03/07	7.85E-07	5.49E-08	3.52E-07	6.82E-07	2.02E-07	4.43E-07	7.30E-07	3.09E-07	6.11E-07
04/07	7.85E-07	5.49E-08	1.66E-06	6.82E-07	2.02E-07	1.67E-06	7.30E-07	3.09E-07	1.91E-06
05/07	7.85E-07	5.49E-08	2.13E-14	6.82E-07	2.02E-07		7.30E-07	3.09E-07	
06/07	7.85E-07		2.13E-14	6.82E-07			7.30E-07		
07/07	7.85E-07	1.45E-06	2.13E-14	6.82E-07	2.32E-06		7.30E-07	2.85E-06	
08/07	7.85E-07		2.90E-12	6.82E-07		1.52E-07	7.30E-07	5.50E-07	
09/07	7.85E-07	2.65E-07	2.59E-06	6.82E-07	2.83E-07	1.63E-06	7.30E-07	2.69E-07	1.72E-06
10/07	2.01E-06	3.08E-06		2.18E-06	3.10E-06		2.16E-06	3.12E-06	
11/07	9.95E-14	8.98E-07	5.63E-07	3.55E-15	9.07E-07	7.59E-07	1.92E-13	9.03E-07	8.46E-07
12/07	7.50E-07	8.98E-07	5.63E-07	7.47E-07	9.07E-07	7.59E-07	7.39E-07	9.03E-07	8.46E-07
13/07	7.50E-07	1.53E-06	5.63E-07	7.47E-07	1.98E-06	7.59E-07	7.39E-07	1.46E-06	8.46E-07
14/07	7.50E-07		5.63E-07	7.47E-07		7.59E-07	7.39E-07		8.46E-07
15/07	9.81E-07	2.33E-06	5.63E-07	7.84E-07	2.31E-06	7.59E-07	6.49E-07	2.29E-06	8.46E-07
16/07	1.22E-06	9.84E-07	5.63E-07	4.74E-07	9.86E-07	7.59E-07	1.20E-06	9.79E-07	8.46E-07
17/07		9.84E-07	5.63E-07	4.74E-07	9.86E-07	7.59E-07		9.79E-07	8.46E-07
18/07		9.84E-07	5.63E-07	4.74E-07	9.86E-07	7.59E-07		9.79E-07	8.46E-07
19/07		9.84E-07	5.63E-07	4.74E-07	9.86E-07	7.59E-07		9.79E-07	8.46E-07
20/07		8.80E-09	5.63E-07	1.29E-07	7.98E-09	7.59E-07		5.32E-09	8.46E-07
21/07	2.45E-06	4.72E-07	5.63E-07	2.61E-06	5.84E-07	7.59E-07	2.43E-06	5.88E-07	8.46E-07
22/07	1.99E-13	4.72E-07	5.63E-07	4.26E-14	5.84E-07	7.59E-07		5.88E-07	8.46E-07
23/07	1.58E-06	4.72E-07	5.63E-07	1.61E-06	5.84E-07	7.59E-07	1.60E-06	5.88E-07	8.46E-07
24/07	2.05E-06	4.72E-07	5.63E-07	2.08E-06	5.84E-07	7.59E-07	2.04E-06	5.88E-07	8.46E-07
25/07		9.77E-07	5.63E-07	1.42E-13		7.59E-07	9.95E-14		8.46E-07
26/07	1.18E-06	2.64E-06	5.63E-07	1.15E-06	2.62E-06	7.59E-07	1.14E-06	2.67E-06	8.46E-07
27/07		1.83E-06	5.63E-07		1.81E-06	7.59E-07		1.85E-06	8.46E-07
28/07		4.68E-07	5.62E-07		4.58E-07	7.59E-07		4.78E-07	8.45E-07
29/07			9.29E-07			9.89E-07			1.63E-07
30/07		4.07E-06			4.05E-06			4.08E-06	
31/07		2.15E-06	1.06E-06		2.14E-06	1.11E-06		2.15E-06	1.13E-06

Date	OVERLAND FLOW (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
01/08									9.95E-14
02/08	5.42E-09						2.53E-08		9.95E-14
03/08	5.42E-09						2.53E-08		9.95E-14
04/08	5.42E-09						2.53E-08		9.95E-14
05/08	5.42E-09		2.24E-06			2.33E-06	2.53E-08		2.38E-06
06/08	5.42E-09					1.99E-13	2.53E-08		
07/08	5.42E-09		2.95E-07			3.94E-07	2.53E-08		4.15E-07
08/08	5.42E-09		1.81E-06			1.92E-06	2.53E-08		1.97E-06
09/08	5.42E-09						2.53E-08		
10/08	5.42E-09	1.04E-06			1.04E-06		2.53E-08	1.04E-06	
11/08	5.42E-09	7.52E-07	4.30E-08		7.58E-07	4.15E-08	2.53E-08	7.44E-07	3.68E-08
12/08	5.42E-09	7.52E-07	2.03E-06		7.58E-07	1.95E-06	2.53E-08	7.44E-07	2.03E-06
13/08	5.42E-09	7.52E-07	1.24E-06		7.58E-07	1.16E-06	2.53E-08	7.44E-07	1.21E-06
14/08	1.72E-06	7.52E-07		1.73E-06	7.58E-07		1.71E-06	7.44E-07	
15/08		7.52E-07			7.58E-07			7.44E-07	
16/08		7.52E-07	1.96E-06		7.58E-07	1.95E-06		7.44E-07	2.01E-06
17/08		7.52E-07			7.58E-07	7.11E-15		7.44E-07	
18/08		7.52E-07			7.58E-07	7.11E-15		7.44E-07	
19/08		7.52E-07			7.58E-07	7.11E-15		7.44E-07	
20/08	5.90E-07	7.52E-07		5.92E-07	7.58E-07	7.11E-15	5.89E-07	7.44E-07	
21/08	5.90E-07	7.52E-07		5.92E-07	7.58E-07	7.11E-15	5.89E-07	7.44E-07	
22/08	5.90E-07	7.52E-07		5.92E-07	7.58E-07	7.11E-15	5.89E-07	7.44E-07	
23/08		1.32E-06		1.16E-12	1.32E-06	7.11E-15		1.35E-06	
24/08				1.16E-12	9.95E-14				
25/08		1.63E-06		1.16E-12	1.63E-06			1.56E-06	
26/08				1.16E-12					
27/08				1.16E-12					
28/08				1.16E-12					
29/08				1.16E-12					
30/08	2.07E-06			2.07E-06			2.07E-06		
31/08	2.54E-07			2.58E-07		0.003536	2.58E-07		0.005374
01/09	2.54E-07			0.003536	0.003536	1.31E-10	0.003102	0.003101	1.52E-07
02/09	2.54E-07			5.24E-06	4.55E-06	1.31E-10		1.68E-08	1.52E-07
03/09	2.54E-07	9.97E-08	1.19E-06	1.07E-13	9.94E-07	2.38E-06		1.78E-13	1.54E-06
04/09	2.54E-07	1.74E-06		1.07E-13	4.36E-06			4.49E-06	
05/09	2.54E-07		3.36E-07	1.07E-13				3.77E-13	
06/09	2.54E-07			1.07E-13	7.16E-07			3.77E-13	
07/09	2.54E-07	1.71E-06	1.32E-06	1.07E-13	1.17E-06	2.02E-06		1.52E-06	2.12E-06
08/09	2.54E-07		2.18E-06	1.07E-13		2.69E-06		7.82E-14	1.38E-06
09/09	2.54E-07	7.67E-07		1.07E-13	4.88E-07			9.23E-07	
10/09	2.54E-07	7.67E-07	5.09E-08	1.07E-13	4.88E-07	3.92E-07		9.23E-07	2.49E-07
11/09	2.54E-07	7.67E-07	5.09E-08	1.07E-13	4.88E-07	3.92E-07		9.23E-07	2.49E-07
12/09	2.54E-07	7.67E-07	1.36E-06	1.07E-13	4.88E-07	9.19E-07		9.23E-07	9.72E-07
13/09	2.54E-07	5.39E-07	1.01E-06	1.07E-13	7.77E-07	1.62E-06		2.18E-07	1.76E-06
14/09	2.54E-07	1.45E-06		1.07E-13	8.14E-07	0.003536		9.57E-07	0.003101
15/09			1.41E-06	0.003537	0.003536	5.79E-06	0.003323	0.003101	1.16E-08
16/09	1.34E-06			1.29E-06	7.32E-11		2.72E-08	2.91E-13	1.16E-08
17/09				7.11E-15	7.32E-11			2.91E-13	1.16E-08
18/09	4.35E-06		7.50E-07	3.42E-06	2.44E-06	1.52E-06	5.98E-07	3.40E-06	1.52E-06
19/09			7.50E-07	1.42E-14	1.07E-13	2.17E-06	5.98E-07		2.27E-06

Date	OVERLAND FLOW (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
20/09			7.50E-07	1.42E-14	8.20E-07		5.98E-07	1.25E-06	8.88E-14
21/09			7.50E-07	1.42E-14	8.20E-07		5.98E-07		8.88E-14
22/09				1.42E-14	8.20E-07		5.98E-07		7.16E-07
23/09			5.38E-07	1.42E-14	8.20E-07	5.65E-07	5.98E-07		1.33E-06
24/09			4.78E-07	4.27E-07	8.20E-07	4.74E-07	5.98E-07		1.13E-06
25/09	2.16E-06		2.12E-06	2.34E-06	8.20E-07	2.14E-06	2.40E-06		1.50E-06
26/09				1.42E-14	8.20E-07		2.13E-14		
27/09				1.42E-14	8.20E-07		2.13E-14		
28/09				1.42E-14	8.20E-07		2.13E-14		
29/09				1.42E-14	8.20E-07		2.13E-14		
30/09			1.59E-06	1.42E-14	8.20E-07	0.003536	2.13E-14		0.003101
01/10			3.13E-06	0.003536	0.003536	3.80E-06	0.005374	0.002868	
02/10			2.29E-06	6.13E-11		3.14E-06			2.51E-06
03/10				6.13E-11					
04/10				6.13E-11					
05/10				1.50E-07	1.09E-06			1.62E-06	
06/10				1.50E-07	9.89E-07			5.34E-07	
07/10	2.95E-06			7.23E-07	9.89E-07		1.54E-06	5.34E-07	
08/10				7.23E-07	9.89E-07			5.34E-07	
09/10				7.23E-07	2.04E-06			1.03E-06	
10/10				7.23E-07				9.95E-14	
11/10		1.23E-09		7.23E-07	7.16E-10			1.07E-07	
12/10		1.23E-09		7.23E-07	7.16E-10			1.07E-07	
13/10		1.23E-09		7.23E-07	7.16E-10			1.07E-07	
14/10		1.23E-09		7.23E-07	7.16E-10	0.003536		1.07E-07	0.002868
15/10		1.23E-09		0.003536	0.003537		0.002868	0.005374	
16/10		1.23E-09		4.23E-11	3.25E-06		8.60E-13	4.91E-06	
17/10		1.23E-09		5.16E-07			1.76E-06		
18/10		6.85E-07		5.16E-07					
19/10		8.22E-06		5.16E-07	4.21E-06			4.76E-06	
20/10				5.16E-07				1.85E-13	
21/10				5.16E-07				1.85E-13	
22/10				5.16E-07				1.85E-13	
23/10				5.16E-07				1.85E-13	
24/10				5.16E-07				1.85E-13	
25/10				5.16E-07				1.85E-13	
26/10				5.16E-07				1.85E-13	
27/10				5.16E-07				1.85E-13	
28/10				5.16E-07				1.85E-13	
29/10				5.16E-07				1.85E-13	
30/10				5.16E-07				1.85E-13	
31/10				5.16E-07		0.003536		1.85E-13	0.002868
01/11				0.003536	0.003536		0.002868	0.003101	
02/11				7.69E-11	1.94E-10		4.33E-13	1.99E-13	
03/11				7.69E-11	1.94E-10		4.33E-13	1.99E-13	
04/11				3.82E-06	1.94E-10	3.86E-07	2.83E-06	1.99E-13	5.22E-07
05/11				3.24E-06	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07
06/11				1.63E-13	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07
07/11				1.63E-13	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07
08/11				1.63E-13	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07

Date	OVERLAND FLOW (m)								
	S19	S20	S21	S22	S23	S24	S25	S26	S27
09/11				1.63E-13	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07
10/11				1.63E-13	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07
11/11				1.63E-13	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07
12/11				1.63E-13	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07
13/11				1.63E-13	1.94E-10	3.86E-07	6.19E-07	1.99E-13	5.22E-07
14/11				1.63E-13	1.94E-10	0.003536	6.19E-07	1.99E-13	0.005374
15/11				0.003536	0.003536	1.15E-10	0.002868	0.002868	
16/11					4.22E-11	1.15E-10	2.66E-13	4.16E-13	
17/11					4.22E-11	1.15E-10	2.66E-13	4.16E-13	
18/11					4.22E-11	1.15E-10	2.66E-13	4.16E-13	
19/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
20/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
21/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
22/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
23/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
24/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
25/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
26/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
27/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
28/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
29/11			7.72E-07		4.22E-11		2.66E-13	4.16E-13	2.56E-07
30/11			7.72E-07		4.22E-11	0.003536	2.66E-13	4.16E-13	0.002868
01/12				0.003536	0.003536	1.44E-06	0.002868	0.002868	9.80E-08
02/12						2.84E-14	6.75E-14	2.31E-13	
03/12						2.84E-14	6.75E-14	2.31E-13	
04/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
05/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
06/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
07/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
08/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
09/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
10/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
11/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
12/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
13/12			9.95E-14			2.84E-14	6.75E-14	2.31E-13	
14/12			9.95E-14			0.003536	6.75E-14	2.31E-13	0.002868
15/12			9.95E-14	0.003536	0.003536	9.32E-11	0.002868	0.002868	2.13E-14
16/12			9.95E-14		2.67E-06	9.32E-11		7.60E-08	2.13E-14
17/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
18/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
19/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
20/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
21/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
22/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
23/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
24/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
25/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
26/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
27/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
28/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
29/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
30/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14
31/12			9.95E-14			9.32E-11		7.60E-08	2.13E-14

APPENDIX 5
(DRAIN OUT FLOW IN MILLI METRES)

DATE	S10	S12	S16	S18	S19	S21	S25	S27
01-01	0	0	0	0	0	0	0	0
02-01	0	0	0	0	23.7755	23.7756	25.9037	25.9054
03-01	0	0	0.000326	0.000398	23.148	23.1297	22.4917	22.5346
04-01	0	0	0.004932	0.004605	18.831	18.8398	16.8506	16.8672
05-01	0	0	0.005114	0.005326	14.8412	14.7656	16.9713	16.9758
06-01	0	0	0.005873	0.00523	11.7328	11.6685	14.1424	14.101
07-01	0	0	0.006601	0.00465	9.3168	9.24302	11.243	11.1837
08-01	0	0	0.007497	0.003953	7.54794	7.35497	9.00828	8.92838
09-01	0	0	0.007201	0.003261	6.16975	5.96779	7.36799	7.02289
10-01	0	0	0.006095	0.002349	5.06953	4.87009	6.01022	5.80668
11-01	0	0	0.005622	0.002089	4.19559	3.93276	4.93083	4.69437
12-01	0	0	0.004635	0.001283	3.35326	3.10389	3.98347	3.7682
13-01	0	0	0.003894	0.001185	2.67181	2.38972	3.24733	2.95101
14-01	0	0	0.003067	0.027552	2.1671	1.90104	2.63224	2.1688
15-01	0	0	0.031079	0.28418	1.77336	1.5216	1.98299	1.74522
16-01	0	0	0.347393	0.268394	1.43079	1.21896	1.53388	1.51962
17-01	0	0	0.328847	0.263223	1.16324	0.919465	1.47359	1.79975
18-01	0	0	0.324104	0.193242	0.903209	0.685977	1.74659	1.80709
19-01	0	0	0.249749	0.124088	0.714064	0.513307	1.72934	1.57146
20-01	0	0	0.171592	0.072524	0.529698	0.401559	1.59662	1.3771
21-01	0	0	1.3345	0.042914	0.348362	0.252354	1.27758	1.20471
22-01	0.982947	0	6.93012	0.028005	1.69775	0.185507	4.31954	0.929597
23-01	7.17311	0	12.1784	0.021025	15.8533	0.159298	18.4177	0.794701
24-01	7.17064	0	9.20092	0.014986	18.8369	0.141538	20.5471	0.67867
25-01	5.64124	0	8.42717	0.011412	16.8745	0.129577	18.1038	0.586736
26-01	4.14518	0	6.33077	0.00904	14.2565	0.115662	15.0199	0.493885
27-01	2.86325	0	4.42215	0.007271	11.6756	0.110858	12.3015	0.420233
28-01	1.81737	0	2.88691	0.006006	9.60459	0.106274	9.93742	0.357084
29-01	1.00775	0	1.79254	0.004976	7.83648	0.10124	8.13209	0.297276
30-01	0.396722	0	0.977268	0.004596	6.46684	0.096436	6.66946	0.253356
31-01	0.171016	0	0.491543	0.041666	5.28429	0.093457	5.46146	0.204789
01-02	0.102475	0	0.618564	0.71269	4.35598	0.091868	4.19651	0.188047
02-02	0.061285	0	2.07492	0.654528	3.41138	0.087752	3.31336	0.278924
03-02	0.041475	0	1.61381	0.643052	2.86502	0.083323	2.78692	0.425003
04-02	0.028157	0	1.51066	0.498975	2.35908	0.080954	3.2082	0.537901
05-02	0.020855	0	1.1123	0.334954	1.8643	0.079225	2.93644	0.602091
06-02	0.017239	0	0.743636	0.198543	1.45699	0.078079	2.5223	0.618485
07-02	0.014964	0	0.457469	0.10552	1.11407	0.076805	2.16296	0.604046
08-02	0.014218	0	0.262434	0.052311	0.806386	0.075879	1.76871	0.568175
09-02	0.011883	0	0.11198	0.033177	0.658417	0.074678	1.4195	0.519943
10-02	0.011028	0	0.046815	0.021054	0.546569	0.072657	1.16655	0.470532
11-02	0.010192	1.42E-05	0.030696	0.015049	0.324026	0.068153	0.915203	0.416808
12-02	0.009905	0.000228	0.021669	0.01026	0.242383	0.067789	0.70126	0.36747
13-02	0.009866	0.000906	0.018688	0.008252	0.188965	0.067283	0.570293	0.316425
14-02	0.011456	0.001508	0.019982	0.063729	0.155744	0.067312	0.467592	0.267049
15-02	0.018855	0.002028	0.226726	1.08375	0.140303	0.067299	0.385802	0.236719
16-02	0.024052	0.002462	1.82949	0.916494	0.133618	0.067228	0.367223	0.372676
17-02	0.024994	0.002571	1.5145	0.873309	0.120601	0.066467	0.54368	0.589905
18-02	0.024931	0.002706	1.45386	0.672321	0.112901	0.066112	0.758719	0.736812
19-02	0.024082	0.002837	1.11871	0.470131	0.108893	0.065672	0.89021	0.779622
20-02	0.023212	0.003232	0.810662	0.294705	0.103336	0.06507	0.918602	0.773368
21-02	0.021904	0.003596	0.539247	0.1594	0.099474	0.064703	0.900658	0.73028
22-02	0.02006	0.003619	0.331062	0.067568	0.0949	0.064459	0.844518	0.666438
23-02	0.016642	0.003633	0.166632	0.036385	0.093218	0.064498	0.771565	0.598786

DRAIN OUTFLOW (mm)								
DATE	S10	S12	S16	S18	S19	S21	S25	S27
24-02	0.015242	0.003662	0.066678	0.024127	0.092854	0.064517	0.689969	0.527024
25-02	0.016658	0.003725	0.050718	0.019861	0.092273	0.064513	0.613717	0.464374
26-02	0.018534	0.003776	0.046766	0.016549	0.090847	0.064501	0.538649	0.396753
27-02	0.019168	0.003784	0.039767	0.012746	0.089406	0.064198	0.472273	0.338909
28-02	0.018654	0.003777	0.03366	0.083022	0.088577	0.064195	0.410039	0.282334
01-03	0.017778	0.003768	0.189529	1.27173	0.087568	0.064208	0.346513	0.249438
02-03	0.016833	0.003738	1.2675	1.06857	0.086712	0.064211	0.315008	0.411885
03-03	0.015531	0.003677	1.30059	1.00891	0.086208	0.064195	0.500654	0.662171
04-03	0.015169	0.003584	1.06494	0.758134	0.08569	0.064161	0.777764	0.809852
05-03	0.015052	0.003498	0.806255	0.50243	0.085112	0.063825	0.923648	0.841457
06-03	0.01498	0.003421	0.590088	0.29954	0.084461	0.063767	0.945283	0.821725
07-03	0.014952	0.003372	0.402786	0.147194	0.08376	0.063711	0.921418	0.771277
08-03	0.014946	0.003404	0.255971	0.059713	0.082746	0.063926	0.863534	0.691106
09-03	0.014249	0.003457	0.144152	0.035349	0.081713	0.063812	0.782493	0.607325
10-03	0.014052	0.0035	0.075512	0.025196	0.080821	0.063672	0.694178	0.528149
11-03	0.013449	0.003534	0.048089	0.01819	0.079916	0.063544	0.614876	0.457144
12-03	0.012569	0.003559	0.036644	0.015677	0.079101	0.063133	0.536309	0.394461
13-03	0.011888	0.003578	0.027194	0.012736	0.078466	0.06365	0.466512	0.337579
14-03	0.011785	0.003595	0.023271	0.081458	0.077618	0.063577	0.409149	0.275932
15-03	0.011976	0.00437	0.176126	1.36519	0.076376	0.064694	0.335144	0.244994
16-03	0.012228	0.004636	1.18106	1.21625	0.07486	0.064536	0.303103	0.420225
17-03	0.012311	0.004892	1.22462	1.19061	0.073748	0.06435	0.501806	0.705337
18-03	0.012183	0.005286	1.06107	0.929196	0.073019	0.064252	0.785358	0.872417
19-03	0.011202	0.005314	0.797916	0.688551	0.072356	0.064247	0.925782	0.926296
20-03	0.011082	0.00534	0.564152	0.479565	0.072025	0.065205	0.952897	0.90707
21-03	0.013137	0.005362	0.40151	0.312225	0.0711	0.065279	0.922217	0.853513
22-03	0.017748	0.005372	0.30776	0.174615	0.070226	0.065643	0.859269	0.773895
23-03	0.025047	0.0054	0.245354	0.081105	0.069373	0.065667	0.778249	0.684697
24-03	0.026924	0.00546	0.189026	0.045982	0.068695	0.065677	0.68852	0.607211
25-03	0.029186	0.00583	0.13062	0.034712	0.068874	0.065984	0.61323	0.534733
26-03	0.02875	0.005896	0.089206	0.029111	0.069277	0.065638	0.549716	0.462697
27-03	0.027725	0.005891	0.066577	0.023495	0.069865	0.066234	0.488914	0.404013
28-03	0.026113	0.005816	0.05107	0.01916	0.070574	0.066184	0.434934	0.347599
29-03	0.023341	0.005682	0.041434	0.015217	0.071766	0.065803	0.387701	0.303686
30-03	0.021573	0.005551	0.032647	0.085094	0.074356	0.065422	0.345086	0.248133
31-03	0.020432	0.005495	0.217587	1.39599	0.07669	0.064781	0.297757	0.227612
01-04	0.019631	0.005491	1.40246	1.20091	0.078117	0.064464	0.276455	0.400029
02-04	0.019576	0.005572	1.44909	1.15975	0.078244	0.064464	0.517802	0.670389
03-04	0.019524	0.00575	1.19609	0.89885	0.078006	0.064445	0.829802	0.831048
04-04	0.019012	0.005882	0.919314	0.651392	0.078015	0.064398	0.985946	0.87923
05-04	0.018118	0.006469	0.677873	0.43775	0.077701	0.064329	1.01843	0.862352
06-04	0.017995	0.006674	0.48594	0.282796	0.077336	0.063378	0.981835	0.813649
07-04	0.018164	0.007028	0.332566	0.161689	0.07694	0.06304	0.916671	0.739985
08-04	0.018442	0.008014	0.211638	0.083207	0.076526	0.06306	0.829326	0.655868
09-04	0.018758	0.008618	0.129716	0.050311	0.07611	0.063097	0.733008	0.585149
10-04	0.019094	0.008779	0.081632	0.038284	0.075702	0.063143	0.643327	0.510879
11-04	0.019503	0.008862	0.061792	0.031061	0.075018	0.063204	0.56557	0.445052
12-04	0.020298	0.008881	0.053047	0.026931	0.07405	0.063274	0.502112	0.391105
13-04	0.021345	0.008862	0.046524	0.021746	0.073182	0.063346	0.43802	0.334118
14-04	0.021562	0.011127	0.04201	0.115491	0.072105	0.074157	0.38109	0.280531
15-04	0.022065	0.012256	0.293611	1.62976	0.071074	0.078668	0.320184	0.263849
16-04	0.022127	0.01413	1.53802	1.43451	0.07065	0.077243	0.300608	0.539273
17-04	0.021946	0.0138	1.56317	1.36737	0.070707	0.07574	0.560015	0.866345
18-04	0.021469	0.013435	1.27432	1.09038	0.070779	0.074501	0.886856	1.03197

DRAIN OUTFLOW (mm)								
DATE	S10	S12	S16	S18	S19	S21	S25	S27
18-04	0.021469	0.013435	1.27432	1.09038	0.070779	0.074501	0.886856	1.03197
19-04	0.020792	0.013204	0.968753	0.822818	0.070173	0.073489	1.03778	1.06886
20-04	0.020276	0.011775	0.722084	0.606459	0.070249	0.072653	1.05659	1.02882
21-04	0.020181	0.011344	0.522656	0.421331	0.069641	0.071641	1.01264	0.952495
22-04	0.02037	0.011194	0.368397	0.272053	0.06939	0.070399	0.935555	0.865442
23-04	0.020745	0.011321	0.250556	0.153245	0.069445	0.069689	0.839491	0.762131
24-04	0.021333	0.011294	0.160521	0.081557	0.069481	0.068466	0.742987	0.67352
25-04	0.022277	0.013778	0.105044	0.063976	0.069497	0.071284	0.657973	0.592375
26-04	0.023134	0.013909	0.078065	0.05612	0.068934	0.070798	0.577005	0.520181
27-04	0.024132	0.01391	0.064659	0.047933	0.069002	0.070563	0.506796	0.458086
28-04	0.024184	0.013872	0.054012	0.042552	0.069104	0.071031	0.445357	0.400904
29-04	0.023904	0.013791	0.046122	0.036767	0.069205	0.070931	0.394478	0.354443
30-04	0.023415	0.013775	0.039407	0.300676	0.069296	0.070532	0.347163	0.301572
01-05	0.025506	0.014025	0.736458	1.55252	0.069367	0.070798	0.286785	0.290279
02-05	0.045647	0.013997	2.91477	1.56998	0.070023	0.070479	0.467746	0.564739
03-05	0.070756	0.014008	2.42428	1.28732	0.070117	0.069813	1.19271	0.895605
04-05	0.087128	0.014127	2.38402	0.997807	0.070704	0.069601	1.67963	1.04934
05-05	0.090742	0.01454	1.92943	0.7525	0.073969	0.069682	1.78608	1.07351
06-05	0.091151	0.029821	1.49299	1.0491	0.077511	0.069458	1.70466	1.03551
07-05	0.08887	0.098772	1.12861	1.97437	0.080606	0.068968	1.54867	1.00709
08-05	0.086528	0.121187	0.86939	2.11259	0.083616	0.071853	1.38707	1.23852
09-05	0.087249	0.127332	0.708205	1.89916	0.087305	0.090048	1.22366	1.55313
10-05	0.088279	0.12309	0.580318	1.61512	0.090547	0.141647	1.07885	1.72758
11-05	0.08852	0.119932	0.468379	1.41447	0.094155	0.204204	0.952874	1.7737
12-05	0.087491	0.117231	0.383758	1.30047	0.098378	0.269355	0.83967	1.74155
13-05	0.087625	0.128083	0.32311	1.36339	0.104971	0.323823	0.745005	1.67251
14-05	0.086347	0.144309	0.264432	2.69098	0.111867	0.370145	0.673348	1.63858
15-05	0.083701	0.14238	0.837372	4.24823	0.116455	0.429596	0.570748	2.75182
16-05	0.081419	0.131934	2.73259	3.07451	0.127136	0.481127	0.709808	3.49344
17-05	0.080073	0.119519	2.24314	2.93732	0.131493	0.508673	1.29689	3.50899
18-05	0.081045	0.107963	2.24619	2.31569	0.132343	0.514747	1.75314	3.19672
19-05	0.081159	0.096032	1.85318	1.75026	0.133806	0.511632	1.85251	2.81075
20-05	0.080881	0.089167	1.44234	1.30621	0.135133	0.491383	1.77492	2.42156
21-05	0.078694	0.087407	1.09914	1.0545	0.136916	0.465255	1.62581	2.08675
22-05	0.074687	0.088352	0.842373	0.878999	0.138443	0.434529	1.45917	1.80202
23-05	0.071816	0.087922	0.636009	0.71151	0.139422	0.402482	1.29216	1.5702
24-05	0.069	0.086643	0.479167	0.575346	0.145884	0.38129	1.14207	1.36414
25-05	0.068173	0.089513	0.361828	0.520321	0.15197	0.36036	1.0019	1.19671
26-05	0.069363	0.098447	0.295721	0.51156	0.153549	0.338769	0.878668	1.0567
27-05	0.072804	0.103287	0.267211	0.478003	0.151929	0.321127	0.773	0.949904
28-05	0.097422	0.103585	0.332159	0.427626	0.150257	0.313055	0.685744	0.874704
29-05	0.135845	0.104238	0.530448	0.373505	0.148816	0.305161	0.619719	0.799329
30-05	0.167234	0.133322	0.66333	2.02232	0.148334	0.298455	0.565226	0.714787
31-05	0.176994	0.207753	2.0274	4.31819	0.149921	0.294219	0.543049	1.72194
01-06	0.173817	0.228835	3.29825	3.20245	0.153291	0.301386	0.927894	2.5793
02-06	0.16275	0.219421	2.92907	3.14322	0.160953	0.328683	1.70593	3.1237
03-06	0.204416	0.205012	3.00363	2.56432	0.169041	0.375286	2.05584	3.056
04-06	0.383796	0.190824	3.33756	2.02047	0.178383	0.424935	2.26302	2.81999
05-06	0.402005	0.17891	2.85439	1.58185	0.201912	0.448964	2.53791	2.55686
06-06	0.354063	0.163978	2.25438	1.25199	0.271393	0.461919	2.62131	2.29297
07-06	0.301165	0.151563	1.7343	0.988259	0.338176	0.471869	2.49912	2.06751
08-06	0.302974	0.14207	1.55082	0.803268	0.383871	0.471856	2.29523	1.859
09-06	0.460712	0.14453	1.94834	0.6945	0.418304	0.473498	2.08683	1.65956
10-06	0.590299	0.151672	2.2714	0.671659	0.456138	0.466124	1.99773	1.48462

DRAIN OUTFLOW (mm)								
DATE	S10	S12	S16	S18	S19	S21	S25	S27
11-06	0.67692	0.16251	2.41285	0.662006	0.560539	0.452481	2.09773	1.34012
12-06	0.689586	0.168082	2.33894	0.633987	0.682615	0.446537	2.31978	1.23836
13-06	0.72437	0.169928	2.32213	0.582829	0.7959	0.445863	2.50684	1.1633
14-06	0.851959	0.165226	2.641	1.1999	0.896744	0.452758	2.66655	1.02752
15-06	0.953669	0.156222	4.81622	3.19085	1.03538	0.459742	2.80719	1.3639
16-06	1.15419	0.144161	7.36623	2.5176	1.30865	0.466418	5.71521	2.04367
17-06	1.39864	0.133565	7.3504	2.4564	2.13874	0.471606	6.88639	2.57274
18-06	1.36045	0.130014	6.75518	2.06517	3.59778	0.470306	8.67759	2.57961
19-06	1.27402	0.126515	5.72172	1.64817	4.60004	0.467706	8.80043	2.4185
20-06	1.12271	0.123521	4.55419	1.30824	5.11911	0.454789	8.35673	2.21355
21-06	0.939904	0.118496	3.54648	1.023	5.20535	0.445934	7.65021	1.99615
22-06	0.773811	0.113146	2.74801	0.804474	5.0214	0.437482	6.85709	1.79611
23-06	0.637001	0.105266	2.10645	0.614217	4.65649	0.428941	6.02287	1.60084
24-06	0.567628	0.098665	1.74158	0.465165	4.19893	0.420863	5.25767	1.42919
25-06	0.689669	0.094371	1.91564	0.364883	3.73734	0.409574	4.56271	1.26779
26-06	0.882894	0.091257	2.16907	0.287331	3.33434	0.389404	4.02021	1.13281
27-06	0.921138	0.087457	2.1211	0.218859	3.14734	0.368478	3.69445	1.00683
28-06	0.900456	0.084539	1.91343	0.165036	3.07082	0.348739	3.52055	0.903481
29-06	1.01963	0.080984	1.95391	0.133081	2.954	0.337429	3.33504	0.814214
30-06	1.17805	0.085728	2.01097	0.137211	2.84702	0.320048	3.1677	0.721077
01-07	1.25859	0.123212	1.96469	0.234331	2.7735	0.30644	3.03437	0.647775
02-07	1.40836	0.180085	2.00721	0.482705	2.70789	0.294434	2.92364	0.591924
03-07	1.48336	0.22602	1.98182	0.670422	2.63982	0.288566	2.82619	0.54595
04-07	1.76934	0.277796	2.18519	0.842226	2.56723	0.294459	2.73223	0.545697
05-07	2.15993	0.294086	2.5247	0.869713	2.52162	0.319127	2.66379	0.576729
06-07	2.65749	0.284409	2.99832	0.821302	2.52995	0.398928	2.65959	0.665366
07-07	3.1063	0.258929	3.46252	0.701033	2.59343	0.529528	2.71507	0.813472
08-07	3.01592	0.279429	3.33408	0.74684	2.79668	0.637106	2.88972	0.919407
09-07	2.73229	0.424682	2.98506	1.20757	2.95156	0.754235	3.04275	1.04069
10-07	2.71651	0.466264	2.9355	1.33846	3.033	0.908764	3.11116	1.19992
11-07	2.51948	0.43134	2.69749	1.226	3.0401	1.18694	3.11385	1.50406
12-07	2.13772	0.410124	2.28041	1.10774	3.02083	1.47982	3.09171	1.79108
13-07	1.7379	0.416987	1.83077	1.10568	2.97631	1.73516	3.04348	2.03189
14-07	1.55162	0.398738	1.6442	1.01774	2.86386	1.88638	2.92322	2.16302
15-07	3.60942	0.354979	3.80009	0.864935	2.69789	2.00383	2.74352	2.26012
16-07	7.59801	0.310576	7.92071	0.697019	2.6613	2.04866	2.71148	2.28557
17-07	8.79307	0.268825	9.15195	0.542696	4.19461	2.04378	4.2913	2.2636
18-07	7.6375	0.234794	7.93237	0.462494	5.99243	2.00432	6.13139	2.19929
19-07	6.21242	0.202708	6.44915	0.351633	6.57719	1.89744	6.73663	2.04644
20-07	6.06804	0.171568	6.27701	0.243348	6.54315	1.7816	6.69728	1.88572
21-07	7.15601	0.157432	7.37061	0.20869	6.28923	1.60748	6.42821	1.70967
22-07	7.33686	0.157355	7.5474	0.205828	6.34891	1.45767	6.48576	1.53634
23-07	7.51594	0.158411	7.73066	0.206133	6.61943	1.31892	6.7573	1.3842
24-07	6.94743	0.154552	7.13395	0.194911	6.87312	1.15997	7.01614	1.22337
25-07	5.94863	0.145714	6.11982	0.168046	6.96771	1.07499	7.10412	1.10666
26-07	4.94962	0.131828	5.06609	0.143535	6.82617	0.98143	6.95204	1.01036
27-07	4.64137	0.121553	4.75368	0.132651	6.30517	0.864119	6.42589	0.919607
28-07	4.55063	0.114139	4.64989	0.125342	5.81132	0.790721	5.92652	0.840894
29-07	3.85736	0.113872	3.94057	0.122615	5.37598	0.731617	5.47344	0.756208
30-07	3.16753	0.124014	3.23527	0.133889	5.02377	0.687903	5.10415	0.687287
31-07	2.51305	0.218364	2.55388	0.256122	4.62966	0.624902	4.70525	0.627751
01-08	1.8621	0.283295	1.88345	0.450862	4.20857	0.571527	4.26708	0.582793
02-08	1.59425	0.292181	1.59967	0.498071	3.75219	0.553437	3.79663	0.567725
03-08	1.97647	0.295635	1.99798	0.51751	3.28114	0.564795	3.33926	0.580198

DRAIN OUTFLOW (mm)								
DATE	S10	S12	S16	S18	S19	S21	S25	S27
04-08	2.03148	0.387332	2.05257	0.799928	3.00401	0.590572	3.0357	0.60622
05-08	1.86528	0.480733	1.87846	1.03622	2.71406	0.633307	2.74204	0.649192
06-08	1.49301	0.51587	1.49866	1.12312	2.62855	0.776229	2.64504	0.781067
07-08	1.26919	0.582817	1.2799	1.28909	2.41497	0.958377	2.42749	0.998887
08-08	1.2496	0.563257	1.25657	1.26416	2.23069	1.29206	2.2481	1.31899
09-08	1.89763	0.748184	1.91053	1.72601	2.12336	1.64127	2.12296	1.65753
10-08	2.38579	1.12454	2.40945	2.74136	1.92879	2.06033	1.93997	2.08431
11-08	2.35352	1.1036	2.37729	2.70193	1.89673	3.03297	1.90632	3.11557
12-08	2.0663	0.996361	2.08717	2.4086	1.93346	3.91638	1.94273	4.02531
13-08	1.63799	0.854956	1.65384	2.03056	1.96726	4.50057	1.976	4.61162
14-08	1.26304	0.807102	1.26399	1.91884	1.97455	4.57627	1.98369	4.69566
15-08	0.953146	0.971212	0.955012	2.37775	1.95124	4.51317	1.95978	4.63099
16-08	0.618861	1.15204	0.621975	2.83578	1.87762	4.52753	1.88429	4.64574
17-08	0.461864	1.08134	0.466142	2.59803	1.79837	4.681	1.80441	4.81795
18-08	0.222876	0.895963	0.223353	2.12791	1.71186	4.77152	1.70874	4.9094
19-08	0.185521	0.735103	0.185868	1.71757	1.54383	4.73072	1.54551	4.86274
20-08	0.195041	0.607627	0.195226	1.36673	1.32649	4.56439	1.33114	4.69163
21-08	0.212941	0.49449	0.212962	1.03827	1.24374	4.15181	1.24008	4.26087
22-08	0.215043	0.399186	0.215664	0.768323	1.11803	3.70931	1.1209	3.80166
23-08	1.32811	0.314142	1.35849	0.544149	0.959001	3.22985	0.963744	3.29006
24-08	4.72849	0.272989	4.76297	0.440077	0.888992	2.80077	0.892487	2.8439
25-08	4.7901	0.303826	4.82257	0.509405	0.996703	2.45981	1.00057	2.51188
26-08	3.98101	0.331865	4.00764	0.564509	1.53866	2.15	1.54411	2.18115
27-08	3.18667	0.328594	3.2078	0.549448	2.27636	1.91489	2.25947	1.93308
28-08	2.45901	0.310807	2.46974	0.505072	2.46894	1.7671	2.47197	1.77953
29-08	1.82505	0.279384	1.83274	0.431479	2.51776	1.60198	2.52882	1.6268
30-08	1.42855	0.277725	1.43189	0.420186	2.4888	1.46408	2.50291	1.47159
31-08	1.22826	0.348634	1.23397	1.54243	2.41674	1.34164	2.42849	1.35054
01-09	0.955187	0.383535	1.71298	3.74463	2.29814	1.22391	2.19088	1.5566
02-09	0.832458	0.381868	3.70209	3.11899	2.1635	1.17778	2.25781	2.27796
03-09	0.636377	0.363973	2.94879	2.9768	1.8612	1.13621	2.71411	2.63666
04-09	0.488588	0.324587	2.88968	2.42029	1.73855	1.10529	3.38557	2.72595
05-09	0.380009	0.286741	2.35084	1.87632	1.47898	1.08134	3.36306	2.64038
06-09	0.248354	0.306378	1.73865	1.69289	1.37455	1.04762	3.04535	2.47285
07-09	0.176783	0.573681	1.27088	2.04652	1.29015	1.01687	2.71912	2.29232
08-09	0.137331	0.726711	0.914836	2.09508	1.17321	0.986772	2.42389	2.16236
09-09	0.111697	0.769714	0.641737	1.9653	0.97405	1.006	2.09464	2.11982
10-09	0.088309	0.844946	0.447944	1.93138	0.910061	1.0564	1.82064	2.11023
11-09	0.066941	0.928591	0.275716	1.90107	0.845407	1.1677	1.59817	2.12762
12-09	0.055059	0.929568	0.151827	1.72948	0.780588	1.30098	1.39704	2.16295
13-09	0.042966	0.858742	0.082964	1.48277	0.569932	1.38309	1.16634	2.15938
14-09	0.050169	0.756212	0.079265	1.9229	0.513597	1.4801	0.996102	2.0406
15-09	0.10017	0.629351	1.79025	3.70021	0.468742	1.57982	0.827025	2.4273
16-09	1.99506	0.510349	6.69721	3.09025	0.411273	1.57446	1.73907	3.0047
17-09	3.5406	0.416687	6.51654	2.93544	0.395772	1.54396	2.7955	3.67045
18-09	3.61683	0.319407	6.60672	2.3447	0.5133	1.49941	3.64498	3.56973
19-09	3.01545	0.233231	5.36978	1.77709	0.987622	1.43255	3.9686	3.28271
20-09	2.38911	0.176691	4.06734	1.31383	1.45895	1.26664	3.96783	2.8868
21-09	1.78043	0.129464	3.05168	0.959973	1.77415	1.18346	3.8247	2.55112
22-09	1.48891	0.118743	2.4047	0.726347	1.92817	1.09336	3.54148	2.22439
23-09	1.63572	0.138596	2.40436	0.713241	1.94849	0.973611	3.245	1.94653
24-09	2.82503	0.203556	3.43918	0.780958	1.93414	0.837988	2.98246	1.66621
25-09	4.42484	0.274097	4.98176	0.83347	1.95749	0.77229	2.8499	1.49422
26-09	4.28485	0.33361	4.71991	0.804795	2.35384	0.729	3.0194	1.34785

DRAIN OUTFLOW (mm)								
DATE	S10	S12	S16	S18	S19	S21	S25	S27
27-09	3.61885	0.325164	3.91373	0.696878	2.83639	0.684131	3.38729	1.23843
28-09	2.88306	0.293752	3.07053	0.56459	3.07099	0.650129	3.61502	1.14415
29-09	2.10694	0.327576	2.289	0.560446	3.13108	0.632813	3.61965	1.07633
30-09	1.44992	1.3531	1.57156	3.06907	3.08658	0.615906	3.47038	0.961781
01-10	0.863778	1.90486	1.32297	5.95217	2.94015	0.61778	3.18999	1.92486
02-10	0.373397	1.97464	2.81416	4.67019	2.72171	0.672357	3.01289	2.82298
03-10	0.148642	1.7988	2.20057	4.66966	2.34745	0.840074	3.08358	3.5578
04-10	0.128273	1.46159	2.26492	3.73874	2.041	1.03864	3.10724	3.66667
05-10	0.288216	1.08882	2.81666	2.77345	1.81158	1.25973	2.94727	3.457
06-10	2.00375	0.741413	4.04376	1.96425	1.50129	1.34379	2.83459	3.20357
07-10	2.31157	0.405065	3.92603	1.28236	1.4113	1.35648	2.88732	2.89839
08-10	2.13451	0.159171	3.28457	0.75089	1.40875	1.34066	2.97373	2.61398
09-10	1.68782	0.100107	2.50133	0.45724	1.44371	1.30404	2.97366	2.33562
10-10	1.13009	0.080977	1.77992	0.282339	1.47655	1.25002	2.86596	2.04977
11-10	0.688163	0.063488	1.15969	0.163666	1.48914	1.14338	2.69909	1.77359
12-10	0.355696	0.06429	0.713874	0.122646	1.47637	1.02987	2.49541	1.53348
13-10	0.157167	0.057874	0.353164	0.093477	1.44083	0.883734	2.27026	1.30962
14-10	0.107383	0.047376	0.174652	0.515653	1.36923	0.741521	2.01716	1.02557
15-10	0.070163	0.04047	0.526042	1.89596	1.22167	0.634959	1.69433	0.889579
16-10	0.04432	0.036111	1.78555	1.87661	1.08809	0.550285	1.46085	1.0582
17-10	0.052196	0.028944	1.77528	1.51668	0.963355	0.412705	1.56703	1.42504
18-10	0.04682	0.02309	1.46167	1.14467	0.825905	0.333349	1.95533	1.51293
19-10	0.030423	0.019005	1.12746	0.833406	0.664478	0.2577	2.01006	1.43747
20-10	0.02631	0.014388	0.841056	0.577932	0.558596	0.213619	1.835	1.29493
21-10	0.021143	0.015311	0.588749	0.407561	0.485075	0.170008	1.65645	1.16639
22-10	0.014703	0.022237	0.376334	0.328907	0.333601	0.147535	1.43824	1.01623
23-10	0.013459	0.033959	0.202426	0.322294	0.244759	0.135253	1.21278	0.880273
24-10	0.01785	0.048069	0.127156	0.298672	0.214482	0.126027	1.01376	0.770162
25-10	0.021143	0.055343	0.111195	0.254559	0.181936	0.119926	0.861473	0.677329
26-10	0.027389	0.056038	0.095956	0.185526	0.157096	0.112417	0.727752	0.610222
27-10	0.031098	0.054714	0.080573	0.13088	0.140165	0.107631	0.619695	0.539906
28-10	0.031267	0.05143	0.066567	0.091966	0.134036	0.106688	0.542604	0.490112
29-10	0.03009	0.043674	0.05535	0.068623	0.128865	0.106397	0.470818	0.443612
30-10	0.02811	0.035799	0.044559	0.049037	0.123552	0.106628	0.411119	0.399512
31-10	0.020551	0.02261	0.033872	0.185846	0.118593	0.106992	0.363323	0.350774
01-11	0.017293	0.016873	0.141325	1.67163	0.115505	0.106354	0.311195	0.327829
02-11	0.016274	0.011378	1.61751	1.38334	0.110816	0.105386	0.286806	0.538152
03-11	0.015849	0.009743	1.39105	1.323	0.108482	0.104038	0.500612	0.835693
04-11	0.017202	0.01316	1.36528	1.03934	0.106067	0.114445	0.798139	0.98188
05-11	0.024315	0.013184	1.0988	0.782301	0.103534	0.111838	0.961579	1.00698
06-11	0.026368	0.012247	0.847133	0.554465	0.101396	0.108489	1.0012	0.970729
07-11	0.023254	0.010515	0.630171	0.366482	0.098297	0.105233	0.979029	0.904825
08-11	0.019982	0.007364	0.437369	0.197995	0.096587	0.100187	0.924082	0.817384
09-11	0.012786	0.006146	0.262478	0.072522	0.091942	0.090113	0.840966	0.721087
10-11	0.011104	0.005263	0.109111	0.034732	0.088216	0.087213	0.742533	0.635893
11-11	0.008512	0.004368	0.04442	0.0207	0.086453	0.084427	0.663165	0.554897
12-11	0.005609	0.003298	0.028158	0.012674	0.084041	0.081706	0.577164	0.476302
13-11	0.005421	0.002638	0.019593	0.00833	0.082173	0.079685	0.50299	0.411433
14-11	0.005285	0.002198	0.014469	0.061815	0.080835	0.077544	0.438427	0.342761
15-11	0.005175	0.002173	0.086527	1.31242	0.078892	0.075195	0.359006	0.316591
16-11	0.005021	0.002221	1.39265	1.1423	0.077817	0.07298	0.319552	0.413732
17-11	0.004811	0.002329	1.17677	1.10624	0.076437	0.071529	0.473001	0.570241
18-11	0.004513	0.002443	1.10979	0.861308	0.075391	0.07006	0.739432	0.67922
19-11	0.00338	0.003665	0.823868	0.714534	0.074052	0.068469	0.876741	0.720739

DRAIN OUTFLOW (mm)								
DATE	S10	S12	S16	S18	S19	S21	S25	S27
20-11	0.002295	0.014239	0.532476	0.888373	0.073061	0.06637	0.906997	0.721552
21-11	0.002237	0.028843	0.305086	0.85045	0.072071	0.064468	0.879855	0.716881
22-11	0.002422	0.035747	0.147668	0.697261	0.069848	0.064117	0.810414	0.726656
23-11	0.002754	0.03704	0.060247	0.532369	0.068673	0.064887	0.717697	0.728905
24-11	0.003165	0.040634	0.035845	0.392318	0.067018	0.066467	0.628512	0.718444
25-11	0.00451	0.040423	0.027086	0.266319	0.066331	0.068757	0.544577	0.685936
26-11	0.005076	0.039211	0.02182	0.174278	0.065705	0.073337	0.467979	0.647563
27-11	0.007446	0.034064	0.022867	0.082142	0.065166	0.07866	0.400278	0.599479
28-11	0.009451	0.022032	0.024321	0.042773	0.064997	0.083823	0.343421	0.548294
29-11	0.010137	0.012185	0.023624	0.023035	0.064885	0.088681	0.290856	0.495669
30-11	0.010071	0.011835	0.020959	0.181086	0.064876	0.090853	0.247942	0.426818
01-12	0.00948	0.015325	0.078482	2.19023	0.064703	0.091931	0.203673	0.421073
02-12	0.008596	0.028036	1.22125	2.17733	0.06492	0.092874	0.182884	0.917487
03-12	0.006848	0.040721	1.04634	2.12776	0.065182	0.093219	0.31926	1.45837
04-12	0.005625	0.050237	0.996504	1.84332	0.065413	0.093586	0.548075	1.6339
05-12	0.004676	0.086388	0.755372	1.7418	0.065559	0.094027	0.706079	1.6332
06-12	0.004104	0.106691	0.506062	1.43019	0.065294	0.096263	0.755411	1.57388
07-12	0.003904	0.108744	0.305648	1.12564	0.065289	0.100817	0.751643	1.48851
08-12	0.00359	0.100217	0.14414	0.844953	0.064257	0.111536	0.717543	1.38174
09-12	0.003554	0.087325	0.055666	0.582954	0.063544	0.122595	0.654065	1.26379
10-12	0.004155	0.069115	0.040913	0.365479	0.062912	0.132697	0.581302	1.14133
11-12	0.008062	0.048271	0.044196	0.173396	0.062864	0.138851	0.514794	1.01388
12-12	0.014199	0.030813	0.047096	0.063762	0.063147	0.146865	0.456465	0.889092
13-12	0.021224	0.019153	0.051206	0.034683	0.063164	0.148762	0.39039	0.777994
14-12	0.023709	0.011094	0.050141	0.145548	0.063316	0.149328	0.341832	0.637169
15-12	0.022203	0.006472	0.186093	1.54783	0.064016	0.147696	0.292061	0.566557
16-12	0.018717	0.004287	1.55488	1.28505	0.064922	0.145006	0.282722	0.723775
17-12	0.014051	0.003724	1.33094	1.21651	0.066967	0.141408	0.53824	1.00938
18-12	0.011476	0.002549	1.21414	0.909415	0.069865	0.134937	0.847232	1.11486
19-12	0.007276	0.004062	0.893079	0.67763	0.071807	0.130893	0.989083	1.10363
20-12	0.005297	0.004515	0.579956	0.465028	0.072552	0.124665	1.00447	1.03975
21-12	0.004081	0.004344	0.329572	0.274872	0.072468	0.116957	0.958334	0.946654
22-12	0.003552	0.004159	0.163642	0.124747	0.072495	0.109951	0.874321	0.838519
23-12	0.003576	0.003947	0.067951	0.044873	0.072371	0.103793	0.768968	0.733419
24-12	0.003657	0.003689	0.037837	0.025569	0.071824	0.098799	0.666682	0.63508
25-12	0.003843	0.003145	0.025757	0.015111	0.071187	0.091388	0.575382	0.547843
26-12	0.003903	0.002605	0.01879	0.009714	0.070188	0.085638	0.493982	0.466358
27-12	0.003789	0.002367	0.012895	0.007594	0.068826	0.079785	0.416676	0.393478
28-12	0.003233	0.00221	0.008999	0.0052	0.067006	0.077715	0.34811	0.340122
29-12	0.002784	0.001913	0.007155	0.004572	0.066254	0.073954	0.299279	0.275678
30-12	0.002702	0.001936	0.005828	0.003762	0.063819	0.071794	0.243041	0.235443
31-12	0.002716	0.001943	0.00504	0.003212	0.06319	0.069768	0.205036	0.185093
01-01	0.298145	1.176247	13.00757	25.59814	2.811953	4.227915	23.16556	34.40325

APPENDIX 6

(RAINFALL POTENTIAL ET AND IRRIGATION DATA)

DATE	IRRIGATION RATE (mm/h) FOR		DAILY RAINFALL (mm)			POTENTIAL EVAPOTRANSPIRATION (mm)		
	10 ML/Y	16 ML/Y	WET	AVERAGE	DRY	WET	AVERAGE	DRY
01-01	2.09	0	0	0	0	6.3	7.4	5.8
02-01	0	3.344	0	0	0	6.7	7.1	5.8
03-01	0	0	1.01818	0	0	5.5	7.2	5.3
04-01	0	0	0.10909	0	0	4.6	6.4	6.1
05-01	0	0	6.65455	0	0	4.5	5.9	7.7
06-01	0	0	0.06364	0	0	4.7	7.2	7
07-01	0	0	0	0	0	6.1	7.2	6
08-01	0	0	0	0	0	5.7	6.1	6.8
09-01	0	0	0	0	0	4.7	5.7	6.6
10-01	0	0	0	0	0	3.6	6.2	5.9
11-01	0	0	0	0	0	4.9	7.3	6
12-01	0	0	0	0	0	6.1	7.1	5.9
13-01	0	0	0	0	0	7.5	5.5	5.2
14-01	0	0	0	0	0	7.5	6.9	5.5
15-01	2.09	3.344	0	0	0	6.3	7.2	7.4
16-01	0	0	0	0	0	7.5	7.6	7.5
17-01	0	0	0.08182	0	0	5.6	7.5	6.4
18-01	0	0	0.48182	0	0	5.6	7.8	6
19-01	0	0	0	0	0.02727	6.6	7.1	5.2
20-01	0	0	0.41818	0	0.01818	3	7.1	6.7
21-01	0	0	85.4455	0	0	2	7.3	4.9
22-01	0	0	91.2818	0	0	2.6	6.1	5.8
23-01	0	0	0.6	0	0	4.3	5	4.9
24-01	0	0	0	0	0	3.9	5.7	4.5
25-01	0	0	0.25455	0	0.02727	5.8	5.8	4.7
26-01	0	0	0	0	0	6.9	6.6	5.5
27-01	0	0	0	0.78182	0	6.9	6.4	6.3
28-01	0	0	0	0	0	5.3	4.3	5.8
29-01	0	0	0	0	0	5.6	4.8	7
30-01	0	0	0	0	0	6.4	5.7	7.3
31-01	0	0	0	0	0.03636	7.3	6.2	4.7
01-02	2.09	3.344	0	0	0.25455	8.1	5.1	4.3
02-02	0	0	0	0	0.25455	7.6	5.6	5.1
03-02	0	0	0	0	0	6.4	5.3	6.3
04-02	0	0	0	0.09091	0	7.8	5	7
05-02	0	0	0	0	0	6.6	5.9	6.5
06-02	0	0	0	0	0	6.1	6.7	3.9
07-02	0	0	0	0	0	6.1	7.6	5.1
08-02	0	0	0	0	0	6	7.4	6.2
09-02	0	0	0	0	0	6.6	7.3	6.7
10-02	0	0	0	0	0	6.6	7.5	6.8
11-02	0	0	0	0	0	6.6	6.4	6.4
12-02	0	0	0	0	0	5.7	5.9	5.5
13-02	0	0	0.09091	0	0	3.4	6.1	5.7
14-02	0	0	6.13636	0	0	4.1	5.3	6.2
15-02	2.09	3.344	0.75455	0	0	3.9	5.8	6.8
16-02	0	0	0.27273	0	0.10909	4	6.6	6.2
17-02	0	0	0	0	0	5.3	7	4.1
18-02	0	0	0	0	0	5.8	7.3	5.4
19-02	0	0	0	0	0	4.2	6.9	5.6
20-02	0	0	0	0	0	5.2	7.1	5.8
21-02	0	0	0	0.04545	0	6.2	6.8	5.9
22-02	0	0	0	0	0.05455	6.1	7	5.4

DATE	IRRIGATION RATE (mm/h) FOR		DAILY RAINFALL (mm)			POTENTIAL EVAPOTRANSPIRATION (mm)		
	10 ML/Y	16 ML/Y	WET	AVERAGE	DRY	WET	AVERAGE	DRY
23-02	0	0	0	0	0	6.4	6.6	5.1
24-02	0	0	0.04545	0.50909	0	6.7	2.9	3.7
25-02	0	0	5.63636	0.12727	0	5.4	5	5.1
26-02	0	0	0	0	0	6.2	4.6	5.7
27-02	0	0	0	0	0	5.8	4.8	6.2
28-02	0	0	0	0.01818	0	5.7	5	4.9
01-03	2.09	3.344	0	0	0	5.9	4.5	6.3
02-03	0	0	0	0	0	5.2	3.8	6.3
03-03	0	0	0.46364	0	0	4.7	4.8	7
04-03	0	0	0.10909	0	0	4.1	5.1	6.4
05-03	0	0	0	0	0	4.6	5.3	6.9
06-03	0	0	0.4	0	0	4.7	5.5	6.4
07-03	0	0	0	0	0.11818	4.2	5.3	4
08-03	0	0	0	0	0	4.7	5.5	4.4
09-03	0	0	0	0	0	5.1	5.4	4.9
10-03	0	0	0	0	0	5	5.8	5.2
11-03	0	0	0	0	0	5.6	5.5	5.2
12-03	0	0	0	0	0	5.6	5.9	5.1
13-03	0	0	0	0	0	4.3	5.7	5.2
14-03	0	0	0	0	0.00909	3.7	6.4	4.9
15-03	2.09	3.344	0	0	2.01818	3.9	6.4	2.9
16-03	0	0	0	0	0.01818	5	5.3	3.7
17-03	0	0	0	0	0	5.1	5.1	4.7
18-03	0	0	0	0	0	5.4	5.5	4.5
19-03	0	0	0	0	0	5.7	5.6	3.8
20-03	0	0	0.15454	0	0	2.1	6.1	4.5
21-03	0	0	6.75455	0	0	2.4	5.6	4.8
22-03	0	0	1.41818	0	0	2.8	5.6	4
23-03	0	0	0	0	0	3.6	4.8	3.6
24-03	0	0	0	3.92727	0	4.2	4.3	3.4
25-03	0	0	0	0	0	4.4	4.9	3.6
26-03	0	0	0	0	0	4.5	4.7	4.5
27-03	0	0	0	0	0	4.5	4.9	5.4
28-03	0	0	0	0.07273	0	4.5	4.9	5.3
29-03	0	0	0	0.01818	0	5	4.2	5.2
30-03	0	0	0	0	0	2.6	4.2	4
31-03	2.09	3.344	0	0	0	3.3	4.2	3.6
01-04	0	0	0	0	0	3.4	4.5	4.9
02-04	0	0	0	0	0	3.4	4.1	4.6
03-04	0	0	0	0	0	4.1	3.2	4.1
04-04	0	0	0	0	0	4.1	3.9	5
05-04	0	0	0	0	0	3.5	4.5	3.5
06-04	0	0	0	0	0	2.7	4.7	2.2
07-04	0	0	0	0	0.21818	3.1	4.3	3.4
08-04	0	0	0	0	0	3	4.2	3.5
09-04	0	0	0	4.36364	0.07273	3	2.1	3.7
10-04	0	0	0	0.10909	0	2.8	3.9	3.8
11-04	0	0	0.07273	0.03636	0.05455	2.4	3.3	4
12-04	0	0	0	0.01818	0	2.9	3.8	4.6
13-04	0	0	0.05455	0	0	3.3	3.8	2.5
14-04	0	0	0	7.46364	1.51818	2.9	2.1	2.6
15-04	2.09	3.344	0	0.20909	0.98182	2.9	2.7	2.8
16-04	0	0	0	0.00909	0.50909	3.5	2.7	2.8

DATE	IRRIGATION RATE (mm/h) FOR		DAILY RAINFALL (mm)			POTENTIAL EVAPOTRANSPIRATION (mm)		
	10 ML/Y	16 ML/Y	WET	AVERAGE	DRY	WET	AVERAGE	DRY
17-04	0	0	0	4.13636	0	4	2.2	3
18-04	0	0	0	0.01818	0	4.3	2.7	2.8
19-04	0	0	0	0	0	3.5	3	3.4
20-04	0	0	0	0	0	2.4	3.3	3.6
21-04	0	0	0	0	0	2.5	3.4	4
22-04	0	0	0	0	0	2.6	3	4.2
23-04	0	0	0	0	0.07273	1.9	2.6	2.7
24-04	0	0	0	0	0.07273	2.1	2.9	2.1
25-04	0	0	0	0	1.56364	2.6	3.3	1.8
26-04	0	0	0	0	0.00909	2.7	3.5	2.2
27-04	0	0	0	4.25455	0	3	1.6	2.8
28-04	0	0	0	0.10909	0	3.6	2.1	3.1
29-04	0	0	0	0	0	3.8	2.4	3.4
30-04	0	0	0	0	0	2.2	2.2	2.6
01-05	2.09	3.344	18.7273	0	0	1.8	2.2	2.9
02-05	0	0	4.94545	0	0	2.3	2.8	2.7
03-05	0	0	0.84545	0	0.10909	1.9	2.4	1.9
04-05	0	0	0.3	0	0	1.9	2.6	2.5
05-05	0	0	0	0	0	1.8	2.8	2.9
06-05	0	0	0	0	46.9727	2.5	2.9	1.7
07-05	0	0	0	0	6.52727	2.8	3	1.8
08-05	0	0	6.86364	0	7.90909	1.3	2.9	2.2
09-05	0	0	1.1	0	0.06364	2.1	2.7	2.3
10-05	0	0	0.1	14.3182	8.93636	2.4	1.6	1.8
11-05	0	0	0.96364	13.4091	0.53636	1.2	2	1.7
12-05	0	0	2.81818	19.1273	11.8091	2	1.8	1.2
13-05	0	0	0.01818	6.22727	8.55455	2.2	1.4	1
14-05	0	0	0	0.60909	0.11818	2.2	1.7	1.8
15-05	2.09	3.344	0	0.02727	0.03636	1.9	2	1.7
16-05	0	0	1.28182	0	0.02727	1.6	2.5	2.1
17-05	0	0	3.69091	3.51818	0.03636	1.3	1.6	2
18-05	0	0	0.07273	24.1	0.01818	1.6	1.6	2.1
19-05	0	0	0.01818	0.28182	0.00909	1.9	2	2.1
20-05	0	0	0	0.03636	6.97273	2.3	2.4	1.7
21-05	0	0	0	0.11818	2.40909	2.2	1.6	1.7
22-05	0	0	0.03636	21.1909	0.03636	2	1.7	2.1
23-05	0	0	0.19091	38.4909	0	1.9	1.1	2.2
24-05	0	0	2.25455	2.52727	6.6	1.8	1.3	1.2
25-05	0	0	2.52727	1.02727	4.36364	1.7	1.5	1.2
26-05	0	0	1.66364	0.03636	0.30909	1.2	1.8	1.2
27-05	0	0	9.67273	0.03636	0.02727	1.4	1.9	1.6
28-05	0	0	6.75455	16.7727	0.01818	1	1.2	1.7
29-05	0	0	4.54545	0.9	8.65455	1.6	1.5	0.7
30-05	0	0	1.07273	0	15.5273	1.7	1.8	1.2
31-05	2.09	3.344	0.70909	0	1.30909	1.9	2.1	1.6
01-06	0	0	0.01818	0.10909	1.02727	2	1.4	1.1
02-06	0	0	0.08182	13.4364	2.8	2.4	1.2	1.2
03-06	0	0	33.6909	0.94546	0.09091	1.4	1.6	1.1
04-06	0	0	0.56364	0	2.28182	1.5	2.3	1.5
05-06	0	0	0	4.22727	0.78182	1.9	1.2	1.3
06-06	0	0	0	13.7818	0	2.6	1.4	1.3
07-06	0	0	3.01818	14.9727	0.00909	2.5	1.4	1.4
08-06	0	0	21.6727	15.6091	6.54545	1.3	1.2	0.7

DATE	IRRIGATION RATE (mm/h) FOR		DAILY RAINFALL (mm)			POTENTIAL EVAPOTRANSPIRATION (mm)		
	10 ML/Y	16 ML/Y	WET	AVERAGE	DRY	WET	AVERAGE	DRY
09-06	0	0	10.3273	18.1182	2.63636	1.4	0.9	1
10-06	0	0	9.42727	0.76364	3.66364	0.6	1.1	1.1
11-06	0	0	5.14545	0.03636	1.58182	1.3	1.5	1.4
12-06	0	0	3.26364	0.01818	2.06364	1.8	1.5	1.5
13-06	0	0	16.4	0.01818	0	0.9	1.2	1.7
14-06	0	0	9.72727	0.25455	0	1.2	1.3	2.1
15-06	2.09	3.344	8.88182	0.08182	1.09091	0.9	1.5	2.2
16-06	0	0	22.2	0	0.11818	1.5	1.5	1.8
17-06	0	0	2	0	5.24545	1	1.7	1.4
18-06	0	0	9.03636	0	0.00909	0.8	1.9	1.7
19-06	0	0	1.24545	0	1.89091	1.5	1.9	1.8
20-06	0	0	0.02727	2.15455	0.13636	1.2	1	1.8
21-06	0	0	0.54546	1.94545	0	1.5	1.5	2.3
22-06	0	0	0	1.17273	0	1.7	1.2	2.2
23-06	0	0	1.28182	18.2091	0.10909	1.8	1.2	1.7
24-06	0	0	13.9818	3.61818	2.60909	1.1	1.2	1.5
25-06	0	0	7.22727	9.58182	0	1.4	1.5	1.6
26-06	0	0	0.26364	1.7	0.03636	1.4	1.4	1.8
27-06	0	0	0.1	0.87273	0	1.6	1.3	2
28-06	0	0	8.50909	0.02727	0	1.4	1.2	2.2
29-06	0	0	4.44545	0	6.34545	1.5	1.2	1.4
30-06	0	0	0.02727	0	9.37273	1.3	1.3	1.1
01-07	0	0	7.67273	0.3	7.36364	1.4	1.1	1.7
02-07	0	0	0.1	1.12727	3.55455	1.6	1.4	1.2
03-07	0	0	7.17273	0.04545	7.13636	0.8	1.6	1.2
04-07	0	0	6.48182	0	2.55455	1.4	2.1	1.5
05-07	0	0	5.87273	2.36364	0	0.7	2.2	1.7
06-07	0	0	8.3	25.8727	0	1.5	1.4	2
07-07	0	0	0.9	2.34545	5.30909	1.3	1.3	1.4
08-07	0	0	0.29091	32.8455	17.7	1.5	1.4	0.9
09-07	0	0	9.02727	21.8091	3.98182	1.1	1.3	1.3
10-07	0	0	1	2.87273	0.00909	1.3	1.2	1.2
11-07	0	0	0.06364	6	1.33636	1.8	1.3	1.4
12-07	0	0	1.16364	13.2364	9.13636	2.6	1.4	1.1
13-07	0	0	5.41818	4.44545	0.02727	1.5	1.5	1.5
14-07	0	0	4.66364	10.1273	0.3	2.6	1.2	1.5
15-07	0	0	39.4909	2.2	0.01818	0.8	1	1.5
16-07	0	0	16.6091	4.16364	0	1.1	1.3	1.6
17-07	0	0	0.81818	0.13636	0.03636	1.3	1.4	1.9
18-07	0	0	0.16364	6.81818	0	1.6	1.6	1.9
19-07	0	0	5.08182	8.84545	0	1.1	1.8	2.1
20-07	0	0	23.1636	41.8636	0.02727	1.3	1.1	1.8
21-07	0	0	2.47273	10.1818	8.75455	1.1	1.2	1.5
22-07	0	0	15.3	0.37273	0	1.4	1.3	1.7
23-07	0	0	5.28182	0	0.00909	1.4	1.8	1.9
24-07	0	0	1.83636	10.9	0	1.4	0.8	1.9
25-07	0	0	5.40909	23.2545	0	1.5	1.5	2.5
26-07	0	0	3.05455	4.48182	0.10909	1.7	1.3	2.5
27-07	0	0	10.0727	3.53636	0	1.6	0.9	2
28-07	0	0	0.56364	4.41818	5.27273	1.7	1.8	1.3
29-07	0	0	0.43636	26.0818	1.22727	2.1	1.4	1.5
30-07	0	0	0.00909	2.46364	14.0818	2	1.2	1.1
31-07	0	0	0	2.14545	3.88182	2.2	1.3	1.6

DATE	IRRIGATION RATE (mm/h) FOR		DAILY RAINFALL (mm)			POTENTIAL EVAPOTRANSPIRATION (mm)		
	10 ML/Y	16 ML/Y	WET	AVERAGE	DRY	WET	AVERAGE	DRY
01-08	0	0	1.9	0.39091	0.1	1	1.5	1.9
02-08	0	0	15.2455	0.03636	0.08182	1.5	2.1	1.8
03-08	0	0	0.29091	0	12.3091	1.5	2	0.9
04-08	0	0	0	0	8.45455	2.2	2.3	2
05-08	0	0	0	0	2.06364	2.4	2.4	1.9
06-08	0	0	0.12727	0	10.3	1.9	2.4	1.8
07-08	0	0	8.22727	0	1.61818	1	2.7	1.4
08-08	0	0	8.92727	0	2.01818	1.8	2.8	1.7
09-08	0	0	8.1	25.9182	33.6727	1.7	1.6	1.9
10-08	0	0	0.04545	4.74545	0.66364	2.1	1.8	1.3
11-08	0	0	0	1.91818	5.3	2	1.7	1.3
12-08	0	0	0.02727	7.12727	1.75455	1.9	1.4	1.8
13-08	0	0	0.20909	13.9	1.86364	1.6	2	1.4
14-08	0	0	1.05455	0.05455	14.8545	2	2.1	1
15-08	0	0	0.29091	0.08182	13.8091	2.5	1.9	2
16-08	0	0	0	0.08182	1.25455	2.8	2.1	2
17-08	0	0	1.32727	8.64545	0	2.9	2.3	1.7
18-08	0	0	1.02727	0.00909	0	1.5	1.7	1.9
19-08	0	0	8.72727	0.74545	0	1.8	1.7	1.5
20-08	0	0	1.54545	10.3818	0.06364	1.7	1.5	1.9
21-08	0	0	0.01818	0.9	0	2.7	1.6	2.5
22-08	0	0	0.19091	5.09091	0	1.8	1.7	2.3
23-08	0	0	40.6636	2.91818	0.20909	1.5	1.2	1.5
24-08	0	0	0.26364	6.93636	15.7273	2.3	2	2.1
25-08	0	0	0	1.62727	0.05455	2.1	1.5	2.2
26-08	0	0	0	5.70909	0	2.5	1.9	2.2
27-08	0	0	0	0.09091	0	2.5	2.5	2.2
28-08	0	0	1.87273	0	0	1.7	2.4	2.2
29-08	0	0	5.57273	0.80909	5.33636	2.3	1.6	1.2
30-08	0	0	1.56364	0.75455	10.3182	2.4	2.2	2
31-08	0	0	2.12727	0.24546	0.21818	2.3	2	1.9
01-09	2.09	3.344	0.89091	0.02727	0.3	2.1	2	1.7
02-09	0	0	2.21818	2.72727	0.40909	1.9	1.8	2.2
03-09	0	0	0.19091	32.4182	1.24545	2.4	2.4	1.9
04-09	0	0	0.75455	4.43636	0.03636	1.7	2.3	2.3
05-09	0	0	0.35455	0.23636	5.64545	2.7	2.7	1.8
06-09	0	0	0.10909	17.9364	14.6091	3	1.9	1.5
07-09	0	0	0	6.18182	2.62727	2.7	2.2	1.4
08-09	0	0	0.01818	0	0.97273	2.6	2	1.9
09-09	0	0	0	3.72727	6.89091	3.7	2.7	2.2
10-09	0	0	0	0.02727	5.28182	3.8	2	2.3
11-09	0	0	0	0.00909	0.06364	3.4	2.4	2
12-09	0	0	0	5.45455	2.10909	3.5	1.3	2
13-09	0	0	0.00909	2.9	1.44545	2.3	2.2	2.2
14-09	0	0	1.27273	1.40909	0	1.3	1.8	2
15-09	2.09	3.344	38.7727	0.69091	1.45455	1.9	2.8	2.4
16-09	0	0	13.9909	0	0.79091	2.1	3.3	2.3
17-09	0	0	0.56364	0	0.28182	2.1	2.8	2.3
18-09	0	0	1.13636	1.56364	0.91818	2.7	3.1	2.3
19-09	0	0	0.00909	2.56364	0.92727	3.7	2	2.7
20-09	0	0	0.47273	1.91818	0	2.5	2.5	3.1
21-09	0	0	5.17273	0.16364	0	2.4	2.4	2.9
22-09	0	0	11.0091	0	14.2273	2.9	2.8	1.9

DATE	IRRIGATION RATE (mm/h) FOR		DAILY RAINFALL (mm)			POTENTIAL EVAPOTRANSPIRATION (mm)		
	10 ML/Y	16 ML/Y	WET	AVERAGE	DRY	WET	AVERAGE	DRY
23-09	0	0	6.70909	0	3.44545	1.6	3.1	2.5
24-09	0	0	19.7909	0	3.22727	2.2	4.3	2.7
25-09	0	0	2.41818	0	2.79091	2.7	3.5	3.4
26-09	0	0	0.00909	0	0	3.1	2.9	3.7
27-09	0	0	0	0	0.00909	2.9	2.7	2.3
28-09	0	0	0	0.05455	0.26364	3.1	2.9	2
29-09	0	0	0	0.00909	23.7273	4.4	2.4	2
30-09	0	0	0	0	6.70909	4.8	2.4	2.8
01-10	2.09	3.344	0	0.00909	1.54545	3.3	3.3	2.2
02-10	0	0	0.02727	0	2.87273	2.9	3.7	3.1
03-10	0	0	0.19091	0.09091	0	2.2	3.9	3.1
04-10	0	0	14.9727	4.05455	0	2.6	2.7	4.2
05-10	0	0	20.5091	1.43636	0	2.7	2.1	4.1
06-10	0	0	0.56364	2.91818	0	3	2.8	3.9
07-10	0	0	1.8	0.42727	0	3.2	2.8	4.5
08-10	0	0	0	0.00909	0.08182	4.4	3.2	2.2
09-10	0	0	0.00909	1.71818	0.9	4.5	2.9	3
10-10	0	0	0	0.43636	0.02727	3.1	3.1	2.8
11-10	0	0	0.55454	12.3818	0.47273	3.4	3.3	2.6
12-10	0	0	0	0.8	1.4	4.1	3.1	3.4
13-10	0	0	0	0	0.00909	4.6	4.7	3
14-10	0	0	0	0	0	4.4	6	2.7
15-10	2.09	3.344	0	0	0.83636	4.6	3	3.1
16-10	0	0	0.01818	2.38182	0	4.7	4.8	4.1
17-10	0	0	1.92727	6.62727	0	2.8	1.8	4
18-10	0	0	0	28.0182	0	3.7	2.5	4.8
19-10	0	0	0	1.00909	0	4.1	4.1	4.5
20-10	0	0	0	0	0.17273	4.6	4.3	3.1
21-10	0	0	0	0	9.56364	5.4	4.7	2.8
22-10	0	0	0	0	7.73636	5.7	5	3
23-10	0	0	0.32727	0	0	2.8	5.1	3
24-10	0	0	1.12727	0	0.06364	2.5	5.6	3.7
25-10	0	0	6.51818	0	0	3.7	4	4.7
26-10	0	0	0.27273	0	0	3.9	4.8	2.8
27-10	0	0	0	0	0	3.9	5.1	3.8
28-10	0	0	0.25455	0	0	3.3	4.2	4.3
29-10	0	0	0	0	0	4.4	4.3	5
30-10	0	0	0	8.74545	0	4.7	3.4	5.3
31-10	0	0	0	4.88182	0	6.4	3.3	5.3
01-11	2.09	3.344	0	4.94545	0	2.7	2.9	5.2
02-11	0	0	0.00909	0.64546	0	3.3	3.8	5.5
03-11	0	0	0.7	0	0	3.7	4	3.1
04-11	0	0	1.24545	0.16364	2.36364	3.1	5.5	3.8
05-11	0	0	1.10909	0	0.00909	3.2	6.2	4.1
06-11	0	0	0.17273	1.14545	0	4.1	3.5	4.7
07-11	0	0	0	2.1	0.01818	4.2	3	5.4
08-11	0	0	0	4.68182	0	5.4	3.3	5.2
09-11	0	0	0	1.00909	0	6.6	2.9	5.8
10-11	0	0	0	0.03636	0	7.8	4.4	6.2
11-11	0	0	0	0	0	3.6	4.1	6.4
12-11	0	0	0	0.3	0	4.9	4.8	6.9
13-11	0	0	0	0	0	5.4	5.7	7.1
14-11	0	0	0	0	0	4.7	6.3	4.3

DATE	IRRIGATION RATE (mm/h) FOR		DAILY RAINFALL (mm)			POTENTIAL EVAPOTRANSPIRATION (mm)		
	10 ML/Y	16 ML/Y	WET	AVERAGE	DRY	WET	AVERAGE	DRY
15-11	2.09	3.344	0	0	0.10909	5.2	5.6	4.8
16-11	0	0	0	0	0.00909	5.7	4.4	4
17-11	0	0	0	0	0	6.2	5.1	4.2
18-11	0	0	0	0	0	7.3	5.8	5.4
19-11	0	0	0	0	27.2636	7.6	4.2	3.5
20-11	0	0	0	0	0.5	5.9	5.9	4.2
21-11	0	0	0	0	0	3.7	6.9	4.5
22-11	0	0	0	0	0.02727	3.2	6.3	4.6
23-11	0	0	0	0	0	3	5.6	4.1
24-11	0	0	0.02727	0	1.71818	4.3	5.4	4.3
25-11	0	0	0	2.89091	0	4.4	4.8	5.6
26-11	0	0	0.59091	1.4	1.01818	3.8	3.8	6.9
27-11	0	0	4.08182	2.79091	0	3.8	3.4	6.9
28-11	0	0	0.17273	0.61818	0	4.5	3.7	6.7
29-11	0	0	0.01818	0.20909	0	4.4	3.3	6.7
30-11	0	0	0	0.89091	4.76364	6.1	4.2	3.4
01-12	2.09	3.344	0.02727	0	18.5	6.6	5.1	3.6
02-12	0	0	0.03636	0	0.16364	6	5.6	4.9
03-12	0	0	0.01818	0	0.9	6.2	5.1	3.6
04-12	0	0	0.64546	0	18.3182	6.1	6	3.3
05-12	0	0	0	0	0.4	5.8	6.7	4.1
06-12	0	0	0	0	0.04545	5.2	7.1	4.1
07-12	0	0	0	0	0.03636	6.3	5.5	4.2
08-12	0	0	0	0	0	4.5	5.4	5.8
09-12	0	0	0.10909	0	0	4.4	5.9	5.5
10-12	0	0	4.09091	0	0	4.2	6.5	5.8
11-12	0	0	5.96364	0	0	3.9	7.2	6.5
12-12	0	0	1.56364	0	0	4.3	5.6	6.4
13-12	0	0	1.55455	0.00909	0	4.5	4.9	6.5
14-12	0	0	0.19091	0	0	4.8	4.1	6.4
15-12	2.09	3.344	0.00909	1.56364	0	5.3	5.2	6.6
16-12	0	0	0	1.78182	0	5.3	4.2	6.4
17-12	0	0	0.01818	0	0	6.3	6	6
18-12	0	0	0	0.00909	0	7.1	6.2	5
19-12	0	0	0	0	3.30909	7.6	5.1	5.1
20-12	0	0	0	3.71818	0.02727	6	4.4	4.9
21-12	0	0	0	3.70909	0	5	4.8	4.4
22-12	0	0	0	0.10909	0	3.7	4.9	5.2
23-12	0	0	0	0.17273	0	5.4	5.5	6
24-12	0	0	0	5.30909	0	2.9	5.1	5.6
25-12	0	0	0	3.65455	0	5.7	5.6	5.8
26-12	0	0	0	0	0	5.3	5	6.2
27-12	0	0	0	0.84545	0	7.4	6.2	6.1
28-12	0	0	0	3.27273	0	5	4.4	4.2
29-12	0	0	0	3.30909	0.11818	5.8	5.4	4.9
30-12	0	0	0	0	0	4.7	6.5	5.3

APPENDIX 7
(PARAMETERS USED IN CALIBRATION)

Table A7- 1: Calibrated Parameters Used in First Simulation

Parameter	Value
Vertical Hydraulic Conductivity (m/s)	0.000005
Horizental Hydraulic Conductivity (m/s)	0.00002
Specific Yield	0.3
Saturated Moisture contents	0.4
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.20

TableA7- 2: Calibrated Parameters Used in Second Simulation

Parameter	Value
Vertical Hydraulic Conductivity (m/s)	0.000004
Horizental Hydraulic Conductivity (m/s)	0.00002
Specific Yield	0.3
Saturated Moisture contents	0.4
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.06
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.25

Table A7-3: Calibrated Parameters Used in Third Simulation

Parameter	Value
Vertical Hydraulic Conductivity (m/s)	0.000005
Horizental Hydraulic Conductivity (m/s)	0.000015
Specific Yield	0.25
Saturated Moisture contents	0.3
Residual Moisture contents	0.012
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	4
Saturated Hydraulic conductivity (m/s)	0.0015
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.2
ET parameter C3	9
ET parameter Cint	0.06
Parameter Aroot	0.20

Table A7-4: Calibrated Parameters Used in Fourth Simulation

Parameter	Value
Vertical Hydraulic Conductivity (m/s)	0.0000035
Horizental Hydraulic Conductivity (m/s)	0.000012
Specific Yield	0.29
Saturated Moisture contents	0.4
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.3
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.10

Table A7-5: Calibrated Parameters Used in Fifth Simulation

Parameter	Value

Vertical Hydraulic Conductivity (m/s)	0.000005
Horizental Hydraulic Conductivity (m/s)	0.00002
Specific Yield	0.3
Saturated Moisture contents	0.4
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.20

Table A7-6: Calibrated Parameters Used in Sixth Simulation

Parameter	Value
Vertical Hydraulic Conductivity (m/s)	0.000005
Horizental Hydraulic Conductivity (m/s)	0.00002
Specific Yield	0.3
Saturated Moisture contents	0.4
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.06
Capillary pressure at field capacity (m)	2
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.32
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.20

Table A7-7: Calibrated Parameters Used in Seventh Simulation

Parameter	Value

Vertical Hydraulic Conductivity (m/s)	0.0000045
Horizental Hydraulic Conductivity (m/s)	0.000018
Specific Yield	0.3
Saturated Moisture contents	0.36
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	2
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.20

Table A7-8: Calibrated Parameters Used in Eight Simulation

Parameter	Value
Vertical Hydraulic Conductivity (m/s)	0.000005
Horizental Hydraulic Conductivity (m/s)	0.00002
Specific Yield	0.3
Saturated Moisture contents	0.4
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.20

Table A7-9: Calibrated Parameters Used in Ninth Simulation

Parameter	Value

Vertical Hydraulic Conductivity (m/s)	0.0000043
Horizental Hydraulic Conductivity (m/s)	0.00002
Specific Yield	0.3
Saturated Moisture contents	0.35
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.2
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.25

Table A7-10: Calibrated Parameters Used in Tenth Simulation

Parameter	Value
Vertical Hydraulic Conductivity (m/s)	0.000004
Horizental Hydraulic Conductivity (m/s)	0.00002
Specific Yield	0.3
Saturated Moisture contents	0.35
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.05
Parameter Aroot	0.20

Table A7-11: Calibrated Parameters Used in Eleventh Simulation

Parameter	Value

Vertical Hydraulic Conductivity (m/s)	0.0000055
Horizental Hydraulic Conductivity (m/s)	0.000023
Specific Yield	0.3
Saturated Moisture contents	0.4
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	4
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.20

Table A7-12: Calibrated Parameters Used in Twelth Simulation

Parameter	Value
Vertical Hydraulic Conductivity (m/s)	0.000005
Horizental Hydraulic Conductivity (m/s)	0.00002
Specific Yield	0.3
Saturated Moisture contents	0.4
Residual Moisture contents	0.02
Coefficient Alpha (1/cm)	0.07
Capillary pressure at field capacity (m)	3
Capillary pressure at wilting (m)	5
Saturated Hydraulic conductivity (m/s)	0.002
Leakage factor	0.0005
ET parameter C1	0.35
ET parameter C2	0.25
ET parameter C3	10
ET parameter Cint	0.06
Parameter Aroot	0.20

Table A-7.13 Rainfall Data and its Classification for Wet, Average and Dry Climates.

Year	Rainfall (mm)
1976	835
1977	717
1978	863
1979	719
1980	996
1981	929
1982	**839**
1983	772
1984	806
1985	744
1986	654
1987	528
1988	834
1989	669
1990	570
1991	800
1992	783
1993	583
1994	511
1995	**738**
1996	903
1997	738
1998	702
1999	987
2000	807
2001	**596**
2002	667
2003	648
2004	658

Table A7.14: Soil Physical Properties of SWIA/HWIA.

Soil Texture and other Physical Properties of SWIA										
Sink 18	Soil	Harvey	AJ and NL Stanford CN+FE Stanford	1	0-10	-Clay , Loam Mostly Loam	Deep Brown	Easily wet, nice texture, not wet/cold	4.41	242.60
				2	30cm	Clay	Pale Brown orange	Definite Clay, easy wet sticky feel, burnt orange mottles	4.68	94.20
Sink 19	Soil	Waroona	Linda Kathleen Vincent and Husband	1	0-10	Clay -Loam	Brown	Slight Mottling	4.08	792.00
				2	20	Clay	Brown	Orange Mottling	4.48	388.00
				3	30	Clay	Brown	Some Mottling	4.87	158.90
Sink 20	Soil	Waroona	Linda Kathleen Vincent and Husband	1	0	Loam	Orange/Brown	Some mottles present	4.48	139.30
				2	15	Clay -Loam	Orangey brown	becoming more orange	4.34	165.40
				3	35	Clay-Loam	light brown orange	Strong mottles, slightly sticky	4.46	179.90
Sink 21	Soil	Waroona	Geoffrey James Mullins	1	0-10	-Sandy Loam			4.34	91.10
				2	20	Clay-Loam			4.56	73.20
				3	30	Clay			4.70	58.20
Sink 22	Soil	Waroona	Geoffrey James Mullins	1	0	-Clayey Sand			4.63	63.20
				2	15	-Clayey Sand			4.73	64.10
				3	30	-Clayey Sand			4.89	88.10
				4	50	-Clayey Sand			5.14	96.50
Sink 23	Soil	Waroona	Geoffrey James Mullins	1	0	Loam			4.22	104.70
				2	15	Sandy Loam			3.74	48.90
				3	30	Loamy Sand			3.67	20.00
				4	50	Loamy Sand			3.66	34.40
				5	65	-Clayey Sand			4.14	54.30

Soil Texture and other Physical Properties of SWIA										
Sink 18	Soil	Harvey	AJ and NL Stanford CN+FE Stanford	1	0-10	-Clay , Loam Mostly Loam	Deep Brown	Easily wet, nice texture, not wet/cold	4.41	242.60
				2	30cm	Clay	Pale Brown orange	Definite Clay, easy wet sticky feel, burnt orange mottles	4.68	94.20
Sink 19	Soil	Waroona	Linda Kathleen Vincent and Husband	1	0-10	Clay -Loam	Brown	Slight Mottling	4.08	792.00
				2	20	Clay	Brown	Orange Mottling	4.48	388.00
				3	30	Clay	Brown	Some Mottling	4.87	158.90
Sink 20	Soil	Waroona	Linda Kathleen Vincent and Husband	1	0	Loam	Orange/Brown	Some mottles present	4.48	139.30
				2	15	Clay -Loam	Orangey brown	becoming more orange	4.34	165.40
				3	35	Clay-Loam	light brown orange	Strong mottles, slightly sticky	4.46	179.90
Sink 21	Soil	Waroona	Geoffrey James Mullins	1	0-10	-Sandy Loam			4.34	91.10
				2	20	Clay-Loam			4.56	73.20
				3	30	Clay			4.70	58.20
Sink 22	Soil	Waroona	Geoffrey James Mullins	1	0	-Clayey Sand			4.63	63.20
				2	15	-Clayey Sand			4.73	64.10
				3	30	-Clayey Sand			4.89	88.10
				4	50	-Clayey Sand			5.14	96.50
Sink 23	Soil	Waroona	Geoffrey James Mullins	1	0	Loam			4.22	104.70
				2	15	Sandy Loam			3.74	48.90
				3	30	Loamy Sand			3.67	20.00
				4	50	Loamy Sand			3.66	34.40
				5	65	-Clayey Sand			4.14	54.30

Soil Texture and other Physical Properties of SWIA										
Sink 10	Soil		Linda Warburton 97960147(	1	0-10	Clay-Loam	Grey with orange mottles	Organic matter = around 6 cm at soil surface	4.82	85
				2	30	Loam-Clay to Clay	Pale Grey and Yellow mottles	Very Clay like but still has small amount of sand in it. Not sampled	NA	
				3	40	Clay	Gray/Brown	Sampled	5.09	59.8
Sink 11	Soil		Linda Warburton	1	0-10	Loam-Sand	Brown	High Organic matter content	4.84	39.4
				2	10-30	Loam-Clay	Orange/Brown	Mottles, no sample	NA	
				3	+30	Clay	Pale White/Gray	Moving more towards clay, no , mottles	4.91	60.3
Sink 12	Soil	Dardanup	Barrie James Gelmi	1	0-10	-Sandy Loam	Grey with mottles		4.5	112.6
				2	25-30	-Loamy Sand	Yellow/Grey		4.53	51.2
				3	45	Sand	Mottled Grey/Brown		4.24	173.6
				4	60	Sand	Brown with orange mottles	Colour of mottles stronger, no sample	NA	
				5	+60	Clay		Mottled clays starting	NA	
Sink 13	Soil	Dardanup	Barrie James Gelmi	1	0-10	-Sandy Loam	Pale Brown/Gray	Good organic matter, forms ball easily. Cool to touch	4.35	154.2
				2	25-30	-Sandy Loam	Pale Gray	Sandy, cold, larger sand particles than sample above	4.98	209.9
				3	40-45	-Sandy Loam	Pale Brown/Gray	Cold	5.12	188.4
Sink 8	Soil	Waroona	AJJA Pty LTD Allen Green)manager Phil(	1	0-10	-Sandy Loam	Light Brown	No mottles, good layer of organic matter, dispersive , under water application	4.61	119.5
				2	25-30	Clay-Loam	Pale Brown	Orange mottles, distinct profile .change	4.68	120.3
Sink 7a,b,c	Drive	Waroona	Alcoa						NA	
Sink 16	Soil	Harvey	Phillip Hall	1	0-10	Loam	Dark Brown, no mottles	Powdery, not cool/cold to touch	4.37	190.3
				2	20	Clay	Orange/Brown mottles	Soil powdery clay not hard set or sticky type clay. Not cold to touch	4.70	82.30
Sink 17	Soil	" "	" "	1	0-10	Clay-Loam	Deep Brown		4.24	557.00
				2	35-40	Clay-Loam	Deep Brown with orange mottles	Sample cool but not wet	4.92	240.50