ANNEX - 5

REHABILITATION PLANS AND PRELIMINARY DESIGN

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1. PRESENT CONDITION OF THE IRRIGATION SYSTEMS

1.1 Present Service Area

Present service area (expressed in the irrigated areas in rainy seasons by gravity irrigation) under the 13 target irrigation schemes in Kathmandu, Bhaktapur and Lalitpur districts are summarized below according to the data provided by each District Irrigation Office (DIO) and inventory survey results by JICA study team during the study period in Nepal. Accordingly, the figures given below are different from those by each DIO.

Name of Schemes	Present Service Areas in ha.(Estimated irrigated areas)
Kathmandu District	
Biswambhara (AK-04)	100
Boshan (AK-05)	168
Dakshinkali (AK-07)	80
Indrayani (AK-14)	112
Shali Nadi (AK-25)	240
Sub-total	700
Bhaktapur District	
Bidol (AB-02)	48
Katunje (AB-10)	72
Kutdhal (AB-12)	118
Mahadev Khola (AB-14)	360
Sub-total	598
Lalitpur District	
Kotkhu (AL-10)	356
Lubhu (AL-13)	132
Thika Bhairaw-I (Al-19)	480
Thika Bhairaw-II (A-20)	320
Sub-total	1,288
Total	2,586

Note: 1/ Original figures for the above were provided by each DIO and they were modified through the field survey by JICA study team with the help of counterparts and the maps with a scale of 1/10,000. It may be mentioned here that the above-mentioned service areas include the areas which are not fully irrigated by present irrigation systems.

1.2 Water Distribution

1.2.1 Present Irrigation Systems

All the target irrigation systems in Kathmandu, Bhaktapur and Lalitpur districts are relatively old and damaged due to floods and landslides which occur frequently. Some of them were constructed more than 30 years ago by the Department of Irrigation (DoI) or by the assistance of the Government of India. Typical irrigation system observed is that with an intake facility and irrigation canals which carry water by gravity. Usually, the intake facility consists of a fixed weir made of concrete or stone/brick masonry. Generally, the irrigation canals are lined with stone/brick masonry only for a limited portion, usually upper portion of the canals. Under these situations, usually, irrigation water does not reach the terminal irrigation facilities, resulting in water shortage in agricultural lands to be irrigated. This situation calls for rehabilitation of those irrigation systems as quickly as possible with proper technical as well as monetary assistance.

1.2.2 Diverted Irrigation Water

Under the target irrigation systems, river flow/natural stream is dammed up by a fixed weir and there, the water is diverted into the main irrigation canal(s) located along the river bank. And the water is further diverted into secondary and tertiary canals through the gates up to the on-farm level canals. However, control and measurement of diverted irrigation water has not been done for long time due to damages to gates and canals as well as due to lack of attention to water management. Accordingly, no data on the amount of diverted irrigation water of the target irrigation systems are not available This situation makes it difficult to correctly analyze how much irrigation water has been consumed under each target irrigation scheme during irrigation. Also this situation makes it difficult to analyze the repeating use-ratio of the irrigation water. This condition will be improved through implementation of the project, which will equip adequate water-measuring devices on the irrigation canals to divert the irrigation water according to designed water discharge required in each irrigation block.

1.2.3 Water Rights

Water resources in Kathmandu Valley, i.e., surface water and ground water are being used for irrigation, drinking water, hydropower generation, industry etc. In the water resources development in the Valley, the government of Nepal has put its highest priority to the development of water resources for drinking water supply. However, it seems that further adjustment in water resources allocation among other sectors is needed. Originally, the water resources in the Valley have been developed by the farmers and used mainly for irrigation since ancient time. With this background, the water resources developed by the farmers have become to be considered as their historical properties, which is now called as "water rights". However, prevailing water resources condition in the Valley, which shows that water resources including surface water and ground water are not sufficient, does not allow to use the water freely by any sectors. At present, the water rights for irrigation is assured by the government, however, at the same time, the government of Nepal is also requesting all the sectors to utilize limited water resources in the Valley through the cooperation among the sectors.

Accordingly, in rehabilitation of the target irrigation systems, water-saving canal systems have been taken into account, although the "water rights" for irrigation of the target irrigation schemes was assured by DoI in the meeting held between the Officials of DoI and the study team in October, 1994.

2. PROJECT FORMULATION

2.1 General

The target irrigation schemes (13 existing irrigation schemes in the Valley) will be rehabilitated according to the priority identified mainly from economic evaluation on each scheme with the following concepts.

(1) To establish safer irrigation systems against floods and other natural hazards and more water-saving irrigation canal systems, through which contributing to stabilize crop cultivation as well as to expand, where possible, irrigated agricultural lands through the project.

(2) To establish more farmers-friendly irrigation systems, especially with respect to operation and maintenance (O&M) and water management also, considering that the rehabilitated irrigation schemes will be handed over to the farmers and maintained by the farmers themselves as is stated in "Irrigation Policy of the Government of Nepal".

(3) To provide up-graded irrigation facilities, enabling the farmers to control the irrigation water easily.

(4) To promote farmers' participation in O&M, water management and other related activities through the farmers' training programs scheduled to be held under the project. To attain this, it is planned to establish water users' associations by the farmers which will have more advanced functions to be controlled and observed by the farmers as is given in the O&M Manual.

(5) To encourage district irrigation offices in Kathmandu, Bhaktapur and Lalitpur district offices so that they can so that they can play more important roles in guiding the farmers who will face the problems at the different stages of the project with the help of more facilities and equipment, through which the farmers under the rehabilitated irrigation schemes can receive more advanced training on O/M, water management and agricultural techniques etc.

As a whole, the project intends to rehabilitate the target irrigation schemes according to the priority identified and to establish the water users' associations and other related organizations as described in the O&M Manual attached to the report, which will consist of all the benefited farmers through the project, to maintain the rehabilitated irrigation schemes by the farmers themselves as well as to realize more aggressive activities in water management by the farmers themselves, as is recommended in the "Irrigation Policy". And, it is expected that implementation of the project will contribute to change the nature of the government-developed irrigation schemes into more farmers-oriented irrigation schemes with the combined efforts by the government officials and the farmers. It may be specially noted here that [Request Forms] for proceeding with establishing the WUAs have been submitted to DoIs from the farmers who belong to 6 target irrigation schemes out of 13 target irrigation schemes. Sample request form is attached to this report as Attachment-1.

2.2 Project Plans

2.2.1 Diversion Works

Existing diversion works of the target irrigation schemes will be improved/replaced with new ones according to their present condition, which differs from each other. The schemes to be improved /replaced with new ones have been identified as follows.

Name of Schemes to be Improved

(1) Biswambhara irrigation scheme in Kathmandu district
*(minor improvement / gate replacement only)
(2) Mahadev Khola irrigation scheme in Bhaktapur district.
(3) Kotkhu irrigation scheme in Lalitpur district.
(4) Thika Bhairaw-(I) irrigation scheme in Lalitpur district. (No.2 diversion only)

Sub-total 4 diversions

Name of Schemes to be Replaced with New Ones

Kathmandu district

(1) Boshan irrigation scheme (4 diversions)
(2) Dakshinkali irrigation scheme (upper scheme only)
(3) Indrayani irrigation scheme
(4) Shali Nadi irrigation scheme

Sub-total 7 diversions

Bhaktapur district

(1) Bidol irrigation scheme
(2) Katunje irrigation scheme
(3) Kutudhal irrigation scheme

Sub-total 3 diversions

Lalitpur district

(1) Lubhu irrigation scheme
(2) Thika Bhairaw-I irrigation scheme (No.1 diversion only)
(2) Thika Bhairaw-II irrigation scheme

Sub-total 3 diversion

Total 4 diversions to be improved 13 to be replaced with new ones.

As a result, out of 13 target irrigation schemes (18 diversions in total), existing 4 diversion works will be improved and 13 diversion works will be replaced with new ones. Remaining 1 diversion (Dhakshinkari Lower Scheme) will not be rehabilitated because it is well maintained. The diversion works to be improved/replaced with new ones will equip more up-graded functions and the diversion works will be made of concrete with sluice ways. As to the detailed plan for improvement/replacement with new ones, see Section 4 (Plan and Design) of this Annex-5.

2.2.2 Improvement of Distribution Systems

Under the project, existing distribution systems of the 13 target irrigation schemes have been planned to have the following improved and up-graded functions.

(1) Unless otherwise specified, the existing distribution systems, namely, existing main, secondary and tertiary irrigation canals have been improved to have concrete-lined section considering presently observed poor conditions of these canals. The required canal section to carry the design discharge has bee decided based mainly upon Manning's formula.

(2) In the improved distribution systems, gates and turnouts with simple water measuring devices have been provided as much as possible, considering prevailing poor water distribution and water control in the existing irrigation canal systems. With provision of these equipment, it is expected that the project will realize more water-saving irrigation water management by the farmers after they have received technical training especially for O&M of the irrigation facilities.

(3) In addition, to establish safer irrigation canal systems against natural hazards, hydraulic structures such as steel-made pipe siphons, cross-drains, concrete-made aqueducts, landslide protection works by gabion etc. have been provided in the improved distribution systems. However, in the layout of the canal locations, existing canal routes have bee respected as much as possible to avoid additional land acquisition. And another reason for respecting the existing canal routes is that they are considered to be more stable than the routes to be made along the hilly slopes of the Valley.

2.2.3 Improvement of Drainage Systems

Improvement of the existing drainage systems under the 13 target irrigation systems has been considered as one of the most important components of the project. As stated in many places of the reports on the project, it can be said at present that there are no systematic drainage networks under the target irrigation systems in the Valley. And it is obvious that lack of proper drainage networks have caused damages to the existing irrigation canals, roads, and other related facilities. Of course, this situation justifies to call for early provision of proper size of drainage networks. However, provision of such net works requires much investment which may not be economically justified under the project. Accordingly, it may be suggested here that provision of the drainage net works should be done utilizing existing natural river system as much as possible, dividing the areas to be drained into small blocks to keep the scale of such drainage networks as possible as small. And, provision of such drainage networks should be made after completion of rehabilitation of the target irrigation schemes after co-observing flooding condition of the schemes by the farmers themselves and the assistant engineers of the concerned district irrigation offices. And, then, minimum size of the drainage networks consisting of small earth canals, which can be excavated easily by the farmers. In this connection, the assistant engineers of each DIO are requested to help the farmers decide the locations of the drainage canals to be excavated. The excavated canals should be connected to the nearest existing natural streams to avoid enlargement of required section of the drainage canals to be excavated.

2.2.4 Improvement of On-Farm Facilities

Unless otherwise specified, the target irrigation schemes will be rehabilitated up to tertiary canals. However, improvement of the existing on-farm level facilities will not be taken care by the project. Since it is considered that most of the on-farm facilities consist of small farm ditches in the agricultural lands to be irrigated. These farm ditches should be maintained by the benefited farmers themselves and if necessary, those farm ditches should be re-excavated by the farmers according to the change of canal alignment proposed in the project.

2.2.5 Extension Area Development

Under the project, the areas to be irrigated under each rehabilitated irrigation scheme have been decided based upon the design discharge with 80 % probability, which means that there is a possibility that even the areas thus decided may not be fully irrigated once in five years. Accordingly, it seems that there is little room for the extension area development under the project if we strictly follow this criterion. However, if we consider the irrigation for ordinary years, there will be some room for extension of the irrigated areas (20 % of the total areas) development under the project. However, since irrigation facilities including canals are not planned for these areas, the irrigation for the extended area will have to depend upon rainfalls, which will cause order-less expansion of the cultivated areas without supports by necessary infrastructures. This situation should be avoided under the project. In this sense, it may be suggested here that there will be less potential for extension area development under the project.

2.3 Strengthening of O&M Capability

2.3.1 Procurement of O&M Equipment and Building Facilities

To realize the strengthening of O&M capability described in the O&M Manuals attached to the report, it is recommended to reinforce the equipment necessary for the intended O&M activities by the farmers. Because, at present, the district irrigation offices as well as the farmers who are expected to be the members of the water users' associations for O&M and water management in the rehabilitated irrigation schemes, do not have any equipment to be mentioned for O&M and water management.

With this background and survey for present availability of the equipment for O&M and water management possessed by the farmers and DIOs, it is recommended to at least procure the following equipment to realize high performance in O&M activities described in the O&M Manual.

(1) Equipment to be Procured for DIOs

	Name of Equipment	Quantities
(a)	Jeep	3 (1 x 3)
(b)	Pickup Truck	3 (1 x 3)
(c)	Motor Cycle	6 (2 x 3)
(d)	Bicycle	9 (3 x 3)
(e)	Audio Visual Set for O&M Training	3 (1 x 3)
(f)	Survey Equipment (Transit, Level, Poles, and Staffs)	3 (1 x 3)
(g)	Tools Set for Maintenance of Gates and Measuring Devices	3 (1 x 3)
(h)	Potable-type Concrete Mixer	3 (1 x 3)

*** : Above-listed equipment should be kept at and maintained by each DIO.

(2) Equipment to be Procured for WUAs (13 WUAs)

	Name of Equipment	Quantities
(a)	Shovel (To be distributed in proportion to the irrigated area)	300
(b)	Bamboo-made Basket for Carrying Wastes and Deposits (To be distributed in proportion to the irrigated area)	300
(c)	Sickle (To be distributed in proportion to the irrigated area)	300
(d)	Tools Set (Hammer, Chisel, Monkey Wrench, Nipper, Pliers, Saw)	26 (2 x 13)
(e)	Wooden Tamper for Consolidating Soils	26 (2 x 13)

*** : These equipment will be kept and maintained at each WUA and will be used by the farmers for O/M activities.

(3) Building Facilities

	Name of Equipment	Quantities
(1)	Brick-made office building for WUAs	13 (1 x 13)

A building with space of 50 m^2 in average will be considered as headquarters of each WUA to accommodate 3 persons in average, consisting of the chairman, technical assistant and administrative staff. And the above-mentioned equipment to be used by the farmers for O&M activities will also be kept at this office. For construction of the buildings, land acquisition of about 650 m^2 is required.

(2)	Typewrite for Documentation	13 (1 x 13)
(3)	Desk and Chair	39 (3 x 13)
(4)	Mimeographing Machine for Printing Communication Papers	13 (1 x 13)

2.3.2 System's Communication Networks

"The system's communication networks" discussed here mainly means the communication among the farms who belong to the same WUA. It is considered necessary for the farmers who belong to the same WUA to obtain at least the following information each other.

(1) Decisions made by the committee of the WUA.

(2) Working schedule for O&M activities and water management for the coming month and the requested activities to be carried out by the farmers.

(3) Price movement of agricultural products in the markets.

(4) Training programs and its schedule.

(5) Monthly budgetary report of the WUA.

(6) Any opinions by the farmers who belong to the same WUA etc.

These information must reach the farmers quickly so that they can discuss and exchange opinions each other for better agricultural activities and O&M performance. To attain this, brief papers written in Nepalese language which include the above information shall be monthly published by each WUA and distributed to all the farmers under the same WUA free of charge. A sample paper for the said purpose is attached to the O&M Manual. For additional communication among the farmers, for example, information on the decisions in the general assembly of WUAs, it shall be communicated by publication of additional papers to the farmers. Other than this, no facilities for the communication networks shall be considered under the project.

3. WATER MANAGEMENT PLAN

3.1 General

Water management by the farmers under the rehabilitated irrigation is considered as of the most important components of the project. Establishment of proper water management is urgently required in consideration of the efficient use of water in irrigation as well as sharing the limited amount of water in the Valley among the different sectors. As general concepts of irrigation (water) management, it may be said that, in the last two decades, newer concepts of irrigation management have evolved. A fundamental change which has taken place in the concept of soil-plant-water relations, leading to a more dynamic approach, is now perceived to be a unified system in which all processes are interdependently linked as in a chain. This change calls for much attention and high performance in water management, With this understanding, the water management under the project aims to achieve the following:

(1) Water management under the project should be carried out under the leadership of the farmers of each irrigation scheme to be rehabilitated;

(2) In consideration of limited availability of water resources in the Valley, rotation irrigation method will be considered as the basis of the water management under the project, especially, proper rotation irrigation during land soaking and land preparation period, where maximum demand of irrigation water will occur, should be realized among the farmers; and

(3) To save the irrigation water consumed in the rehabilitated irrigation system as much as possible, it is necessary for all the farmers under the rehabilitated irrigation schemes to fulfil their duties in water management described in the O&M Manual.

3.2 Water Management schemes

3.2.1 Irrigation Water Requirement

The calculation of irrigation water requirements for the target irrigation schemes was carried out by referring to the general guidelines described in the "Design Manuals for Irrigation Projects in Nepal M-3 Hydrology and Agro-meteorology Manual 1990". The calculation was conducted on a semi-monthly basis.

(1) Potential evapotranspiration

Reference crop evapotranspiration (ET_0) and open water evaporation (E_0) were calculated by the Penman method recommended by Food and Agriculture Organisation of the United Nations (FAO) using the meteorological data at Kathmandu airport, following the above mentioned Design Manual. Since the original data at Kathmandu airport were compiled on a monthly basis, they were converted into the semi-monthly basis for calculation of the water requirements as shown below :

Unit : mm

	Jan(E)	Jan(L)	Feb(E)	Feb(L)	Mar(E)	Mar(L)	Apr(E)	Apr(L)	May(E)	May(L)	Jun(E)	Jun(L)
ET_0	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65
E_0	2.30	2.55	3.00	3.85	4.65	5.25	5.70	6.10	6.40	6.55	6.00	5.60

	Jul(E)	Jul(L)	Aug(E)	Aug(L)	Sep(E)	Sep(L)	Oct(E)	Oct(L)	Nov(E)	Nov(L)	Dec(E)	Dec(L)
ET_0	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60
E_0	5.35	5.17	5.05	4.90	4.70	4.50	4.25	3.90	3.35	2.75	2.37	2.15

(2) Consumptive use

Consumptive use by crop is estimated by the product of crop factor (Kc) and potential evapotranspiration (ET_o). On the basis of the values recommended by FAO, crop factors (Kc) used for estimation are given in Table 3-1.

(3) Field irrigation water requirement

Field irrigation water requirements are assessed with consumptive use and other requirement such as land preparation (puddling water) requirement, percolation loss in the paddy field and nursery water requirement for the paddy.

a) Percolation loss in the paddy field

In the calculation of percolation in the paddy fields, the value of 5 mm/day recommended in the manual was used, considering the soil conditions and the fact that the paddy fields under the schemes to be rehabilitated have been irrigated for many years.

b) Puddling water for land preparation on the paddy field

Puddling water requirement for land preparation on the paddy field consists of soil saturation requirement and submergence water. Soil saturation requirement is assessed by soil depth to be saturated and soil porosity. Assuming effective soil depth of the paddy field and soil conditions are as follows, puddling water requirement is estimated at 150 mm, with a condition that after land preparation same percolation rate as mentioned above and evaporation rate from water surface (Eo) which are estimated as mentioned above will be applied.

Soil depth to be saturated :	300 mm
Porosity of soil in above depth :	50%
Vapour phase in soils after puddling :	3%
Soil moisture before water supply :	12%
Bulk density of soil :	1.2 kg/lit
Soil saturation requirement	
= 300 x (50 - 3 - 12 x 1.2)/100 =	98 mm
Standing water depth after puddling :	50 mm
Total	148 mm say 150 mm

c) Nursery water requirement for paddy

The water requirements for nursery beds of the paddy are estimated at 1/20 or 5% of puddling water requirement estimated as above.

(4) Effective Rainfall

a) Rainfall Data

The target irrigation schemes are located in a relatively flat and central area of the Valley and on the slopes of the surrounding mountainous area. Accordingly, rainfall patterns in both areas are different from each other (the former has less rainfall compared to the latter). Therefore, the areas were divided into two patterns; Zone-A and Zone-B by the amount of annual rainfall, i.e., by the isohyet of 1,500 mm as shown in Fig.4-4 in Annex-4. Based on this, different rainfall data were applied for calculation of rainfall, in the areas where the target irrigation schemes are located as shown below :

	Zone A Central Area	Zone B Surrounding Area
Patter of isohyet	R < 1,500 mm	1,500 <= R < 2,000 mm
Meteorological Station	No. 1030 Kathmandu Airport	No. 1059 Changu Narayan
Annual Rainfall	1,403 mm	1,677 mm
Schemes belong	AB-10 Katunje AB-14 Mahadev Khola AL-08 Khokana AL-10 Kotkhu AL-13 Lubhu AL-19 Thika Bhairaw-I AL-20 Thika Bhairaw-II	AK-04 Biswambhara AK-05 Boshan AK-07 Dakshinkali AK-14 Indrayani AK-25 Shali Nadi AK-27 Tokha AB-02 Bidol AB-04 Dhunge Dhara AB-12 Kutudhal

b) Effective Rainfall (Re)

Effective rainfall (Re) was estimated for each case given below using rainfall data with an 80% probability (R_{80}) modifying the method recommended in the manual :

For paddy :	Potential Re (R_o)	Effective Rainfall
R_{80} <= 5 mm	$R_o = 0$	$Re = R_o$
5 mm < R_{80} <= 100 mm	$R_o = R_{80} \times 0.85$	
	If $R_o <= T_{loss}$, then	$Re = R_o$
	If $R_o > T_{loss}$, then	$Re = T_{loss}$
R_{80} < 100 mm	$R_o = R_{80} \times 0.70$	
	If $R_o <= T_{loss}$, then	$Re = R_o$
	If $R_o > T_{loss}$, then	$Re = T_{loss}$
For upland field crops:	$R_o = R_{80} \times 0.70$	
	If $R_o <= T_{loss}$, then	$Re = R_o$
	If $R_o > T_{loss}$, then	$Re = T_{loss}$

Where; T_{loss} : Total crop water requirement (in the case of paddy, percolation is added, but land preparation requirement is not considered.)

(5) Irrigation Efficiency

In the calculation, the values of field efficiency recommended in the manual were adopted. The recommended values seem to be relatively small. However, they are thought to be acceptable considering the prevailing field conditions in Nepal. Regarding the water transportation efficiency of the canal, the manual recommends that relatively lower values of 49% to 64% be used considering the water leakage from the canals and inadequate water management. However, in the calculation, the following values were used, under the conditions that the canals for the Project will be lined and water management will be improved.

Field efficiency:

1)	For paddy fields :	85%
2)	For upland crops :	60%

Water transportation efficiency in the canals:

1)	For selected schemes for rehabilitation :	80%
2)	For existing schemes :	60%

(6) Diversion Water Requirements

Based on the above assumptions, the consumptive use, field irrigation water requirement and diversion water requirement for not only respective crops proposed for the target irrigation schemes but also major crops prevailing in the Valley were calculated on a semi-monthly basis as shown in Tables 3-2.1 to 3-2.18. The unit field irrigation water requirements and unit diversion water requirements by respective crops in each zone are summarised in Tables 3-3.1 and 3-3.2, and Tables 3-4.1 and 3-4.2, respectively. The diversion water requirements for typical cropping pattern proposed for selected schemes in each zone are shown in Tables 3-5.1 and 3-5.2. Irrigation water requirements for each model scheme in respective zones are shown in Tables 3-6.1 and 3-6.2.

As for reference, Tables 3-7.1 and 3-7.2 show irrigation water requirement for prevailing present cropping pattern in each scheme in respective zones with a conveyance efficiency 80% (after improvement) and Tables 3-9.1 and 3-9.2 show the same with a conveyance efficiency 60% (present conditions). Tables 3-8 and 3-10 show irrigation water requirement for cropping pattern proposed in Kotkhu Water Supply Project with a conveyance efficiency 80% and 60%, respectively.

(7) Design Discharge

From the following assumption, design discharge of the facilities are decided:

1) For water balance study:
Diversion water requirement of respective schemes estimated in Tables 3-6.1 and 3-6.2 for the proposed cropping pattern.
Peak water requirement are 0.653 lit/sec/ha (5.64 mm/day) in both Zones-A and B
Diversion water requirement for present cropping pattern for existing system estimated in Tables 3-9.2(4/4) and 3-10, this result were used for water abstracted in upstream reaches of proposed schemes in water balance study.
Peak water requirement are 1.275 lit/sec/ha (11.02 mm/day) in Zone-A
and 1.182 lit/sec/ha (10.21 mm/day) in Zone-B

2) For design discharge of the intake and upstream reaches of main canal:
Diversion water requirement of respective schemes estimated in Tables 3-7.1 and 3-7.2 for prevailing cropping pattern, considering that introduction of the proposed cropping pattern will takes some period and that in these period farmers will continue prevailing farming.
Peak water requirement are 0.986 lit/sec/ha (8.52 mm/day) in Zone-A
and 0.933 lit/sec/ha (8.06 mm/day) in Zone-B

3) For design discharge of the terminal facilities such as tertiary canals and down stream reaches of secondary or main canals of small scale schemes:
Diversion water requirement of paddy estimated in Table 3-2.1, as all area will be cultivated with paddy.
Peak water requirement are 1.306 lit/sec/ha (11.29 mm/day) in both Zones-A and B

3.2.2 Diagram of Proposed Irrigation Systems

Diagram of irrigation system for each scheme is proposed based on existing canal alignment and canal structures. These diagrams are shown in Fig.3.2-1 to 3.2-13.

3.2.3 Water Management

(1) Main Canals and Laterals

The water management in main canals and laterals shall be carried out on the basis of the following.

(a) As the first step, the turnout leaders of each irrigation scheme shall collect information from the respective farmers on irrigation schedule for land soaking, land preparation, areas to be irrigated and kind of crops to be irrigated etc. Based upon this, the turnout leaders shall, in collaboration with technical staffs and Association Organizers (AOs) of DIOs, decide the amount of water to be diverted, timing of water diversion etc. And the turnout leaders shall inform the farmers of the decisions made by them for the above so that the decided rotation schedule should be kept by the farmers in a cooperative manner.

(b) Based on the schedule, the turnout leaders shall estimate the required manpower and its service period by the farmers of each irrigation scheme.. And the turnout leaders shall appoint required numbers of water issuers to be selected from the farmers for operation of the gates provided in the main and lateral canals.

(2) Farm Level

On farm level water management shall be carried out on farmers own initiative. However, at the initial stage of the on farm level water management, initiative shall be taken by the farmers who have received the training for water management under the project. The on farm level water management will include operation of small gates (timely opening and closing gates in consideration of maximum saving of water) and maintenance of on -farm level canals (to keep the shape of the canals, desilting and weeding) by the farmers.

(3) Rotation Irrigation Method

Rotation irrigation method may be partly needed for distribution of irrigation water in the rehabilitated irrigation systems, especially, this method shall be applied during land soaking and land preparation in which much water is required within a limited time. Rotation of irrigation water for a designated irrigation scheme during this time should be completed within one month at latest paying attention to growing period of rice and others. It is recommended that the rotation irrigation should be carried out on the basis of the farmer-irrigators' groups which will consist of 20 to 30 farmers with total areas of about 5.0 ha to be irrigated. To carry out the rotation irrigation smoothly among the farmer-irrigators' groups, it is recommended to have meetings several times among the farmers and discuss and decide the water distribution schedule for each farm plot to avoid conflicts among the farmers.

(4) Water Measuring Devices

Water measuring devices under the rehabilitated irrigation systems consist of the gates with simple measuring meters on and at the head of the main, secondary and tertiary canals. These gates can also function as measuring devices by reading opening of the gates with provision of opening vs. discharge curve which is particular to each gate before hand. Also the drop structures which are to be provided in the main and secondary canals will also function as the water measuring devices because it is definitely anticipated that critical flow will occur on these structures. Then the discharge can be easily obtained by measuring the depth of the critical flow and substituting it to an appropriate hydraulic formula for obtaining the discharge. It is considered that measuring the discharge in the canals and keeping the records on the discharge can be

done by the farmers after several on the job training by the technical assistant engineers from DIO.

3.3 Water Management Training Program

The water management training program under the project should be prepared and carried out with the understanding that the water management by the farmers under the rehabilitated irrigation schemes would play a vital role in the project. Eventually, success of the water management largely depends upon how the farmers participate in it in a friendly and cooperative manner with the understanding that effective water management will contribute to increase the agricultural products and by saving water through the water management in a organized way, it will also contribute to the other sectors which also need water badly. Also, it is considered very important that the training program should guide the farmers so that the farmers can recognize that the irrigation water is no longer obtained free of charge, and the water has become common asset to be possessed by the people equally. Accordingly, the water management training program under the project should include the following and the training opportunity should be widely opened to many farmers, aiming at self-reliant water management by the farmers.

(1) Since the water management under the project is closely related to O&M activities by the farmers, as the first step towards better understanding of water management by the farmers, it is recommended that 3 to five farmers selected from the farmer-irrigators' groups should receive the orientations organized by Association Organizers (AOs) from each District Irrigation Office (DIO) as described in Section 3.7 of the O&M Manual attached to the report. Basically, such orientations to the farmers shall be given at each DIO according to the schedule and timing described in the said manual.

(2) The orientations will consist of (i) initial orientation to the farmers, (ii) intermediate orientation to the farmers and (iii) final orientation to the farmers. Regarding the detailed contents of the programs at each stage of the orientations, see the Section 3.7 of the O&M Manual. Through these training programs, it is expected that the farmers can learn the nature of the project, expected farmers' roles in the project, necessity of O&M of the irrigation facilities, operation and control of gates, maintenance of the canals in a organized way, necessity of record keeping and collection of water charge according to the irrigation policy highlighted d by the government. The understanding for the above by the farmers will definitely contribute to the water management by the farmers.

(3) In addition to the above, the water management training programs should include the rotation irrigation method. Such rotation irrigation method shall be fully applied for distribution of the irrigation water in the rehabilitated irrigation systems, especially for the period of land soaking and land preparation in which much amount of water is required within a limited time. The rotation irrigation method to be trained to the farmers will be based on the method described in the clause 3.3 of Section 3 of Chapter 3 of this Annex-5.

3.4 Formation of Farmer-Irrigator's Group

Under the project, farmer-irrigators' groups shall be organized for each irrigation scheme for smooth water management by the farmers as well as for equal irrigation water distribution under each irrigation scheme. The unit farmer-irrigators' groups shall consist of 20 to 30 farmers who have an average agricultural land of about 0.3 ha, totalling to about 5.0 ha in average. And this unit will be considered as the minimum unit of the farmers groups. Water management and O&M activities by the farmers shall be carried out on the basis of this organization. And each farmer-irrigator's group shall appoint 3 responsible persons to

undertake duties described in the O&M Manual. The number of the farmer-irrigators' groups under each irrigation scheme shall be as follows.

Name of Scheme	Number of Farmer-Irrigators' Groups
Biswambhara	18
Boshan	24
Dakshinkali	14
Indrayani	20
Shali Nadi	30
Total Kathmandu District	106
Bidol	6
Katunje	8
Kutdhal	8
Mahadev Khola	22
Total Bhaktapur District	44
Kotkhu	49
Lubhu	26
Thika Bhairaw-(I)	99
Thika Bhairaw-(II)	18
Total Lalitpur District	192
Grand Total	342

4 PLAN AND DESIGN

4.1 Survey and Mapping

4.1.1 General

Topographic survey with a scale of 1/5,000 covering the command areas of the 13 target irrigation schemes was conducted during January to February 1994 by the topographic survey team dispatched by JICA. In March 1994, JICA study team conducted additional field survey for the 13 target irrigation schemes with the help of the said topographic maps. The information obtained from the said maps was fully utilized for the improvement and rehabilitation plan of the 13 target irrigation schemes. The topographic maps cover about 2,800 ha of the areas. In addition, during March to May 1994, JICA study team conducted supplemental survey (plane table survey and levelling survey) for the existing intake facilities as well as the main canals of the existing 13 target irrigation schemes to obtain additional information necessary for establishment of the improvement and rehabilitation plan of the target 13 irrigation schemes.

4.1.2 Control Survey

As stated earlier, during March to May 1994, JICA study team conducted control survey for the intake sites of the said 13 target irrigation schemes to obtain additional information necessary for design and improvement of the same. The survey included topographic survey for the intake sites and dimension survey for the existing structures at the intake sites.

4.1.3 Canal Survey

In parallel to the above survey, JICA study team conducted supplemental levelling survey along the main canals of the 13 target irrigation schemes, survey for the existing structures on the main canals and cross-sectional survey of the main canals. The results obtained from these survey were fully utilized in the course of preparation of the rehabilitation plan for the target irrigation schemes.

4.1.4 Topographic Survey

As stated above, during January to February 1994, topographic survey with a scale of 1/5,000 was carried out by a survey team dispatched from JICA. The survey included the topographic survey for the areas of about 2,800 ha of the target irrigation schemes.

4.2 Design Criteria

4.2.1 Design Discharge Modules

As mentioned in Section 3.2.1, design discharges of facilities has been estimated as below:

For intake and upstream reaches of main canal:

Zone-A : 0.986 lit./sec./ha.
Zone-B : 0.933 lit./sec./ha.

For downstream reaches of main canal and terminal facilities (secondary and tertiary canal) : 1.306 lit./sec./ha.

Classification of upstream reaches and downstream reaches is shown in the proposed diagram of irrigation system (Fig. 3.2-1* to 3.2-13) and design discharge of each scheme is summarized in Table 4-1.

4.2.2 Diversion Works (Intake)

JICA study team surveyed 18 diversion sites in total. Within these 18 diversion sites, replacement of the intake is proposed for 13 sites, improvement of the intake is proposed for 3 sites and minor improvement of the intake is proposed for 1 site. And no rehabilitation of the intake is proposed for Dhakshinkari (Lower scheme). Design criteria for newly replaced diversion works are summarized in Table 4-1.

4.2.3 Canals

Canal works are classified into 3 categories, i.e., main canal, secondary canal (branch canal) and tertiary canal (main farm ditch) in the planning. For main and secondary canals, 8 types of canals have been proposed as follows.

Type	Discharge(max.) (m^3/sec.)	B (m)	H (m)
Type-1	0.023	0.40	0.30
Type-2	0.040	0.45	0.35
Type-3	0.068	0.50	0.40
Type-4	0.104	0.55	0.45
Type-5	0.150	0.60	0.50
Type-6	0.268	0.70	0.60
Type-7	0.430	0.80	0.70
Type-8	0.530	0.85	0.75

Notes: Shape of section : Rectangular
Design slope of main canal : 1/400
Manning's roughness of coefficient : n=0.017

The thickness of side wall and base slab shall be 10 to 15 cm with reinforcement. Generally, 80 kg of reinforcing bar per 1m3 of concrete should be used.

4.2.4 Canal Structures

Basically, canal structures are proposed to be replaced at the same locations of the existing structures.

a) Field Diversion (Diversion structure for tertiary canal (main farm ditch))

There are several field diversion points with difference of 2 to 5m in elevation between canals and field. In such cases, to keep out waste water and protect erosion of the fields, field diversion structures with small shoots have been proposed instead of normal type.

Type-1 : Normal type
Type-2 : Integrated small shoot type

b) Canal Diversion

Presently, simple canal diversion structures without water control equipment are observed. They have a function of flushing obstacles like gravel, etc. In the rehabilitation plan it has been recommended to put sluice gates to control diversion water for canal diversion structures. Canal diversion structures are classified into 3 types depending on the size of canal.

Type-1 : for Type-1 to Type-2 canals
Type-2 : for Type-3 to Type-5 canals
Type-3 : for Type-6 to Type-8 canals

c) Escape (Side spillway type)

Few escape structures are provided in the existing irrigation schemes. Accordingly, escape structures of the following 3 types should be additionally constructed.

	Length of spillway(m)
Type-1 : for Type-1 to Type-2 canals	0.9
Type-2 : for Type-3 to Type-5 canals	1.3
Type-3 : for Type-6 to Type-7 canals	2.0

d) Drainage Crossing (Super passage)

There observed problems of erosion by drained-water at the downstream of drainage crossings. Accordingly, additional drainage crossings have been proposed to solve the above problems.

e) Catch Drain

Presently, no catch-drains are provided in the existing irrigation systems. Accordingly, additional catch drains with a function of escape have been proposed in the planning.

f) Drop

Drop structures should be replaced with new ones at same the locations where the old drops exist, because it is difficult to acquire additional land for newly planned drop structures.

g) Aqueduct (Open type)

Water leakage is observed from the existing aqueducts. And the length of the existing aqueducts is mostly 3 to 5m. In several schemes (Biswambhara, Shali Nadi, Kutudhal, Thika Bhairaw II), middle size (10-20m) aqueducts are constructed.

In the rehabilitation plan, concrete made aqueducts have been proposed.

h) Road Crossing

Typically, 3 types of road crossing have been proposed depending on the length.

Type-1 : 3m length
Type-2 : 5m length
Type-3 : 7m length

i) Others

There exists 1 siphon structure in Bidol irrigation scheme. Presently, this structure is out of order and needs replacement with new one.

4.2.5 On Farm Facilities

Field diversion box has been newly proposed at an interval of 50m (average) along the tertiary canals (main farm ditches) in the field to control irrigation water in slope area and to divert irrigation water to farm ditches. These farm ditches (small earthen ditches) should be constructed by the farmers.

4.3 Rehabilitation Plan

Rehabilitation plan for 13 schemes is shown in Tables 4-2 and 4-3.

5. PROJECT ORGANIZATION AND IMPLEMENTATION

5.1 Present Organization

At present, district irrigation offices are considered as one of the most important government organizations which are responsible for construction of medium to small scale irrigation schemes in the Valley as well as for rehabilitation of the irrigation schemes with the said scale. And these district irrigation offices are implementing and rehabilitating many small to medium scale irrigation schemes in the Valley and even outside the Valley under the Irrigation Sector Programs (ISP).with the aid of Asian Development Bank, of which first stage started in 1989.

Note: Irrigation Sector Program (ISP) is included in the Irrigation Sector Project. The total project cost is estimated at US $ 47.1 million. The project cost consist of a loan from ADB of US $ 36.3 million, contribution of US $ 4.7 million by HMGN, contribution of US $ 4.4 million by farmers in cash or by labour and grant of US $ 2.01 million by United Nations Development Program (UNDP) for consulting services and training. In the program, priority is given to rehabilitation, extension, and upgrading of the existing framers-managed irrigation schemes as well as to construction of new small and medium-scale gravity irrigation schemes. Originally, as stated earlier, the first phase of the program started in 1989 and is scheduled to be completed by December 1994. Negotiations for the second phase of the program are in progress between HMGN and ADB.

However, at present, these district irrigation offices are suffering from shortage of technical staff and budget allocation especially for O&M of the completed irrigation schemes. These problems are summarized below.

(1) It has been observed that the district irrigation offices in Kathmandu, Bhaktapur and Lalitpur districts do not have enough staff. Usually these offices have 15 to 20 staff including administrative and service staff. However, the technical staff at each DIO are few, usually consisting 3 to 4 technical staff. And these technical staff are now taking care of many medium to small scale irrigation schemes in the Valley. Accordingly, these technical staff should be reinforced by additional man power allocation of 3 technical staff at each DIO in consideration of implementation stage of the project.

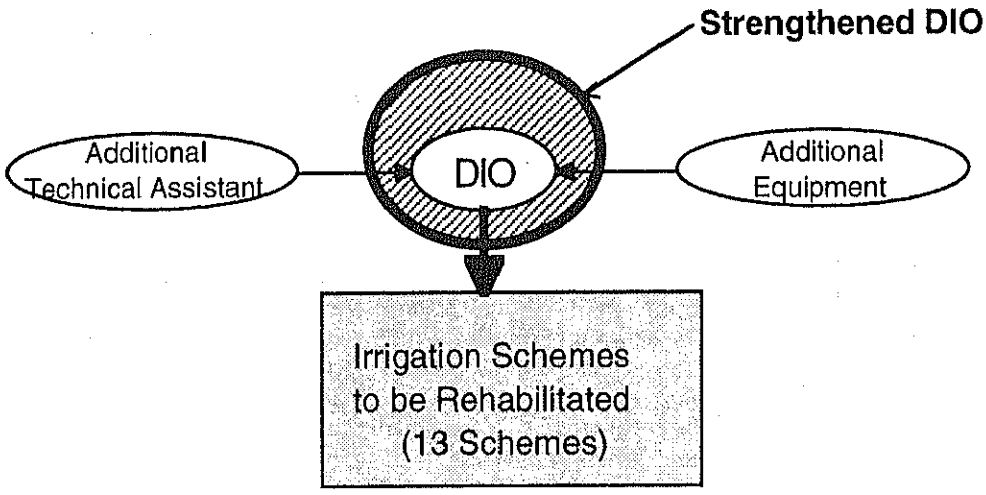
(2) In addition, it may be pointed out that these DoIs do not have enough equipment to implement or rehabilitate even small scale irrigation schemes in the Valley, although some kind of heavy equipment for construction, such as bulldozers, dump tracks, power shovels etc. may be borrowed from Department of Irrigation. However, other than these heavy equipment, it seems necessary that these offices should have such light equipment as jeeps pickup trucks, motor cycles, audio visual sets, survey equipment, tools etc. aiming at improvement in the performance of construction, rehabilitation and O&M of the irrigation facilities.

As a result, it is considered necessary that these district irrigation offices in Kathmandu, Bhaktapur and Lalitpur districts should be reinforced with respect its equipment and technical staff immediately. The recommended equipment to be additionally provided at each DIO are listed in Section 2.3 of Chapter 2 of this Annex-5.

5.2 Proposed Organization for Implementation

Basically, rehabilitation of the 13 target irrigation schemes under the project shall be carried out under the leadership of DIOs which will have more reinforced functions through the project. Accordingly, the said DIOs are considered as main executing government agencies of the project. And they will implement the project in collaboration with Department of Irrigation and the farmers who will receive the benefits from the project. To support the technical staff at each DIO during implementation of the project, it may be recommended to provide a foreign senior technical staff at each DIO from the initial stage of the project. And his main assignment to the project shall be management of the project at various stages. And he will be well-

cooperated with other technical staff of each DIO. To achieve this, it is recommended to provide 3 technical assistant engineers at each DIO additionally. The proposed organization for implementation of the project is shown below.



5.3 Proposed Organization for O&M

In principle, under the project, O&M of the rehabilitated or improved irrigation facilities shall be maintained by all the farmers who will belong to the rehabilitated irrigation schemes. As to the proposed organization for O&M, see Section 3.3.7 of Chapter 3 of the O&M Manual. The basic ideas for the proposed organization are summarized below.

(1) As the basis of the proposed organization, farmer-irrigators' groups (unit organizations) shall be organized under each irrigation scheme and they will consist of 20 to 30 farmers with total agricultural areas to be irrigated of about 5.0 ha. And O&M of the rehabilitated irrigation facilities and water management in the rehabilitated irrigation schemes shall be conducted on the basis of these unit organizations.

(2) These unit organizations shall be guided by the turnout leaders who will be selected from the farmers as is seen from the figure given in the said Section of the O&M Manual.

(3) And these unit organizations shall be combined into a committee of the respective WUAs as is seen from the said figure.

With these basic considerations for organizations for O&M, the O&M and water management under the project shall be carried out, and the committee of WUA is considered to be the top decision-making organization in handling O&M and water management in each irrigation scheme.

5.4 Implementation Method

Implementation of the project shall be made on the following concepts.

(1) The implementing agencies of the project shall be 3 DIOs in the Kathmandu, Bhaktapur, and Lalitpur districts, which are to be reinforced through the project with respect to its equipment and technical staff.

(2) During implementation of the project, DoI as well as the Central Regional Irrigation Directorate (CRID) shall provide necessary assistance to the technical staff of DIO whenever necessary including renting out the heavy equipment possessed by DoI to each DIO. The rehabilitation/improvement works for the project shall be carried out from the intake facilities up to the tertiary canals on the contract basis by the pre-qualified contractors. And the farmers will take part in construction of all the irrigation facilities after the tertiary canals with proper technical guidance by the assistant engineers of DIOs, for which no payment to the farmers shall be basically made.

(3) All the farmers who will receive benefits from the project shall participate in the various stages of the project, i.e., (i) preparatory stage of the project, (ii) construction stage of the project, (iii) handing over stage of the project and (iv) O&M stage of the project. At preparatory stage of the project, the farmers shall receive necessary information and lectures on the project from AOs, the Mobile Irrigation Team (MIT) and assistant engineers of each DIO for smooth implementation of the project and formation of the organizations of different levels which are specified in the O&M Manual.

(4) At the handing over stage of the project, final training and lectures for O&M and water management shall be given by AOs, MIT, assistant technical engineers of DIOs and other senior advisors to the responsible farmers selected from each irrigation scheme. At the same time, on the job training accompanied by the assistant engineers especially for O&M and water management shall be also carried out for the selected farmers.

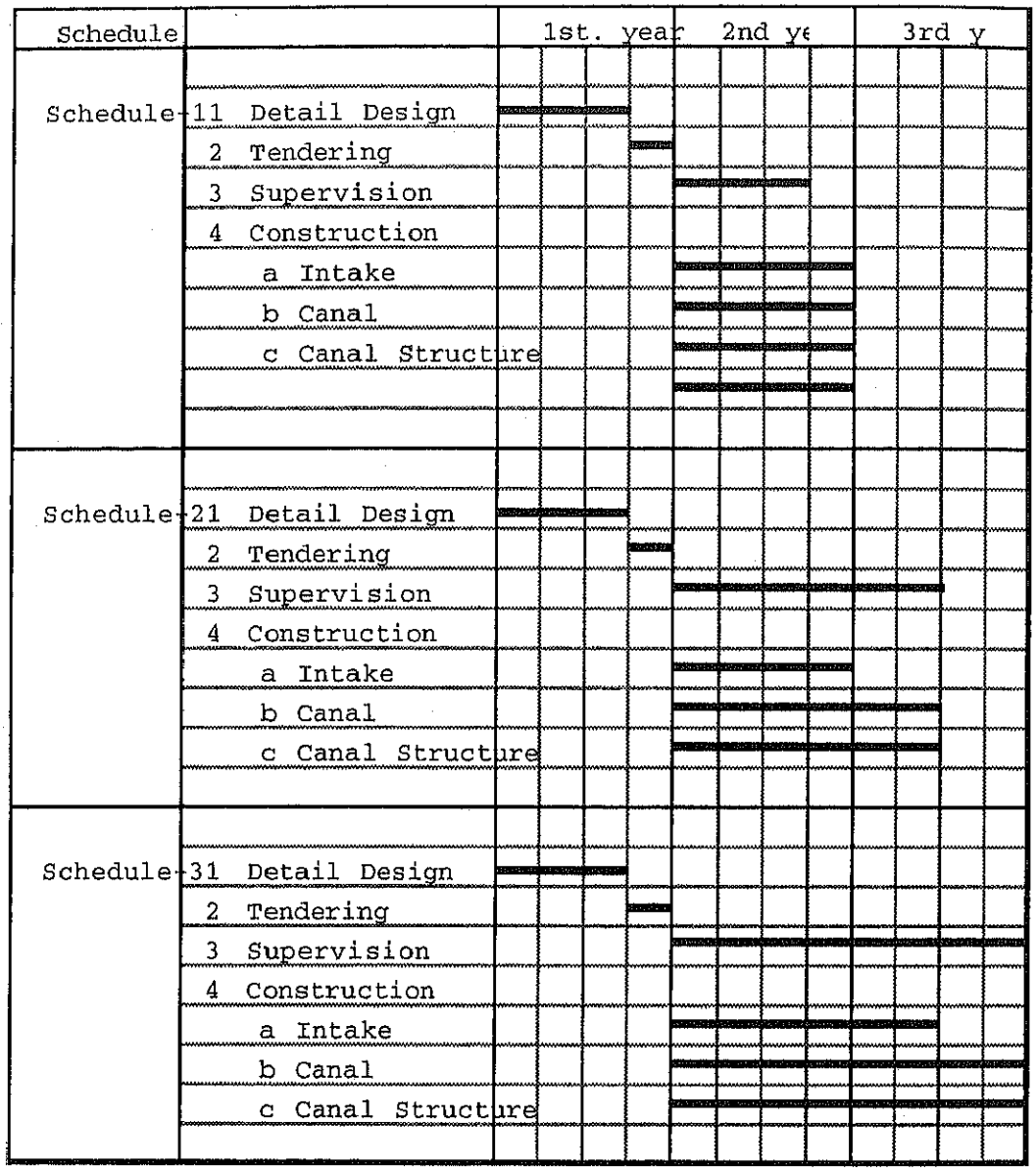
With these concepts, the project should be implemented under the technical and administrative leadership of each DIO in collaboration with DoI, farmers, AOs, MIT, and other technical staff where necessary.

5.5 Implementation Schedule

Implementation of the project shall be carried out according to the following schedule for each irrigation scheme as proposed below.

Schedule -1	Biswambhara, Katunje,	Dhakshinkari, Kutudhal,	Indrayani, Mahadev Khola,	Bidol, Lubhu
Schedule-2	Boshan, Thika Bhairaw II	Shali Nadi,	Kotkhu,	
Schedule-3	Thika Bhairaw I			

Implementation Schedule



6 COSTS ESTIMATES AND DISBURSEMENT SCHEDULE

6.1 Assumptions

In the cost estimates, the following have been taken into account.

(1) Exchange rate

Following exchange rates have been used:
US$ 1.00 = NRs.49.0 = ¥100.0, NRs.1.00 = ¥2.04

(2) Labour's costs

Labour' costs are based on "Labour's Cost of Bhaktapur District. (F.Y. 1994-1995)". Main labour's costs are shown in Table 6-1.

(3) Unit Price of Construction Materials

Unit price of construction materials are based on the prevailing market prices as of May, 1994 as shown in Table 6-2.

(4) Unit Price of Civil Works

Unit price of civil works is estimated based on "Construction Works Rate Analysis Norms, Design Manuals for Irrigation Project in Nepal" prepared by DIO in February, 1990.

6.2 Direct Construction Cost

The direct construction cost includes construction/rehabilitation of intake facilities, canals and other related structures, and temporally work cost. The direct construction cost of each irrigation scheme is summarized as follows and breakdown of the cost is shown in Table 6-3, 6-4 and 6-5.

Direct Construction Cost

(unit : NRs.1,000)

Item	L.C.	F.C.	Total
Biswambhara	8,798	6,466	15,264
Boshan	10,348	7,672	18,020
Dhakshinkari	8,026	6,045	14,071
Indrayani	8,287	6,024	14,311
Shali Nadi	13,517	9,328	22,845
Bidol	6,858	2,890	9,748
Katunje	4,112	3,087	7,199
Kutudhal	5,644	4,105	9,749
Mahadev Khola	14,413	10,645	25,058
Kotkhu	23,500	16,736	40,236
Lubhu	14,614	10,337	24,953
Thika Bhairaw I	60,432	41,296	101,728
Thika Bhairaw II	15,422	10,907	26,329
Total	193,973	135,538	329,511

6.3 Land Acquisition

Though land acquisition is not necessary for the construction/rehabilitation works of intake facilities, canals and other structures, it is necessary for the office building for O&M activities.

Land price and required area for the office building are as follows:

Unit Price : NRs.200,000/ropani (= 0.05ha or 50m^2)
(based on average price by the Inventory Survey)

Required Area : 650 m^2 in total (50m^2 for each office building for 13 schemes)

6.4 Operation and Maintenance Cost

(1) O&M cost for procuring O&M equipment

O&M cost for procuring O&M equipment is summarized as follows and breakdown of the cost is shown in Table 6-6.

(unit : NRs.1,000)

Item	L.C.	F.C.	Total
Equipment for DIO	5,367	10,006	15,373
Equipment for WUA	224	605	829
Building Facilities for WUA	5,129	1,517	6,646
Total	10,720	12,128	22,848

(2) Annual O&M Cost

Daily O&M activities will be carried out by the farmers themselves and O&M cost (Water Charge) for the O&M activities will be collected from the farmers.

Disbursements for the O&M activities are as follows:

Maintenance cost for facilities :	1% of direct construction cost of each scheme per year
Salary for office staff : (Engineer, Accountant)	2-4 members for each O&M office (number of office staff should be decided depending on the scheme volume)
Material cost for monthly information paper :	Paper for print, ink, etc.
Fuel for vehicles :	for patrol and maintenance work (2 vehicles)

Amount of the water charge is estimated from the total amount of O&M cost for the above-mentioned items. And recommendable amount of water charge is proposed as follows:

NRs.100/0.3ha farm land (=1 unit) / month (= NRs.1,200/0.3ha/year)

Annual O&M costs are summarized as follows and breakdown of the annual O&M costs are shown in Table 6-7.

(unit: NRs.)

Scheme	Area (ha.)	Nos of unit	Total amount of collected water charge	Total amount of annual O&M cost
Biswambhara	115	383	460,000	316,635
Boshan	153	510	612,000	350,802
Dhakshinkari	84	280	336,000	251,315
Indrayani	126	420	504,000	309,017
Shali Nadi	196	653	784,000	454,528
Bidol	40	133	160,000	200,435
Katunje	50	167	200,000	176,683
Kutudhal	54	180	216,000	202,879
Mahadev Khola	140	467	560,000	418,921
Kotkhu	308	1027	1,232,000	647,911
Lubhu	163	543	652,000	421,870
Thika Bhairaw-I	621	2070	2,484,000	1,317,251
Thika Bhairaw-II	110	367	440,000	426,415
Total	2,160	7,200	8,640,000	5,694,662

6.5 Other Works and Items

(1) Administration Cost

Administration cost is estimated at 15% of direct construction cost.

(2) Engineering Cost

Engineering cost is estimated at 7% of direct construction cost.

(3) Physical Contingencies

Physical contingencies are estimated at 3% of the total of construction cost.

(4) Price Escalation

Price escalation is estimated at 12.0% for the local currency and 3.9% for the foreign currency.

6.6 Disbursement Schedule

Disbursement schedule has been prepared depending on the implementation schedule (see Section 5.5) and is shown in Table 6-8. Total project costs are summarized in Table 6-9.

Tables

Table 3 - 1 Crop Coefficient (Kc) for Selected Crops

Month	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Growing	Irrigation
Period	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Period	Period
Paddy												*3	#	1.10	1.10	1.10	1.10	1.05	1.05	0.95	0.95	#			120 days	105 days
Paddy (L)														*3	1.10	1.10	1.10	1.10	1.05	1.05	0.95	0.95	#		120 days	105 days
Wheat	0.65	1.05	1.15	1.15	1.15	0.90	0.40	0.00	0.00	#													#	0.43	150 days	105 days
Legume	0.75	0.95	1.05	1.05	0.96	0.00	#															#	0.40	0.50	120 days	90 days
Legume (L)	0.50	0.75	0.95	1.05	1.05	0.96	0.00	#															#	0.40	120 days	90 days
Mustard	0.82	1.00	1.00	0.72	0.00																		0.40	0.40	90 days	75 days
Potatoes	0.66	0.96	1.13	1.10	0.98	0.79																	#	0.44	105 days	75 days
Early Potatoes 1	1.08	0.82																				0.46	0.84	1.13	75 days	60 days
Early Potatoes 2	1.13	1.08	0.82																				0.46	0.84	75 days	60 days
Late Potatoes				0.46	0.84	1.13	1.08	0.82																	75 days	60 days
Maize										#	0.45	0.60	0.80	1.05	1.05	1.05	0.80								105 days	90 days
Summer Vegetables																										
S. Vegetable 1							#	0.34	0.54	0.93	1.05	1.05	1.04	0.91	#										105 days	105 days
S. Vegetable 2									#	0.34	0.54	0.93	1.05	1.05	1.04	0.91	#								105 days	105 days
Winter Vegetables																										
W. Vegetable 1	0.38	0.68	0.92	0.95	0.90	#																	#	0.28	90 days	90 days
W. Vegetable 2	#	0.28	0.38	0.68	0.92	0.95	0.90	#																	90 days	90 days
W. Vegetable 3															#	0.28	0.34	0.54	0.86	0.95	0.95	0.89	#		105 days	105 days
W. Vegetable 4	#																#	0.28	0.34	0.54	0.86	0.95	0.95	0.89	105 days	105 days
W. Vegetable 5	0.94	0.95	0.89	#															#	0.27	0.32	0.42	0.62	0.86	150 days	120 days

Note 1 : Where less than 1/3 of cropping area will be provided before indicated cropping period (shown in #), same coefficient of next period shall be used.

2 : Similarly, after cropping period (shown with #), crop coefficient of previous period shall be used.

3 : Crop coefficient of paddy is after transplanting.

Table 3-2.1 Irrigation Requirement for Paddy

Irrigation Efficiency, etc. :

Deep percolation rate for paddy = 5.0 mm/day Conveyance Efficiency = 80.0%

Field Efficiency for Paddy = 85.0% Irrigation Efficiency for paddy = 68.0%

Month	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern											Nursery / Land Preparation		Transplanting				Paddy			Drain		Harvest				
Eto mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc Paddy													1.10	1.10	1.10	1.10	1.10	1.05	1.05	0.95	0.95	0.95				Paddy
Et = Kc x Eto mm/day													4.90	4.73	4.62	4.46	4.24	3.89	3.62	2.95	2.42	1.95				
Paddy (mm)													73.43	75.68	69.30	71.28	63.53	58.28	54.34	47.12	36.34	29.21			578	mm
Deep Percolation P (mm)											75.00	75.00	75.00	80.00	75.00	80.00	75.00	75.00	75.00	80.00	75.00	75.00			915	mm
Tloos = Et + P (mm)											75.00	75.00	148.43	155.68	144.30	151.28	138.53	133.28	129.34	127.12	111.34	104.21				
Field Irrigation Requirement																										
Area to be irrigated													25%	75%	100%	100%	100%	100%	100%	75%	25%					
Net Et (mm)													18.4	56.8	69.3	71.3	63.5	58.3	54.3	35.3	9.1				436	for Paddy
LP (mm)											150.0	150.0	150.0													
Land preparation area											5%	45%	50%													
Net LP (mm)											7.5	67.5	75.0												150	mm
Area to be irrigated											5%	25%	75%	100%	100%	100%	100%	100%	75%	25%						
Net P (mm)											3.8	18.8	56.3	80.0	75.0	80.0	75.0	75.0	56.3	20.0					540	mm
Potential Eo mm/day	2.30	2.55	3.00	3.85	4.65	5.25	5.70	6.10	6.40	6.55	6.00	5.60	5.35	5.17	5.05	4.90	4.70	4.50	4.25	3.90	3.35	2.75	2.37	2.15		
(mm)	34.50	38.25	45.00	57.75	69.75	78.75	85.50	91.50	96.00	98.25	90.00	84.00	80.25	77.55	75.75	73.50	70.50	67.50	63.75	58.50	50.25	41.25	35.55	32.25	1,596	mm
Area prepared											5%	25%	50%	25%												
Net Eo (mm)											4.5	21.0	40.1	19.4											85	mm
Zone - A																										
Provable Rainfall R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall (mm)	5.44	7.57	6.97	5.61	7.99	15.22	11.48	25.84	38.34	42.84	57.97	83.86	99.54	137.27	107.10	80.71	84.77	45.65	34.94	5.70	0.00	0.00	0.00	0.00	905	mm
Effective Rainfall Re (mm)	0	0	0	0	0	0	0	0	0	0	57.97	75.00	99.54	137.27	107.10	80.71	84.77	45.65	34.94	5.70	0	0	0	0	729	mm
Area to be irrigated											5%	25%	75%	100%	100%	100%	100%	100%	100%	75%	25%					
Net Re (mm)	-	-	-	-	-	-	-	-	-	-	2.9	18.8	74.6	136.8	107.1	80.7	84.8	45.6	34.9	4.3	-	-	-	-	590	mm
Total Net (Et + LP + P + Eo - Re) (mm)	-	-	-	-	-	-	-	-	-	-	12.9	88.5	115.1	19.4	37.2	70.6	53.8	87.6	75.7	51.1	9.1	-	-	-	621	mm
Field Efficiency 85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%		
Field Requirement (mm)	-	-	-	-	-	-	-	-	-	-	15.1	104.1	135.4	22.8	43.8	83.0	63.2	103.1	89.0	60.1	10.7	-	-	-	730	mm
(mm/day)	-	-	-	-	-	-	-	-	-	-	1.01	6.94	9.03	1.43	2.92	5.19	4.22	6.87	5.93	3.76	0.71	-	-	-		
(l/s/ha)	-	-	-	-	-	-	-	-	-	-	0.117	0.803	1.045	0.165	0.338	0.601	0.488	0.795	0.687	0.435	0.082	-	-	-		
Conveyance efficiency 80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement (mm)	-	-	-	-	-	-	-	-	-	-	18.9	130.1	169.3	28.5	54.7	103.8	79.1	128.9	111.3	75.1	13.4	-	-	-	913	mm
(mm/day)	-	-	-	-	-	-	-	-	-	-	1.26	8.68	11.29	1.78	3.65	6.49	5.27	8.59	7.42	4.69	0.89	-	-	-		for Paddy
(l/s/ha)	-	-	-	-	-	-	-	-	-	-	0.146	1.004	1.306	0.206	0.422	0.751	0.610	0.994	0.858	0.543	0.103	-	-	-		in Zone-A
Monthly average (l/s/ha)		-		-		-		-		-		0.575		0.756		0.586		0.802		0.701		0.052		-		
Zone - B																										
Provable Rainfall R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall (mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall Re (mm)	0	0	0	0	0	0	0	0	0	0	75.00	75.00	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0	0	0	0	0	841	mm
Area to be irrigated											5%	25%	75%	100%	100%	100%	100%	100%	100%	75%	25%					
Net Re (mm)	-	-	-	-	-	-	-	-	-	-	3.8	18.8	74.6	136.8	122.2	123.6	91.0	60.4	34.6	-	-	-	-	-	666	mm
Total Net (Et + LP + P + Eo - Re) (mm)	-	-	-	-	-	-	-	-	-	-	12.0	88.5	115.1	19.4	22.1	27.7	47.5	72.9	76.0	55.3	9.1	-	-	-	546	mm
Field Efficiency 85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%		
Field Requirement (mm)	-	-	-	-	-	-	-	-	-	-	14.1	104.1	135.4	22.8	26.0	32.6	55.9	85.8	89.4	65.1	10.7	-	-	-	642	mm
(mm/day)	-	-	-	-	-	-	-	-	-	-	0.94	6.94	9.03	1.43	1.73	2.04	3.73	5.72	5.96	4.07	0.71	-	-	-		
(l/s/ha)	-	-	-	-	-	-	-	-	-	-	0.109	0.803	1.045	0.165	0.200	0.236	0.431	0.662	0.690	0.471	0.082	-	-	-		
Conveyance efficiency 80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement (mm)	-	-	-	-	-	-	-	-	-	-	17.6	130.1	169.3	28.5	32.5	40.8	69.9	107.2	111.8	81.4	13.4	-	-	-	802	mm
(mm/day)	-	-	-	-	-	-	-	-	-	-	1.18	8.68	11.29	1.78	2.16	2.55	4.66	7.15	7.45	5.09	0.89	-	-	-		for Paddy
(l/s/ha)	-	-	-	-	-	-	-	-	-	-	0.136	1.004	1.306	0.206	0.251	0.295	0.539	0.827	0.862	0.589	0.103	-	-	-		in Zone-B
Monthly average (l/s/ha)		-		-		-		-		-		0.570		0.756		0.273		0.683		0.726		0.052		-		

Table 3-2.2 Irrigation Requirement for Paddy (L)

Irrigation Efficiency, etc. :

Deep percolation rate for paddy = 5.0 mm/day Conveyance Efficiency = 80.0%

Field Efficiency for Paddy = 85.0% Irrigation Efficiency for paddy = 68.0%

Month	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern													Nursery / Land Preparation		Transplanting		Paddy (L)					Drain	Harvest			
Eto mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64 mm/day	
(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328 mm	
Kc Paddy (L)															1.10	1.10	1.10	1.10	1.05	1.05	0.95	0.95	0.95			Paddy (L)
Et = Kc x Eto mm/day															4.62	4.46	4.24	4.07	3.62	3.26	2.42	1.95	1.71			
Paddy (L) (mm)															69.30	71.28	63.53	61.05	54.34	52.08	36.34	29.21	25.65		463 mm	
Deep Percolation P (mm)													75.00	80.00	75.00	80.00	75.00	75.00	75.00	80.00	75.00	75.00	75.00		840 mm	
Tloos = Et + P (mm)													75.00	80.00	144.30	151.28	138.53	136.05	129.34	132.08	111.34	104.21	100.65			
Field Irrigation Requirement																										
Area to be irrigated															50%	100%	100%	100%	100%	100%	100%	50%				
Net Et (mm)															34.7	71.3	63.5	61.1	54.3	52.1	36.3	14.6			388 for Paddy (L)	
LP (mm)													150.0	150.0												
Land preparation area													5%	95%												
Net LP (mm)													7.5	142.5											150 mm	
Area to be irrigated													5%	50%	100%	100%	100%	100%	100%	100%	50%					
Net P (mm)													3.8	40.0	75.0	80.0	75.0	75.0	75.0	80.0	37.5				541 mm	
Potential Eo mm/day	2.30	2.55	3.00	3.85	4.65	5.25	5.70	6.10	6.40	6.55	6.00	5.60	5.35	5.17	5.05	4.90	4.70	4.50	4.25	3.90	3.35	2.75	2.37	2.15		
(mm)	34.50	38.25	45.00	57.75	69.75	78.75	85.50	91.50	96.00	98.25	90.00	84.00	80.25	77.55	75.75	73.50	70.50	67.50	63.75	58.50	50.25	41.25	35.55	32.25	1,596 mm	
Area prepared													5%	50%	50%											
Net Eo (mm)													4.0	38.8	37.9										81 mm	
Zone - A																										
Provable Rainfall R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215 mm	
Potential Effect. Rainfall (mm)	5.44	7.57	6.97	5.61	7.99	15.22	11.48	25.84	38.34	42.84	57.97	83.86	99.54	137.27	107.10	80.71	84.77	45.65	34.94	5.70	0.00	0.00	0.00	0.00	905 mm	
Effective Rainfall Re (mm)	0	0	0	0	0	0	0	0	0	0	0	0	75.00	80.00	107.10	80.71	84.77	45.65	34.94	5.70	0	0	0	0	514 mm	
Area to be irrigated													5%	50%	100%	100%	100%	100%	100%	100%	100%	50%				
Net Re (mm)	-	-	-	-	-	-	-	-	-	-	-	-	3.8	40.0	107.1	80.7	84.8	45.6	34.9	5.7	-	-	-	-	403 mm	
Total Net (Et + LP + P + Eo - Re)																										
(mm)	-	-	-	-	-	-	-	-	-	-	-	-	11.5	181.3	40.4	70.6	53.8	90.4	94.4	126.4	73.8	14.6	-	-	757 mm	
Field Efficiency 85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%		
Field Requirement (mm)	-	-	-	-	-	-	-	-	-	-	-	-	13.5	213.3	47.6	83.0	63.2	106.4	111.1	148.7	86.9	17.2	-	-	891 mm	
(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	0.90	13.33	3.17	5.19	4.22	7.09	7.40	9.29	5.79	1.15	-	-		
(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	0.105	1.543	0.367	0.601	0.488	0.821	0.857	1.076	0.670	0.133	-	-		
Conveyance efficiency 80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement (mm)	-	-	-	-	-	-	-	-	-	-	-	-	16.9	266.6	59.4	103.8	79.1	132.9	138.8	185.9	108.6	21.5	-	-	1,113 mm	
(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	1.13	16.66	3.96	6.49	5.27	8.86	9.26	11.62	7.24	1.43	-	-	for Paddy (L)	
(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	0.131	1.928	0.459	0.751	0.610	1.026	1.071	1.344	0.838	0.166	-	-	in Zone-A	
Monthly average (l/s/ha)		-		-		-		-		-		-		1.030		0.605		0.818		1.208		0.502		-		
Zone - B																										
Provable Rainfall R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364 mm	
Potential Effect. Rainfall (mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007 mm	
Effective Rainfall Re (mm)	0	0	0	0	0	0	0	0	0	0	0	0	75.00	80.00	122.22	123.55	91.00	60.35	34.60	0	0	0	0	0	587 mm	
Area to be irrigated													5%	50%	100%	100%	100%	100%	100%	100%	100%	50%				
Net Re (mm)	-	-	-	-	-	-	-	-	-	-	-	-	3.8	40.0	109.7	123.6	91.0	60.4	34.6	-	-	-	-	-	463 mm	
Total Net (Et + LP + P + Eo - Re)																										
(mm)	-	-	-	-	-	-	-	-	-	-	-	-	11.5	181.3	37.9	27.7	47.5	75.7	94.7	132.1	73.8	14.6	-	-	697 mm	
Field Efficiency 85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%		
Field Requirement (mm)	-	-	-	-	-	-	-	-	-	-	-	-	13.5	213.3	44.6	32.6	55.9	89.1	111.5	155.4	86.9	17.2	-	-	820 mm	
(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	0.90	13.33	2.97	2.04	3.73	5.94	7.43	9.71	5.79	1.15	-	-		
(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	0.105	1.543	0.344	0.236	0.431	0.687	0.860	1.124	0.670	0.133	-	-		
Conveyance efficiency 80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement (mm)	-	-	-	-	-	-	-	-	-	-	-	-	16.9	266.6	55.7	40.8	69.9	111.3	139.3	194.2	108.6	21.5	-	-	1,025 mm	
(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	1.13	16.66	3.71	2.55	4.66	7.42	9.29	12.14	7.24	1.43	-	-	for Paddy (L)	
(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	0.131	1.928	0.430	0.295	0.539	0.859	1.075	1.405	0.838	0.166	-	-	in Zone-B	
Monthly average (l/s/ha)		-		-		-		-		-		-		1.030		0.362		0.699		1.240		0.502		-		

Table 3-2.3 Irrigation Requirement for Wheat

Irrigation Efficiency, etc. :

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern			Wheat			Terminate Irrigation				Harvest																	
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64 mm/day	
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328 mm	
Kc	Wheat	0.65	1.05	1.15	1.15	1.15	0.90	0.40	0.00	0.00	0.00													0.43	0.43	Wheat	
Et = Kc x Eto	mm/day	1.12	2.03	2.76	3.51	4.37	3.96	1.90																0.77	0.69		
Wheat	(mm)	16.87	32.42	41.40	45.60	65.55	63.36	28.50																11.61	11.01	316 mm	
Deep Percolation P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 mm	
Tloos = Et + P	(mm)	16.87	32.42	41.40	45.60	65.55	63.36	28.50																11.61	11.01		
Field Irrigation Requirement																											
Area to be irrigated		100%	100%	100%	100%	100%	75%	25%																25%	75%		
Net Et	(mm)	16.9	32.4	41.4	45.6	65.6	47.5	7.1																2.9	8.3	268 for Wheat	
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0 mm	
Zone - A																											
Provable Rainfall R80	(mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215 mm	
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850 mm	
Effective Rainfall Re	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50 mm	
Area to be irrigated		100%	100%	100%	100%	100%	75%	25%																25%	75%		
Net Re	(mm)	4.5	6.2	5.7	4.6	6.6	9.4	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39 mm	
Total Net (Et + P - Re)	(mm)	12.4	26.2	35.7	41.0	59.0	38.1	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9	8.3	228 mm	
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	20.6	43.7	59.4	68.3	98.3	63.5	7.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8	13.8	380 mm	
	(mm/day)	1.38	2.73	3.96	5.25	6.55	3.97	0.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.32	0.86		
	(l/s/ha)	0.159	0.316	0.459	0.608	0.758	0.460	0.061	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.037	0.100		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	25.8	54.6	74.3	85.4	122.9	79.4	9.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.0	17.2	475 mm	
	(mm/day)	1.72	3.41	4.95	6.57	8.19	4.96	0.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40	1.08	for Wheat	
	(l/s/ha)	0.199	0.395	0.573	0.760	0.948	0.575	0.077	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.047	0.124	in Zone-A	
Monthly average	(l/s/ha)		0.297		0.667		0.761		0.038		-		-		-		-		-		-		-		0.086		
Zone - B																											
Provable Rainfall R80	(mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364 mm	
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007 mm	
Effective Rainfall Re	(mm)	0	6.715	9.18	7.82	9.435	9.605	6.545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49 mm	
Area to be irrigated		100%	100%	100%	100%	100%	75%	25%																25%	75%		
Net Re	(mm)	-	6.7	9.2	7.8	9.4	7.2	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42 mm	
Total Net (Et + P - Re)	(mm)	16.9	25.7	32.2	37.8	56.1	40.3	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9	8.3	226 mm	
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	28.1	42.8	53.7	63.0	93.5	67.2	9.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8	13.8	376 mm	
	(mm/day)	1.87	2.68	3.58	4.84	6.24	4.20	0.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.32	0.86		
	(l/s/ha)	0.217	0.310	0.414	0.561	0.722	0.486	0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.037	0.100		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	35.1	53.6	67.1	78.7	116.9	84.0	11.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.0	17.2	470 mm	
	(mm/day)	2.34	3.35	4.48	6.05	7.79	5.25	0.76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40	1.08	for Wheat	
	(l/s/ha)	0.271	0.387	0.518	0.701	0.902	0.608	0.088	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.047	0.124	in Zone-B	
Monthly average	(l/s/ha)		0.329		0.609		0.755		0.044		-		-		-		-		-		-		-		0.086		

Table 3-2.4 Irrigation Requirement for Legume

Irrigation Efficiency, etc. :

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.	Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	
Cropping Pattern		Legume				Terminate Irrigation		Harvest																		
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64 mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328 mm
Kc	Legume	0.75	0.95	1.05	1.05	0.96	0.00	0.00															0.40	0.40	0.50	Legume
Et = Kc x Eto	mm/day	1.30	1.83	2.52	3.20	3.65																	0.82	0.72	0.80	
Legume	(mm)	19.46	29.34	37.80	41.63	54.72																	12.30	10.80	12.80	219 mm
Deep Percolation P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 mm
Tloos = Et + P	(mm)	19.46	29.34	37.80	41.63	54.72																	12.30	10.80	12.80	
Field Irrigation Requirement																										
Area to be irrigated		100%	100%	75%	25%																		25%	75%	100%	
Net Et	(mm)	19.5	29.3	28.4	10.4																		3.1	8.1	12.8	112 for Legume
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Net P	(mm)																									0 mm
Zone - A																										
Provable Rainfall R80	(mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215 mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850 mm
Effective Rainfall Re	(mm)	4.48	6.23	5.74	4.62	6.58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28 mm
Area to be irrigated		100%	100%	75%	25%																		25%	75%	100%	
Net Re	(mm)	4.5	6.2	4.3	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16 mm
Total Net (Et + P - Re)	(mm)	15.0	23.1	24.0	9.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.1	8.1	12.8	95 mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	
Field Requirement	(mm)	25.0	38.5	40.1	15.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	13.5	21.3	159 mm
	(mm/day)	1.66	2.41	2.67	1.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.34	0.90	1.33	
	(l/s/ha)	0.193	0.279	0.309	0.137	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.040	0.104	0.154	
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	
Diversion Requirement	(mm)	31.2	48.1	50.1	19.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	16.9	26.7	199 mm
	(mm/day)	2.08	3.01	3.34	1.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.43	1.13	1.67	for Legume
	(l/s/ha)	0.241	0.348	0.387	0.172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.049	0.130	0.193	in Zone-A
Monthly average	(l/s/ha)		0.295		0.279		-		-		-		-		-		-		-		-		0.025		0.162	
Zone - B																										
Provable Rainfall R80	(mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364 mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007 mm
Effective Rainfall Re	(mm)	0	6.715	9.18	7.82	9.435	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33 mm
Area to be irrigated		100%	100%	75%	25%																		25%	75%	100%	
Net Re	(mm)	-	6.7	6.9	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16 mm
Total Net (Et + P - Re)	(mm)	19.5	22.6	21.5	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.1	8.1	12.8	96 mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	
Field Requirement	(mm)	32.4	37.7	35.8	14.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	13.5	21.3	160 mm
	(mm/day)	2.16	2.36	2.39	1.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.34	0.90	1.33	
	(l/s/ha)	0.250	0.273	0.276	0.125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.040	0.104	0.154	
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	
Diversion Requirement	(mm)	40.5	47.1	44.7	17.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	16.9	26.7	200 mm
	(mm/day)	2.70	2.95	2.98	1.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.43	1.13	1.67	for Legume
	(l/s/ha)	0.313	0.341	0.345	0.157	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.049	0.130	0.193	in Zone-B
Monthly average	(l/s/ha)		0.327		0.251		-		-		-		-		-		-		-		-		0.025		0.162	

Table 3-2.5 Irrigation Requirement for Legume (L)

Irrigation Efficiency, etc.:

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern		Legume (L)				Terminate Irrigation			Harvest																		
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc	Legume (L)	0.50	0.75	0.95	1.05	1.05	0.96	0.00	0.00															0.40	0.40		Legume (L)
Et = Kc x Eto	mm/day	0.87	1.45	2.28	3.20	3.99	4.22																	0.72	0.64		
Legume (L)	(mm)	12.98	23.16	34.20	41.63	59.85	67.58																	10.80	10.24	260	mm
Deep Percolation	P (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Tloos = Et + P	(mm)	12.98	23.16	34.20	41.63	59.85	67.58																	10.80	10.24		
Field Irrigation Requirement																											
Area to be irrigated		100%	100%	100%	75%	25%																		25%	75%		
Net Et	(mm)	13.0	23.2	34.2	31.2	15.0																		2.7	7.7	127	for Legume (L)
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0	mm
Zone - A																											
Provable Rainfall	R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall	Re (mm)	4.48	6.23	5.74	4.62	6.58	12.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	mm
Area to be irrigated		100%	100%	100%	75%	25%																		25%	75%		
Net Re	(mm)	4.5	6.2	5.7	3.5	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	mm
Total Net (Et + P - Re)																											
	(mm)	8.5	16.9	28.5	27.8	13.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.7	7.7	105	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	14.2	28.2	47.4	46.3	22.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	12.8	176	mm
	(mm/day)	0.94	1.76	3.16	3.56	1.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30	0.80		
	(l/s/ha)	0.109	0.204	0.366	0.412	0.171	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.035	0.093		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	17.7	35.3	59.3	57.8	27.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.6	16.0	219	mm
	(mm/day)	1.18	2.20	3.95	4.45	1.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.38	1.00		for Legume (L)
	(l/s/ha)	0.137	0.255	0.457	0.515	0.214	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.043	0.116		in Zone-A
Monthly average	(l/s/ha)		0.196		0.486		0.107		-		-		-		-		-		-		-		-		0.080		
Zone - B																											
Provable Rainfall	R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall	Re (mm)	0	6.715	9.18	7.82	9.435	9.605	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	mm
Area to be irrigated		100%	100%	100%	75%	25%																		25%	75%		
Net Re	(mm)	-	6.7	9.2	5.9	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	mm
Total Net (Et + P - Re)																											
	(mm)	13.0	16.4	25.0	25.4	12.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.7	7.7	103	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	21.6	27.4	41.7	42.3	21.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	12.8	171	mm
	(mm/day)	1.44	1.71	2.78	3.25	1.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30	0.80		
	(l/s/ha)	0.167	0.198	0.322	0.376	0.162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.035	0.093		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	27.0	34.3	52.1	52.8	26.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.6	16.0	214	mm
	(mm/day)	1.80	2.14	3.48	4.06	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.38	1.00		for Legume (L)
	(l/s/ha)	0.209	0.248	0.402	0.470	0.203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.043	0.116		in Zone-B
Monthly average	(l/s/ha)		0.228		0.436		0.101		-		-		-		-		-		-		-		-		0.080		

Table 3-2.6 Irrigation Requirement for Mustard

Irrigation Efficiency, etc. :
Field Efficiency for upland crops = 60.0%
Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern		Mustard			Terminate Irrigation	Harvest																					
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc	Mustard	0.82	1.00	1.00	0.72	0.00																		0.40	0.40		Mustard
Et = Kc x Eto	mm/day	1.42	1.93	2.40	2.20																			0.72	0.64		
Mustard	(mm)	21.28	30.88	36.00	28.55																			10.80	10.24	138	mm
Deep Percolation P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Tloos = Et + P	(mm)	21.28	30.88	36.00	28.55																			10.80	10.24		
Field Irrigation Requirement																											
Area to be irrigated		100%	100%	100%	50%																			50%	100%		
Net Et	(mm)	21.3	30.9	36.0	14.3																			5.4	10.2	118	for Mustard
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0	mm
Zone - A																											
Provable Rainfall R80	(mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall Re	(mm)	4.48	6.23	5.74	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	mm
Area to be irrigated		100%	100%	100%	50%																			50%	100%		
Net Re	(mm)	4.5	6.2	5.7	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	mm
Total Net (Et + P - Re)																											
	(mm)	16.8	24.7	30.3	12.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4	10.2	99	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	28.0	41.1	50.4	19.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.0	17.1	166	mm
	(mm/day)	1.87	2.57	3.36	1.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.60	1.07		
	(l/s/ha)	0.216	0.297	0.389	0.178	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.069	0.123		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	35.0	51.4	63.0	24.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.3	21.3	207	mm
	(mm/day)	2.33	3.21	4.20	1.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.75	1.33		for Mustard
	(l/s/ha)	0.270	0.371	0.486	0.222	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.087	0.154		in Zone-A
Monthly average	(l/s/ha)		0.321		0.354		-		-		-		-		-		-		-		-		-		0.121		
Zone - B																											
Provable Rainfall R80	(mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall Re	(mm)	0	6.715	9.18	7.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	mm
Area to be irrigated		100%	100%	100%	50%																			50%	100%		
Net Re	(mm)	-	6.7	9.2	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	mm
Total Net (Et + P - Re)																											
	(mm)	21.3	24.2	26.8	10.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4	10.2	98	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	35.5	40.3	44.7	17.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.0	17.1	164	mm
	(mm/day)	2.36	2.52	2.98	1.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.60	1.07		
	(l/s/ha)	0.274	0.291	0.345	0.154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.069	0.123		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	44.3	50.3	55.9	21.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.3	21.3	205	mm
	(mm/day)	2.96	3.15	3.73	1.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.75	1.33		for Mustard
	(l/s/ha)	0.342	0.364	0.431	0.192	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.087	0.154		in Zone-B
Monthly average	(l/s/ha)		0.353		0.312		-		-		-		-		-		-		-		-		-		0.121		

Table 3-2.7 Irrigation Requirement for Potatoes

Irrigation Efficiency, etc. :
Field Efficiency for upland crops = 60.0%
Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern			Potatoes			Terminate Irrigation	Harvest																				
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc	Potatoes	0.66	0.96	1.13	1.10	0.98	0.79																	0.44	0.44		Potatoes
Et = Kc x Eto	mm/day	1.14	1.85	2.71	3.36	3.72	3.48																	0.79	0.70		
Potatoes	(mm)	17.13	29.64	40.68	43.62	55.86	55.62																	11.88	11.26	266	mm
Deep Percolation	P (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Tloos = Et + P	(mm)	17.13	29.64	40.68	43.62	55.86	55.62																	11.88	11.26		
Field Irrigation Requirement																											
Area to be irrigated		100%	100%	100%	75%	25%																		25%	75%		
Net Et	(mm)	17.1	29.6	40.7	32.7	14.0																		3.0	8.4	146	for Potatoes
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0	mm
Zone - A																											
Provable Rainfall	R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall	Re (mm)	4.48	6.23	5.74	4.62	6.58	12.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	mm
Area to be irrigated		100%	100%	100%	75%	25%																		25%	75%		
Net Re	(mm)	4.5	6.2	5.7	3.5	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	mm
Total Net (Et + P - Re)	(mm)	12.6	23.4	34.9	29.2	12.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0	8.4	124	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	21.1	39.0	58.2	48.7	20.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	14.1	207	mm
	(mm/day)	1.41	2.44	3.88	3.75	1.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.33	0.88		
	(l/s/ha)	0.163	0.282	0.449	0.434	0.158	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.038	0.102		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	26.3	48.8	72.8	60.9	25.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	17.6	258	mm
	(mm/day)	1.76	3.05	4.85	4.69	1.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41	1.10		for Potatoes
	(l/s/ha)	0.203	0.353	0.562	0.542	0.198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.048	0.127		in Zone-A
Monthly average	(l/s/ha)		0.278		0.552		0.099		-		-		-		-		-		-		-		-		0.088		
Zone - B																											
Provable Rainfall	R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall	Re (mm)	0	6.715	9.18	7.82	9.435	9.605	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	mm
Area to be irrigated		100%	100%	100%	75%	25%																		25%	75%		
Net Re	(mm)	-	6.7	9.2	5.9	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	mm
Total Net (Et + P - Re)	(mm)	17.1	22.9	31.5	26.8	11.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0	8.4	121	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	28.5	38.2	52.5	44.7	19.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	14.1	202	mm
	(mm/day)	1.90	2.39	3.50	3.44	1.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.33	0.88		
	(l/s/ha)	0.220	0.276	0.405	0.398	0.149	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.038	0.102		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	35.7	47.8	65.6	55.9	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	17.6	253	mm
	(mm/day)	2.38	2.99	4.38	4.30	1.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41	1.10		for Potatoes
	(l/s/ha)	0.275	0.346	0.506	0.498	0.187	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.048	0.127		in Zone-B
Monthly average	(l/s/ha)		0.310		0.502		0.093		-		-		-		-		-		-		-		-		0.088		

Table 3-2.8 Irrigation Requirement for Early Potatoes-1

Irrigation Efficiency, etc. :

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.	Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	
Cropping Pattern		Early Potatoes-1		Harvest / Terminate Irrigation																			Early Potatoes-1			
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64 mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328 mm
Kc	Early Potatoes-1	1.08	0.82																				0.46	0.84	1.13	Early Potatoes-1
Et = Kc x Eto	mm/day	1.87	1.58																				0.94	1.51	1.81	
Early Potatoes-1	(mm)	28.03	25.32																				14.15	22.68	28.93	119 mm
Deep Percolation P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 mm
Tloos = Et + P	(mm)	28.03	25.32																				14.15	22.68	28.93	
Field Irrigation Requirement																										
Area to be irrigated		100%	50%																				50%	100%	100%	
Net Et	(mm)	28.0	12.7																				7.1	22.7	28.9	99 for Early Potatoes-1
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Net P	(mm)																									0 mm
Zone - A																										
Provable Rainfall R80	(mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215 mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850 mm
Effective Rainfall Re	(mm)	4.48	6.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11 mm
Area to be irrigated		100%	50%																				50%	100%	100%	
Net Re	(mm)	4.5	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8 mm
Total Net (Et + P - Re)	(mm)	23.5	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.1	22.7	28.9	92 mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	
Field Requirement	(mm)	39.2	15.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.8	37.8	48.2	153 mm
	(mm/day)	2.62	0.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.79	2.52	3.01	
	(l/s/ha)	0.303	0.115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.091	0.292	0.349	
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	
Diversion Requirement	(mm)	49.1	19.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.7	47.3	60.3	191 mm
	(mm/day)	3.27	1.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.98	3.15	3.77	for Early Potatoes-1
	(l/s/ha)	0.379	0.144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.114	0.365	0.436	in Zone-A
Monthly average	(l/s/ha)		0.261		-		-		-		-		-		-		-		-		-		0.057		0.400	
Zone - B																										
Provable Rainfall R80	(mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364 mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007 mm
Effective Rainfall Re	(mm)	0	6.715	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7 mm
Area to be irrigated		100%	50%																				50%	100%	100%	
Net Re	(mm)	-	3.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3 mm
Total Net (Et + P - Re)	(mm)	28.0	9.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.1	22.7	28.9	96 mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	
Field Requirement	(mm)	46.7	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.8	37.8	48.2	160 mm
	(mm/day)	3.11	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.79	2.52	3.01	
	(l/s/ha)	0.360	0.112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.091	0.292	0.349	
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	
Diversion Requirement	(mm)	58.4	19.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.7	47.3	60.3	200 mm
	(mm/day)	3.89	1.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.98	3.15	3.77	for Early Potatoes-1
	(l/s/ha)	0.451	0.140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.114	0.365	0.436	in Zone-B
Monthly average	(l/s/ha)		0.295		-		-		-		-		-		-		-		-		-		0.057		0.400	

Table 3-2.9 Irrigation Requirement for Early Potatoes-2

Irrigation Efficiency, etc. :

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern		Early Potatoes-2		Harvest / Terminate Irrigation																							
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc	Early Potatoes-2	1.13	1.08	0.82																				0.46	0.84		Early Potatoes-2
Et = Kc x Eto	mm/day	1.95	2.08	1.97																				0.83	1.34		
Early Potatoes-2	(mm)	29.32	33.35	29.52																				12.42	21.50	126	mm
Deep Percolation P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Tloos = Et + P	(mm)	29.32	33.35	29.52																				12.42	21.50		
Field Irrigation Requirement																											
Area to be irrigated		100%	100%	50%																				50%	100%		
Net Et	(mm)	29.3	33.4	14.8																				6.2	21.5	105	for Early Potatoes-2
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0	mm
Zone - A																											
Provable Rainfall R80	(mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall Re	(mm)	4.48	6.23	5.74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	mm
Area to be irrigated		100%	100%	50%																				50%	100%		
Net Re	(mm)	4.5	6.2	2.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	mm
Total Net (Et + P - Re)	(mm)	24.8	27.1	11.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	21.5	92	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	41.4	45.2	19.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.4	35.8	153	mm
	(mm/day)	2.76	2.83	1.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.69	2.24		
	(l/s/ha)	0.319	0.327	0.153	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.080	0.259		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	51.8	56.5	24.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.9	44.8	191	mm
	(mm/day)	3.45	3.53	1.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.86	2.80		for Early Potatoes-2
	(l/s/ha)	0.399	0.409	0.191	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.100	0.324		in Zone-A
Monthly average	(l/s/ha)		0.404		0.096		-		-		-		-		-		-		-		-		-		0.212		
Zone - B																											
Provable Rainfall R80	(mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall Re	(mm)	0	6.715	9.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	mm
Area to be irrigated		100%	100%	50%																				50%	100%		
Net Re	(mm)	-	6.7	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	mm
Total Net (Et + P - Re)	(mm)	29.3	26.6	10.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	21.5	94	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	48.9	44.4	17.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.4	35.8	156	mm
	(mm/day)	3.26	2.77	1.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.69	2.24		
	(l/s/ha)	0.377	0.321	0.131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.080	0.259		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	61.1	55.5	21.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.9	44.8	196	mm
	(mm/day)	4.07	3.47	1.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.86	2.80		for Early Potatoes-2
	(l/s/ha)	0.471	0.401	0.163	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.100	0.324		in Zone-B
Monthly average	(l/s/ha)		0.436		0.082		-		-		-		-		-		-		-		-		-		0.212		

Table 3-2.10 Irrigation Requirement for Late Potatoes

Irrigation Efficiency, etc. :
Field Efficiency for upland crops = 60.0%
Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern					Late Potatoes				Harvest / Terminate Irrigation																		
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc	Late Potatoes				0.46	0.84	1.13	1.08	0.82																		Late Potatoes
Et = Kc x Eto	mm/day				1.40	3.19	4.97	5.13	4.29																		
Late Potatoes	(mm)				18.24	47.88	79.55	76.95	64.33																	287	mm
Deep Percolation	P (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Tloss = Et + P	(mm)				18.24	47.88	79.55	76.95	64.33																		
Field Irrigation Requirement																											
Area to be irrigated					50%	100%	100%	100%	50%																		
Net Et	(mm)				9.1	47.9	79.6	77.0	32.2																	246	for Late Potatoes
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0	mm
Zone - A																											
Provable Rainfall	R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall	Re (mm)	0	0	0	4.62	6.58	12.53	9.45	21.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	mm
Area to be irrigated					50%	100%	100%	100%	50%																		
Net Re	(mm)	-	-	-	2.3	6.6	12.5	9.5	10.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	mm
Total Net (Et + P - Re)																											
	(mm)	-	-	-	6.8	41.3	67.0	67.5	21.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	204	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	11.3	68.8	111.7	112.5	35.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	340	mm
	(mm/day)	-	-	-	0.87	4.59	6.98	7.50	2.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	-	-	-	0.101	0.531	0.808	0.868	0.277	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	14.2	86.0	139.6	140.6	44.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	425	mm
	(mm/day)	-	-	-	1.09	5.74	8.73	9.38	2.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		for Late Potatoes
	(l/s/ha)	-	-	-	0.126	0.664	1.010	1.085	0.346	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		in Zone-A
Monthly average	(l/s/ha)		-		0.063		0.837		0.716		-		-		-		-		-		-		-		-		
Zone - B																											
Provable Rainfall	R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall	Re (mm)	0	0	0	7.82	9.435	9.605	6.545	28.56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	mm
Area to be irrigated					50%	100%	100%	100%	50%																		
Net Re	(mm)	-	-	-	3.9	9.4	9.6	6.5	14.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44	mm
Total Net (Et + P - Re)																											
	(mm)	-	-	-	5.2	38.4	69.9	70.4	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	202	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	8.7	64.1	116.6	117.3	29.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	336	mm
	(mm/day)	-	-	-	0.67	4.27	7.29	7.82	1.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	-	-	-	0.077	0.494	0.843	0.905	0.230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	10.9	80.1	145.7	146.7	37.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	421	mm
	(mm/day)	-	-	-	0.83	5.34	9.11	9.78	2.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		for Late Potatoes
	(l/s/ha)	-	-	-	0.097	0.618	1.054	1.132	0.287	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		in Zone-B
Monthly average	(l/s/ha)		-		0.048		0.836		0.710		-		-		-		-		-		-		-		-		

Table 3-2.11 Irrigation Requirement for Maize

Irrigation Efficiency, etc. :

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec			
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Annual	Remarks
Cropping Pattern															Maize				Terminate Irrigation		Harvest						
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc Maize												0.45	0.45	0.60	0.80	1.05	1.05	1.05	0.80								Maize
Et = Kc x Eto	mm/day											2.32	2.09	2.67	3.44	4.41	4.25	4.04	2.96								
Maize	(mm)											34.76	31.39	40.05	55.04	66.15	68.04	60.64	44.40							400	mm
Deep Percolation P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Tloos = Et + P	(mm)											34.76	31.39	40.05	55.04	66.15	68.04	60.64	44.40								
Field Irrigation Requirement																											
Area to be irrigated												25%	75%	100%	100%	100%	100%	75%	25%								
Net Et	(mm)											8.7	23.5	40.1	55.0	66.2	68.0	45.5	11.1							318	for Maize
Area to be irrigated																											
Net P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Zone - A																											
Provable Rainfall R80	(mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall Re	(mm)	0	0	0	0	0	0	0	0	0	0	34.763	31.388	40.05	55.04	66.15	68.04	60.638	37.59	0	0	0	0	0	0	394	mm
Area to be irrigated												25%	75%	100%	100%	100%	100%	75%	25%								
Net Re	(mm)	-	-	-	-	-	-	-	-	-	-	8.7	23.5	40.1	55.0	66.2	68.0	45.5	9.4	-	-	-	-	-	-	316	mm
Total Net (Et + P - Re)																											
	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	-	-	-	-	-	-	2	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.8	-	-	-	-	-	-	3	mm
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19	-	-	-	-	-	-		
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.022	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5	-	-	-	-	-	-	4	mm
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.24	-	-	-	-	-	-		for Maize
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.027	-	-	-	-	-	-		in Zone-A
Monthly average	(l/s/ha)		-		-		-		-		-		-		-		-		0.014		-		-		-		
Zone - B																											
Provable Rainfall R80	(mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall Re	(mm)	0	0	0	0	0	0	0	0	0	0	34.763	31.388	40.05	55.04	66.15	68.04	60.638	44.4	0	0	0	0	0	0	400	mm
Area to be irrigated												25%	75%	100%	100%	100%	100%	75%	25%								
Net Re	(mm)	-	-	-	-	-	-	-	-	-	-	8.7	23.5	40.1	55.0	66.2	68.0	45.5	11.1	-	-	-	-	-	-	318	mm
Total Net (Et + P - Re)																											
	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		for Maize
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		in Zone-B
Monthly average	(l/s/ha)		-		-		-		-		-		-		-		-		-		-		-		-		

Table 3-2.12 Irrigation Requirement for Summer Vegetables-1

Irrigation Efficiency, etc. :
Field Efficiency for upland crops = 60.0%
Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern								Summer Vegetables-1																			
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64 mm/day	
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328 mm	
Kc	Summer Vegetables-1							0.34	0.34	0.54	0.93	1.05	1.05	1.04	0.91	0.91											Summer Vegetables-1
Et = Kc x Eto	mm/day							1.62	1.78	2.97	5.21	5.41	4.88	4.63	3.91	3.82											
mer Vegetables-1	(mm)							24.23	26.67	44.55	83.33	81.11	73.24	69.42	62.61	57.33										522 mm	
Deep Percolation	P (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 mm	
	Tloos = Et + P (mm)							24.23	26.67	44.55	83.33	81.11	73.24	69.42	62.61	57.33											
Field Irrigation Requirement																											
	Area to be irrigated							25%	75%	100%	100%	100%	100%	100%	75%	25%											
	Net Et (mm)							6.1	20.0	44.6	83.3	81.1	73.2	69.4	47.0	14.3										439 for Summer Vegetables-1	
	Area to be irrigated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Net P (mm)																									0 mm	
Zone - A																											
Provable Rainfall	R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215 mm	
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850 mm	
Effective Rainfall	Re (mm)	0	0	0	0	0	0	9.45	21.28	31.57	35.28	47.74	73.238	69.42	62.608	57.33	0	0	0	0	0	0	0	0	0	408 mm	
	Area to be irrigated							25%	75%	100%	100%	100%	100%	100%	75%	25%											
	Net Re (mm)	-	-	-	-	-	-	2.4	16.0	31.6	35.3	47.7	73.2	69.4	47.0	14.3	-	-	-	-	-	-	-	-	-	337 mm	
Total Net (Et + P - Re)																											
	(mm)	-	-	-	-	-	-	3.7	4.0	13.0	48.0	33.4	-	-	-	-	-	-	-	-	-	-	-	-	-	102 mm	
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	-	-	-	6.2	6.7	21.6	80.1	55.6	-	-	-	-	-	-	-	-	-	-	-	-	-	170 mm	
	(mm/day)	-	-	-	-	-	-	0.41	0.45	1.44	5.01	3.71	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	-	-	-	-	-	-	0.048	0.052	0.167	0.579	0.429	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	-	-	-	7.7	8.4	27.0	100.1	69.5	-	-	-	-	-	-	-	-	-	-	-	-	-	213 mm	
	(mm/day)	-	-	-	-	-	-	0.51	0.56	1.80	6.26	4.64	-	-	-	-	-	-	-	-	-	-	-	-	-	for Summer Vegetables-1	
	(l/s/ha)	-	-	-	-	-	-	0.059	0.065	0.209	0.724	0.536	-	-	-	-	-	-	-	-	-	-	-	-	-	in Zone-A	
Monthly average	(l/s/ha)		-		-		-		0.062		0.466		0.268		-		-		-		-		-		-		
Zone - B																											
Provable Rainfall	R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364 mm	
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007 mm	
Effective Rainfall	Re (mm)	0	0	0	0	0	0	6.545	26.673	33.915	44.37	81.113	73.238	69.42	62.608	57.33	0	0	0	0	0	0	0	0	0	455 mm	
	Area to be irrigated							25%	75%	100%	100%	100%	100%	100%	75%	25%											
	Net Re (mm)	-	-	-	-	-	-	1.6	20.0	33.9	44.4	81.1	73.2	69.4	47.0	14.3	-	-	-	-	-	-	-	-	-	385 mm	
Total Net (Et + P - Re)																											
	(mm)	-	-	-	-	-	-	4.4	-	10.6	39.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54 mm	
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	-	-	-	7.4	-	17.7	64.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90 mm	
	(mm/day)	-	-	-	-	-	-	0.49	-	1.18	4.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	-	-	-	-	-	-	0.057	-	0.137	0.470	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	-	-	-	9.2	-	22.2	81.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	113 mm	
	(mm/day)	-	-	-	-	-	-	0.61	-	1.48	5.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	for Summer Vegetables-1	
	(l/s/ha)	-	-	-	-	-	-	0.071	-	0.171	0.587	-	-	-	-	-	-	-	-	-	-	-	-	-	-	in Zone-B	
Monthly average	(l/s/ha)		-		-		-		0.036		0.379		-		-		-		-		-		-		-		

Table 3-2.13 Irrigation Requirement for Summer Vegetables-2

Irrigation Efficiency, etc. :

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern												Summer Vegetables-2															
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc	Summer Vegetables-2									0.34	0.34	0.54	0.93	1.05	1.05	1.04	0.91	0.91									Summer Vegetables-2
Et = Kc x Eto	mm/day									1.87	1.90	2.78	4.32	4.67	4.52	4.37	3.69	3.50									
mer Vegetables-2	(mm)									28.05	30.46	41.72	64.87	70.09	72.24	65.52	58.97	52.55								484	mm
Deep Percolation P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Tloos = Et + P	(mm)									28.05	30.46	41.72	64.87	70.09	72.24	65.52	58.97	52.55									
Field Irrigation Requirement																											
Area to be irrigated										25%	75%	100%	100%	100%	100%	100%	75%	25%									
Net Et	(mm)									7.0	22.8	41.7	64.9	70.1	72.2	65.5	44.2	13.1								402	for Summer Vegetables-2
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0	mm
Zone - A																											
Provable Rainfall R80	(mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall Re	(mm)	0	0	0	0	0	0	0	0	28.05	30.464	41.715	64.868	70.088	72.24	65.52	58.968	52.553	0	0	0	0	0	0	0	484	mm
Area to be irrigated										25%	75%	100%	100%	100%	100%	100%	75%	25%									
Net Re	(mm)	-	-	-	-	-	-	-	-	7.0	22.8	41.7	64.9	70.1	72.2	65.5	44.2	13.1	-	-	-	-	-	-	-	402	mm
Total Net (Et + P - Re)	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		for Summer Vegetables-2
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		in Zone-A
Monthly average	(l/s/ha)		-		-		-		-		-		-		-		-		-		-		-		-		
Zone - B																											
Provable Rainfall R80	(mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall Re	(mm)	0	0	0	0	0	0	0	0	28.05	30.464	41.715	64.868	70.088	72.24	65.52	58.968	52.553	0	0	0	0	0	0	0	484	mm
Area to be irrigated										25%	75%	100%	100%	100%	100%	100%	75%	25%									
Net Re	(mm)	-	-	-	-	-	-	-	-	7.0	22.8	41.7	64.9	70.1	72.2	65.5	44.2	13.1	-	-	-	-	-	-	-	402	mm
Total Net (Et + P - Re)	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		for Summer Vegetables-2
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		in Zone-B
Monthly average	(l/s/ha)		-		-		-		-		-		-		-		-		-		-		-		-		

Table 3-2.14 Irrigation Requirement for Winter Vegetable 1

Irrigation Efficiency, etc. :

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec			
Period	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Annual	Remarks
Cropping Pattern			Winter Vegetable 1																							
Eto mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64 mm/day	
(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328 mm	
Kc Winter Vegetabl	0.38	0.68	0.92	0.95	0.90	0.90																	0.28	0.28		Winter Vegetable 1
Et = Kc x Eto mm/day	0.66	1.31	2.21	2.90	3.42	3.96																	0.50	0.45		
Winter Vegetable 1 (mm)	9.86	21.00	33.12	37.67	51.30	63.36																	7.56	7.17	231 mm	
Deep Percolation P (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 mm	
Tloos = Et + P (mm)	9.86	21.00	33.12	37.67	51.30	63.36																	7.56	7.17		
Field Irrigation Requirement																										
Area to be irrigated	100%	100%	100%	100%	75%	25%																	25%	75%		
Net Et (mm)	9.9	21.0	33.1	37.7	38.5	15.8																	1.9	5.4	163	for Winter Vegetable 1
Area to be irrigated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Net P (mm)																									0 mm	
Zone - A																										
Provable Rainfall R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215 mm	
Potential Effect. Rainfall (mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850 mm	
Effective Rainfall Re (mm)	4.48	6.23	5.74	4.62	6.58	12.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40 mm	
Area to be irrigated	100%	100%	100%	100%	75%	25%																	25%	75%		
Net Re (mm)	4.5	6.2	5.7	4.6	4.9	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29 mm	
Total Net (Et + P - Re) (mm)	5.4	14.8	27.4	33.0	33.5	12.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.9	5.4	134 mm	
Field Efficiency 60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement (mm)	9.0	24.6	45.6	55.1	55.9	21.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	9.0	223 mm	
(mm/day)	0.60	1.54	3.04	4.24	3.73	1.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.21	0.56		
(l/s/ha)	0.069	0.178	0.352	0.490	0.431	0.153	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.024	0.065		
Conveyance efficiency 80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement (mm)	11.2	30.8	57.0	68.8	69.9	26.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.9	11.2	279 mm	
(mm/day)	0.75	1.92	3.80	5.30	4.66	1.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.26	0.70		for Winter Vegetable 1
(l/s/ha)	0.087	0.223	0.440	0.613	0.539	0.192	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.030	0.081		in Zone-A
Monthly average (l/s/ha)		0.155		0.527		0.365		-		-		-		-		-		-		-		-		0.056		
Zone - B																										
Provable Rainfall R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364 mm	
Potential Effect. Rainfall (mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1.007 mm	
Effective Rainfall Re (mm)	0	6.715	9.18	7.82	9.435	9.605	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43 mm	
Area to be irrigated	100%	100%	100%	100%	75%	25%																	25%	75%		
Net Re (mm)	-	6.7	9.2	7.8	7.1	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33 mm	
Total Net (Et + P - Re) (mm)	9.9	14.3	23.9	29.8	31.4	13.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.9	5.4	130 mm	
Field Efficiency 60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement (mm)	16.4	23.8	39.9	49.7	52.3	22.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	9.0	217 mm	
(mm/day)	1.10	1.49	2.66	3.83	3.49	1.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.21	0.56		
(l/s/ha)	0.127	0.172	0.308	0.443	0.404	0.162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.024	0.065		
Conveyance efficiency 80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement (mm)	20.5	29.8	49.9	62.2	65.4	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.9	11.2	271 mm	
(mm/day)	1.37	1.86	3.33	4.78	4.36	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.26	0.70		for Winter Vegetable 1
(l/s/ha)	0.159	0.215	0.385	0.554	0.505	0.203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.030	0.081		in Zone-B
Monthly average (l/s/ha)		0.187		0.469		0.354		-		-		-		-		-		-		-		-		0.056		

Table 3-2.15 Irrigation Requirement for Winter Vegetable 2

Irrigation Efficiency, etc. :
Field Efficiency for upland crops = 60.0%
Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern				Winter Vegetable 2																							
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc	Winter Vegetabl	0.28	0.28	0.38	0.68	0.92	0.95	0.90	0.90																		Winter Vegetable 2
Et = Kc x Eto	mm/day	0.48	0.54	0.91	2.07	3.50	4.18	4.28	4.71																		
Winter Vegetable 2	(mm)	7.27	8.65	13.68	26.96	52.44	66.88	64.13	70.61																	311	mm
Deep Percolation	P (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
	Tloos = Et + P (mm)	7.27	8.65	13.68	26.96	52.44	66.88	64.13	70.61																		
Field Irrigation Requirement																											
	Area to be irrigated	25%	75%	100%	100%	100%	100%	75%	25%																		
	Net Et (mm)	1.8	6.5	13.7	27.0	52.4	66.9	48.1	17.7																	234	for Winter Vegetable 2
	Area to be irrigated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Net P (mm)																									0	mm
Zone - A																											
Provable Rainfall	R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall	Re (mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	mm
	Area to be irrigated	25%	75%	100%	100%	100%	100%	75%	25%																		
	Net Re (mm)	1.1	4.7	5.7	4.6	6.6	12.5	7.1	5.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	mm
Total Net (Et + P - Re)																											
	(mm)	0.7	1.8	7.9	22.3	45.9	54.4	41.0	12.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	186	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	1.2	3.0	13.2	37.2	76.4	90.6	68.3	20.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	311	mm
	(mm/day)	0.08	0.19	0.88	2.86	5.10	5.66	4.56	1.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	0.009	0.022	0.102	0.332	0.590	0.655	0.527	0.159	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	1.5	3.8	16.5	46.5	95.5	113.2	85.4	25.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	388	mm
	(mm/day)	0.10	0.24	1.10	3.58	6.37	7.08	5.70	1.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		for Winter Vegetable 2
	(l/s/ha)	0.011	0.027	0.128	0.414	0.737	0.819	0.659	0.198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		in Zone-A
Monthly average	(l/s/ha)		0.019		0.271		0.778		0.429		-		-		-		-		-		-		-		-		
Zone - B																											
Provable Rainfall	R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall	Re (mm)	0	6.715	9.18	7.82	9.435	9.605	6.545	28.56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	mm
	Area to be irrigated	25%	75%	100%	100%	100%	100%	75%	25%																		
	Net Re (mm)	-	5.0	9.2	7.8	9.4	9.6	4.9	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53	mm
Total Net (Et + P - Re)																											
	(mm)	1.8	1.4	4.5	19.1	43.0	57.3	43.2	10.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	181	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	3.0	2.4	7.5	31.9	71.7	95.5	72.0	17.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	301	mm
	(mm/day)	0.20	0.15	0.50	2.45	4.78	5.97	4.80	1.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	(l/s/ha)	0.023	0.017	0.058	0.284	0.553	0.691	0.555	0.135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	3.8	3.0	9.4	39.9	89.6	119.3	90.0	21.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	377	mm
	(mm/day)	0.25	0.19	0.63	3.07	5.97	7.46	6.00	1.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		for Winter Vegetable 2
	(l/s/ha)	0.029	0.022	0.072	0.355	0.691	0.863	0.694	0.169	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		in Zone-B
Monthly average	(l/s/ha)		0.026		0.214		0.777		0.432		-		-		-		-		-		-		-		-		

Table 3-2.16 Irrigation Requirement for Winter Vegetable 3

Irrigation Efficiency, etc. :

Field Efficiency for upland crops = 60.0%

Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern																		Winter Vegetable 3									
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64 mm/day	
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328 mm	
Kc	Winter Vegetable 3															0.28	0.28	0.34	0.54	0.86	0.95	0.95	0.89	0.89			Winter Vegetable 3
Et = Kc x Eto	mm/day															1.18	1.13	1.31	2.00	2.97	2.95	2.42	1.82	1.60			
Winter Vegetable 3	(mm)															17.64	18.14	19.64	29.97	44.51	47.12	36.34	27.37	24.03		265 mm	
Deep Percolation P	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 mm	
Tloos = Et + P	(mm)															17.64	18.14	19.64	29.97	44.51	47.12	36.34	27.37	24.03			
Field Irrigation Requirement																											
Area to be irrigated																25%	75%	100%	100%	100%	100%	100%	75%	25%			
Net Et	(mm)															4.4	13.6	19.6	30.0	44.5	47.1	36.3	20.5	6.0		222 for Winter Vegetable 3	
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0 mm	
Zone - A																											
Provable Rainfall R80	(mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215 mm	
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850 mm	
Effective Rainfall Re	(mm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.64	18.144	19.635	29.97	28.77	4.69	0	0	0	0	119 mm	
Area to be irrigated																25%	75%	100%	100%	100%	100%	100%	75%	25%			
Net Re	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.4	13.6	19.6	30.0	28.8	4.7	-	-	-	-	101 mm	
Total Net (Et + P - Re)	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.7	42.4	36.3	20.5	6.0	-	121 mm	
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.2	70.7	60.6	34.2	10.0	-	202 mm	
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.75	4.42	4.04	2.28	0.67	-		
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.202	0.512	0.467	0.264	0.077	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32.8	88.4	75.7	42.8	12.5	-	252 mm	
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.19	5.52	5.05	2.85	0.83	-	for Winter Vegetable 3	
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.253	0.639	0.584	0.330	0.097	-	in Zone-A	
Monthly average	(l/s/ha)		-		-		-		-		-		-		-		-		-		0.446		0.457		0.048		
Zone - B																											
Provable Rainfall R80	(mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364 mm	
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007 mm	
Effective Rainfall Re	(mm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.64	18.144	19.635	29.97	34.595	0	0	0	0	0	120 mm	
Area to be irrigated																25%	75%	100%	100%	100%	100%	100%	75%	25%			
Net Re	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.4	13.6	19.6	30.0	34.6	-	-	-	-	-	102 mm	
Total Net (Et + P - Re)	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.9	47.1	36.3	20.5	6.0	-	120 mm	
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.5	78.5	60.6	34.2	10.0	-	200 mm	
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.10	4.91	4.04	2.28	0.67	-		
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.127	0.568	0.467	0.264	0.077	-		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.6	98.2	75.7	42.8	12.5	-	250 mm	
	(mm/day)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.38	6.14	5.05	2.85	0.83	-	for Winter Vegetable 3	
	(l/s/ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.159	0.710	0.584	0.330	0.097	-	in Zone-B	
Monthly average	(l/s/ha)		-		-		-		-		-		-		-		-		-		0.435		0.457		0.048		

Table 3-2.17 Irrigation Requirement for Winter Vegetable 4

Irrigation Efficiency, etc. :
Field Efficiency for upland crops = 60.0%
Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month		Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period		Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern																											
																					Winter Vegetable 4						
Eto	mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64	mm/day
	(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328	mm
Kc	Winter Vegetab	0.89																0.28	0.28	0.34	0.54	0.86	0.95	0.95	0.89		Winter Vegetable 4
Et = Kc x Eto	mm/day	1.54																1.08	1.04	1.17	1.67	2.19	1.95	1.71	1.42		
Winter Vegetable 4	(mm)	23.10																16.17	15.54	17.60	26.78	32.90	29.21	25.65	22.78	210	mm
Deep Percolation	P (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	mm
	Tloos = Et + P (mm)	23.10																16.17	15.54	17.60	26.78	32.90	29.21	25.65	22.78		
Field Irrigation Requirement																											
Area to be irrigated		25%																25%	75%	100%	100%	100%	100%	100%	75%		
Net Et	(mm)	5.8																4.0	11.7	17.6	26.8	32.9	29.2	25.7	17.1	171	for Winter Vegetable 4
Area to be irrigated		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P	(mm)																									0	mm
Zone - A																											
Provable Rainfall	R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215	mm
Potential Effect. Rainfall	(mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850	mm
Effective Rainfall	Re (mm)	4.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.17	15.54	17.595	4.69	0	0	0	0	58	mm
Area to be irrigated		25%																25%	75%	100%	100%	100%	100%	100%	75%		
Net Re	(mm)	1.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0	11.7	17.6	4.7	-	-	-	-	39	mm
Total Net (Et + P - Re)	(mm)	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22.1	32.9	29.2	25.7	17.1	132	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36.8	54.8	48.7	42.8	28.5	219	mm
	(mm/day)	0.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.30	3.66	3.25	2.85	1.78		
	(l/s/ha)	0.060	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.266	0.423	0.376	0.330	0.206		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	9.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46.0	68.5	60.9	53.4	35.6	274	mm
	(mm/day)	0.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.88	4.57	4.06	3.56	2.23		for Winter Vegetable 4
	(l/s/ha)	0.075	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.333	0.529	0.470	0.412	0.258		in Zone-A
Monthly average	(l/s/ha)		0.037		-		-		-		-		-		-		-		-		0.166		0.499		0.335		
Zone - B																											
Provable Rainfall	R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364	mm
Potential Effect. Rainfall	(mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007	mm
Effective Rainfall	Re (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.17	15.54	17.595	0	0	0	0	0	49	mm
Area to be irrigated		25%																25%	75%	100%	100%	100%	100%	100%	75%		
Net Re	(mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0	11.7	17.6	-	-	-	-	-	33	mm
Total Net (Et + P - Re)	(mm)	5.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.8	32.9	29.2	25.7	17.1	137	mm
Field Efficiency	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement	(mm)	9.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44.6	54.8	48.7	42.8	28.5	229	mm
	(mm/day)	0.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.79	3.66	3.25	2.85	1.78		
	(l/s/ha)	0.074	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.323	0.423	0.376	0.330	0.206		
Conveyance efficiency	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement	(mm)	12.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55.8	68.5	60.9	53.4	35.6	286	mm
	(mm/day)	0.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.49	4.57	4.06	3.56	2.23		for Winter Vegetable 4
	(l/s/ha)	0.093	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.404	0.529	0.470	0.412	0.258		in Zone-B
Monthly average	(l/s/ha)		0.046		-		-		-		-		-		-		-		-		0.202		0.499		0.335		

Table 3-2.18 Irrigation Requirement for Winter Vegetable 5

Irrigation Efficiency, etc. :
Field Efficiency for upland crops = 60.0%
Conveyance Efficiency = 80.0% Irrigation Efficiency for upland crops = 48.0%

Month	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
Period	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Cropping Pattern	Winter Vegetable 5			Terminate Irrigation	Harvest																Winter Vegetable 5					
Eto mm/day	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60	3.64 mm/day	
(mm)	26.0	30.9	36.0	39.7	57.0	70.4	71.3	78.5	82.5	89.6	77.3	69.8	66.8	68.8	63.0	64.8	57.8	55.5	51.8	49.6	38.3	30.8	27.0	25.6	1,328 mm	
Kc Winter Vegetabl	0.94	0.95	0.89	0.89															0.27	0.27	0.32	0.42	0.62	0.86		Winter Vegetable 5
Et = Kc x Eto mm/day	1.63	1.83	2.14	2.71															0.93	0.84	0.82	0.86	1.12	1.38		
inter Vegetable 5 (mm)	24.39	29.34	32.04	35.29															13.97	13.39	12.24	12.92	16.74	22.02	212 mm	
Deep Percolation P (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 mm	
Tloss = Et + P (mm)	24.39	29.34	32.04	35.29															13.97	13.39	12.24	12.92	16.74	22.02		
Field Irrigation Requirement																										
Area to be irrigated	100%	100%	75%	25%															25%	75%	100%	100%	100%	100%		
Net Et (mm)	24.4	29.3	24.0	8.8															3.5	10.0	12.2	12.9	16.7	22.0	164	for Winter Vegetable 5
Area to be irrigated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Net P (mm)																									0 mm	
Zone - A																										
Provable Rainfall R80 (mm)	6.40	8.90	8.20	6.60	9.40	17.90	13.50	30.40	45.10	50.40	68.20	119.80	142.20	196.10	153.00	115.30	121.10	53.70	41.10	6.70	0.00	0.00	0.00	0.50	1,215 mm	
Potential Effect. Rainfall (mm)	4.48	6.23	5.74	4.62	6.58	12.53	9.45	21.28	31.57	35.28	47.74	83.86	99.54	137.27	107.10	80.71	84.77	37.59	28.77	4.69	0.00	0.00	0.00	0.00	850 mm	
Effective Rainfall Re (mm)	4.48	6.23	5.74	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.973	4.69	0	0	0	0	40 mm	
Area to be irrigated	100%	100%	75%	25%															25%	75%	100%	100%	100%	100%		
Net Re (mm)	4.5	6.2	4.3	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5	3.5	-	-	-	-	23 mm	
Total Net (Et + P - Re) (mm)	19.9	23.1	19.7	7.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.5	12.2	12.9	16.7	22.0	141 mm	
Field Efficiency 60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement (mm)	33.2	38.5	32.9	12.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.9	20.4	21.5	27.9	36.7	235 mm	
(mm/day)	2.21	2.41	2.19	0.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.68	1.36	1.44	1.86	2.29		
(l/s/ha)	0.256	0.279	0.254	0.114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.079	0.157	0.166	0.215	0.265		
Conveyance efficiency 80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement (mm)	41.5	48.1	41.1	16.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.6	25.5	26.9	34.9	45.9	293 mm	
(mm/day)	2.77	3.01	2.74	1.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.85	1.70	1.79	2.33	2.87		for Winter Vegetable 5
(l/s/ha)	0.320	0.348	0.317	0.142	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.098	0.197	0.208	0.269	0.332		in Zone-A
Monthly average (l/s/ha)		0.334		0.230		-		-		-		-		-		-		-		0.049		0.202		0.300		
Zone - B																										
Provable Rainfall R80 (mm)	1.30	7.90	10.80	9.20	11.10	11.30	7.70	33.60	39.90	52.20	97.70	108.80	166.60	204.10	174.60	176.50	130.00	71.00	40.70	3.60	0.00	0.00	2.20	3.20	1,364 mm	
Potential Effect. Rainfall (mm)	0.00	6.72	9.18	7.82	9.44	9.61	6.55	28.56	33.92	44.37	83.05	76.16	116.62	142.87	122.22	123.55	91.00	60.35	34.60	0.00	0.00	0.00	0.00	0.00	1,007 mm	
Effective Rainfall Re (mm)	0	6.715	9.18	7.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.973	0	0	0	0	0	38 mm	
Area to be irrigated	100%	100%	75%	25%															25%	75%	100%	100%	100%	100%		
Net Re (mm)	-	6.7	6.9	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5	-	-	-	-	-	19 mm	
Total Net (Et + P - Re) (mm)	24.4	22.6	17.1	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.0	12.2	12.9	16.7	22.0	145 mm	
Field Efficiency 60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		
Field Requirement (mm)	40.7	37.7	28.6	11.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.7	20.4	21.5	27.9	36.7	242 mm	
(mm/day)	2.71	2.36	1.91	0.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.05	1.36	1.44	1.86	2.29		
(l/s/ha)	0.314	0.273	0.220	0.102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.121	0.157	0.166	0.215	0.265		
Conveyance efficiency 80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
Diversion Requirement (mm)	50.8	47.1	35.7	14.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.9	25.5	26.9	34.9	45.9	302 mm	
(mm/day)	3.39	2.95	2.38	1.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.31	1.70	1.79	2.33	2.87		for Winter Vegetable 5
(l/s/ha)	0.392	0.341	0.276	0.127	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.151	0.197	0.208	0.269	0.332		in Zone-B
Monthly average (l/s/ha)		0.367		0.201		-		-		-		-		-		-		-		0.076		0.202		0.300		

Table 3-3.1 Unit Field Irrigation Water Requirement by Crops in Zone - A

1. Field Irrigation Water Requirement in Half-Month

Unit : mm

Crops	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	/Max.	
Paddy	0	0	0	0	0	0	0	0	0	0	15.1	104.1	135.4	22.8	43.8	83.0	63.2	103.1	89.0	60.1	10.7	0	0	0	730	Annual total
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	13.5	213.3	47.6	83.0	63.2	106.4	111.1	148.7	86.9	17.2	0	0	891	"
Wheat	20.6	43.7	59.4	68.3	98.3	63.5	7.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.8	13.8	380	"
Legume	25.0	38.5	40.1	15.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.1	13.5	21.3	159	"
Legume (L)	14.2	28.2	47.4	46.3	22.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.5	12.8	176	"
Mustard	28.0	41.1	50.4	19.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.0	17.1	166	"
Potatoes	21.1	39.0	58.2	48.7	20.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.0	14.1	207	"
Early Potatoes - 1	39.2	15.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.8	37.8	48.2	153	"
Early Potatoes - 2	41.4	45.2	19.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.4	35.8	153	"
Late Potatoes	0	0	0	11.3	68.8	111.7	112.5	35.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	340	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8	0	0	0	0	0	0	3	"
Summer Vegetables 1	0	0	0	0	0	0	6.2	6.7	21.6	80.1	55.6	0	0	0	0	0	0	0	0	0	0	0	0	0	170	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	9.0	24.6	45.6	55.1	55.9	21.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.2	9.0	223	"
2	1.2	3.0	13.2	37.2	76.4	90.6	68.3	20.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	311	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26.2	70.7	60.6	34.2	10.0	0	202	"
4	7.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36.8	54.8	48.7	42.8	28.5	219	"
5	33.2	38.5	32.9	12.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.9	20.4	21.5	27.9	36.7	235	"

2. Semi-Monthly Field Irrigation Water Requirement in mm/day

Unit : mm/day

Paddy	0	0	0	0	0	0	0	0	0	0	1.01	6.94	9.03	1.43	2.92	5.19	4.22	6.87	5.93	3.76	0.71	0	0	0	9.03	Maximum
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	0.90	13.33	3.17	5.19	4.22	7.09	7.40	9.29	5.79	1.15	0	0	13.33	"
Wheat	1.38	2.73	3.96	5.25	6.55	3.97	0.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.32	0.86	6.55	"
Legume	1.66	2.41	2.67	1.19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.34	0.90	1.33	2.67	"
Legume (L)	0.94	1.76	3.16	3.56	1.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.30	0.80	3.56	"
Mustard	1.87	2.57	3.36	1.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.60	1.07	3.36	"
Potatoes	1.41	2.44	3.88	3.75	1.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0.88	3.88	"
Early Potatoes - 1	2.62	0.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.79	2.52	3.01	3.01	"
Early Potatoes - 2	2.76	2.83	1.32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.69	2.24	2.83	"
Late Potatoes	0	0	0	0.87	4.59	6.98	7.50	2.39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.50	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.19	0	0	0	0	0	0	0.19	"
Summer Vegetables 1	0	0	0	0	0	0	0.41	0.45	1.44	5.01	3.71	0	0	0	0	0	0	0	0	0	0	0	0	0	5.01	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	0.60	1.54	3.04	4.24	3.73	1.32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.21	0.56	4.24	"
2	0.08	0.19	0.88	2.86	5.10	5.66	4.56	1.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.66	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.75	4.42	4.04	2.28	0.67	0	4.42	"
4	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.30	3.66	3.25	2.85	1.78	3.66	"
5	2.21	2.41	2.19	0.98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.68	1.36	1.44	1.86	2.29	2.41	"

3. Semi-Monthly Field Irrigation Water Requirement in lit/sec/ha

Unit : lit/sec/ha

Paddy	0	0	0	0	0	0	0	0	0	0	0.117	0.803	1.045	0.165	0.338	0.601	0.488	0.795	0.687	0.435	0.082	0	0	0	1.045	Maximum
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	0.105	1.543	0.367	0.601	0.488	0.821	0.857	1.076	0.670	0.133	0	0	1.543	"
Wheat	0.159	0.316	0.459	0.608	0.758	0.460	0.061	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.037	0.100	0.758	"
Legume	0.193	0.279	0.309	0.137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.040	0.104	0.154	0.309	"
Legume (L)	0.109	0.204	0.366	0.412	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.035	0.093	0.412	"
Mustard	0.216	0.297	0.389	0.178	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.069	0.123	0.389	"
Potatoes	0.163	0.282	0.449	0.434	0.158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.038	0.102	0.449	"
Early Potatoes - 1	0.303	0.115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.091	0.292	0.349	0.349	"
Early Potatoes - 2	0.319	0.327	0.153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.080	0.259	0.327	"
Late Potatoes	0	0	0	0.101	0.531	0.808	0.868	0.277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.868	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.022	0	0	0	0	0	0	0.022	"
Summer Vegetables 1	0	0	0	0	0	0	0.048	0.052	0.167	0.579	0.429	0	0	0	0	0	0	0	0	0	0	0	0	0	0.579	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	0.069	0.178	0.352	0.490	0.431	0.153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.024	0.065	0.490	"
2	0.009	0.022	0.102	0.332	0.590	0.655	0.527	0.159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.655	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.202	0.512	0.467	0.264	0.077	0	0.512	"
4	0.060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.266	0.423	0.376	0.330	0.206	0.423	"
5	0.256	0.279	0.254	0.114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.079	0.157	0.166	0.215	0.265	0.279	"

Table 3-3.2 Unit Field Irrigation Water Requirement by Crops in Zone - B

1. Field Irrigation Water Requirement in Half-Month

Unit : mm

Crops	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual /Max.	Remarks
	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Paddy	0	0	0	0	0	0	0	0	0	0	14.1	104.1	135.4	22.8	26.0	32.6	55.9	85.8	89.4	65.1	10.7	0	0	0	642	Annual total
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	13.5	213.3	44.6	32.6	55.9	89.1	111.5	155.4	86.9	17.2	0	0	820	"
Wheat	28.1	42.8	53.7	63.0	93.5	67.2	9.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.8	13.8	376	"
Legume	32.4	37.7	35.8	14.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.1	13.5	21.3	160	"
Legume (L)	21.6	27.4	41.7	42.3	21.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.5	12.8	171	"
Mustard	35.5	40.3	44.7	17.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.0	17.1	164	"
Potatoes	28.5	38.2	52.5	44.7	19.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.0	14.1	202	"
Early Potatoes - 1	46.7	15.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.8	37.8	48.2	160	"
Early Potatoes - 2	48.9	44.4	17.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.4	35.8	156	"
Late Potatoes	0	0	0	8.7	64.1	116.6	117.3	29.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	336	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Summer Vegetables 1	0	0	0	0	0	0	7.4	0	17.7	64.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	16.4	23.8	39.9	49.7	52.3	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.2	9.0	217	"
2	3.0	2.4	7.5	31.9	71.7	95.5	72.0	17.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	301	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.5	78.5	60.6	34.2	10.0	0	200	"
4	9.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44.6	54.8	48.7	42.8	28.5	229	"
5	40.7	37.7	28.6	11.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.7	20.4	21.5	27.9	36.7	242	"

2. Semi-Monthly Field Irrigation Water Requirement in mm/day

Unit : mm/day

Paddy	0	0	0	0	0	0	0	0	0	0	0.94	6.94	9.03	1.43	1.73	2.04	3.73	5.72	5.96	4.07	0.71	0	0	0	9.03	Maximum
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	0.90	13.33	2.97	2.04	3.73	5.94	7.43	9.71	5.79	1.15	0	0	13.33	"
Wheat	1.87	2.68	3.58	4.84	6.24	4.20	0.61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.32	0.86	6.24	"
Legume	2.16	2.36	2.39	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.34	0.90	1.33	2.39	"
Legume (L)	1.44	1.71	2.78	3.25	1.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.30	0.80	3.25	"
Mustard	2.36	2.52	2.98	1.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.60	1.07	2.98	"
Potatoes	1.90	2.39	3.50	3.44	1.29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0.88	3.50	"
Early Potatoes - 1	3.11	0.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.79	2.52	3.01	3.11	"
Early Potatoes - 2	3.26	2.77	1.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.69	2.24	3.26	"
Late Potatoes	0	0	0	0.67	4.27	7.29	7.82	1.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.82	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Summer Vegetables 1	0	0	0	0	0	0	0.49	0	1.18	4.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.06	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	1.10	1.49	2.66	3.83	3.49	1.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.21	0.56	3.83	"
2	0.20	0.15	0.50	2.45	4.78	5.97	4.80	1.17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.97	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.10	4.91	4.04	2.28	0.67	0	4.91	"
4	0.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.79	3.66	3.25	2.85	1.78	3.66	"
5	2.71	2.36	1.91	0.88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.05	1.36	1.44	1.86	2.29	2.71	"

3. Semi-Monthly Field Irrigation Water Requirement in lit/sec/ha

Unit : lit/sec/ha

Paddy	0	0	0	0	0	0	0	0	0	0	0.109	0.803	1.045	0.165	0.200	0.236	0.431	0.662	0.690	0.471	0.082	0	0	0	1.045	Maximum
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	0.105	1.543	0.344	0.236	0.431	0.687	0.860	1.124	0.670	0.133	0	0	1.543	"
Wheat	0.217	0.310	0.414	0.561	0.722	0.486	0.071	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.037	0.100	0.722	"
Legume	0.250	0.273	0.276	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.040	0.104	0.154	0.276	"
Legume (L)	0.167	0.198	0.322	0.376	0.162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.035	0.093	0.376	"
Mustard	0.274	0.291	0.345	0.154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.069	0.123	0.345	"
Potatoes	0.220	0.276	0.405	0.398	0.149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.038	0.102	0.405	"
Early Potatoes - 1	0.360	0.112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.091	0.292	0.349	0.360	"
Early Potatoes - 2	0.377	0.321	0.131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.080	0.259	0.377	"
Late Potatoes	0	0	0	0.077	0.494	0.843	0.905	0.230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.905	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Summer Vegetables 1	0	0	0	0	0	0	0.057	0	0.137	0.470	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.470	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	0.127	0.172	0.308	0.443	0.404	0.162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.024	0.065	0.443	"
2	0.023	0.017	0.058	0.284	0.553	0.691	0.555	0.135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.691	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.127	0.568	0.467	0.264	0.077	0	0.568	"
4	0.074	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.323	0.423	0.376	0.330	0.206	0.423	"
5	0.314	0.273	0.220	0.102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.121	0.157	0.166	0.215	0.265	0.314	"

Table 3-4.1 Unit Diversion Water Requirement by Crops in Zone - A

1. Semi-Monthly Diversion Water Requirement

Conveyance Efficiency = 80%

Unit : mm

Crops	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual	Remarks
	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	/Max.	
Paddy	0	0	0	0	0	0	0	0	0	0	18.9	130.1	169.3	28.5	54.7	103.8	79.1	128.9	111.3	75.1	13.4	0	0	0	913	Annual total
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	16.9	266.6	59.4	103.8	79.1	132.9	138.8	185.9	108.6	21.5	0	0	1113	"
Wheat	25.8	54.6	74.3	85.4	122.9	79.4	9.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.0	17.2	475	"
Legume	31.2	48.1	50.1	19.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.4	16.9	26.7	199	"
Legume (L)	17.7	35.3	59.3	57.8	27.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.6	16.0	219	"
Mustard	35.0	51.4	63.0	24.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.3	21.3	207	"
Potatoes	26.3	48.8	72.8	60.9	25.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.2	17.6	258	"
Early Potatoes - 1	49.1	19.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47.3	60.3	191	"
Early Potatoes - 2	51.8	56.5	24.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.7	47.3	60.3	191	"
Late Potatoes	0	0	0	14.2	86.0	139.6	140.6	44.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.9	44.8	191	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	425	"
Summer Vegetables 1	0	0	0	0	0	0	7.7	8.4	27.0	100.1	69.5	0	0	0	0	0	0	3.5	0	0	0	0	0	0	4	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	213	"
Winter Vegetables 1	11.2	30.8	57.0	68.8	69.9	26.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
2	1.5	3.8	16.5	46.5	95.5	113.2	85.4	25.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.9	11.2	279	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	388	"
4	9.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32.8	88.4	75.7	42.8	12.5	0	252	"
5	41.5	48.1	41.1	16.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46.0	68.5	60.9	53.4	35.6	274	"
																			0	13.6	25.5	26.9	34.9	45.9	293	"

2. Semi-Monthly Diversion Water Requirement in mm/day

Unit : mm/day

Paddy	0	0	0	0	0	0	0	0	0	0	1.26	8.68	11.29	1.78	3.65	6.49	5.27	8.59	7.42	4.69	0.89	0	0	0	11.29	Maximum
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	1.13	16.66	3.96	6.49	5.27	8.86	9.26	11.62	7.24	1.43	0	0	16.66	"
Wheat	1.72	3.41	4.95	6.57	8.19	4.96	0.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.40	1.08	8.19	"
Legume	2.08	3.01	3.34	1.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.43	1.13	1.67	3.34	"
Legume (L)	1.18	2.20	3.95	4.45	1.85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.38	1.00	4.45	"
Mustard	2.33	3.21	4.20	1.92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.75	1.33	4.20	"
Potatoes	1.76	3.05	4.85	4.69	1.71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.41	1.10	4.85	"
Early Potatoes - 1	3.27	1.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.98	3.15	3.77	3.77	"
Early Potatoes - 2	3.45	3.53	1.65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.86	2.80	3.53	"
Late Potatoes	0	0	0	1.09	5.74	8.73	9.38	2.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.38	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0	0	0	0	0	0.24	"
Summer Vegetables 1	0	0	0	0	0	0	0.51	0.56	1.80	6.26	4.64	0	0	0	0	0	0	0	0	0	0	0	0	0	6.26	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	0.75	1.92	3.80	5.30	4.66	1.65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.26	0.70	5.30	"
2	0.10	0.24	1.10	3.58	6.37	7.08	5.70	1.71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.08	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.19	5.52	5.05	2.85	0.83	0	5.52	"
4	0.65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.88	4.57	4.06	3.56	2.23	4.57	"
5	2.77	3.01	2.74	1.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.85	1.70	1.79	2.33	2.87	3.01	"

3. Semi-Monthly Diversion Water Requirement in lit/sec/ha

Unit : lit/sec/ha

Paddy	0	0	0	0	0	0	0	0	0	0	0.146	1.004	1.306	0.206	0.422	0.751	0.610	0.994	0.858	0.543	0.103	0	0	0	1.306	Maximum
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	0.131	1.928	0.459	0.751	0.610	1.026	1.071	1.344	0.838	0.166	0	0	1.928	"
Wheat	0.199	0.395	0.573	0.760	0.948	0.575	0.077	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.047	0.124	0.948	"
Legume	0.241	0.348	0.387	0.172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.130	0.193	0.387	"
Legume (L)	0.137	0.255	0.457	0.515	0.214	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.043	0.116	0.515	"
Mustard	0.270	0.371	0.486	0.222	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.087	0.154	0.486	"
Potatoes	0.203	0.353	0.562	0.542	0.198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.048	0.127	0.562	"
Early Potatoes - 1	0.379	0.144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.114	0.365	0.436	0.436	"
Early Potatoes - 2	0.399	0.409	0.191	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.100	0.324	0.409	"
Late Potatoes	0	0	0	0.126	0.664	1.010	1.085	0.346	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.085	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.027	0	0	0	0	0	0	0.027	"
Summer Vegetables 1	0	0	0	0	0	0	0.059	0.065	0.209	0.724	0.536	0	0	0	0	0	0	0	0	0	0	0	0	0	0.724	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	0.087	0.223	0.440	0.613	0.539	0.192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.030	0.081	0.613	"
2	0.011	0.027	0.128	0.414	0.737	0.819	0.659	0.198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.819	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.253	0.639	0.584	0.330	0.097	0	0.639	"
4	0.075	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.333	0.529	0.470	0.412	0.258	0.529	"
5	0.320	0.348	0.317	0.142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.098	0.197	0.208	0.269	0.332	0.348	"

Table 3-4.2 Unit Diversion Water Requirement by Crops in Zone - B

1. Semi-Monthly Diversion Water Requirement

Conveyance Efficiency = 80%

Unit : mm

Crops	Jan.		Feb.		Mar		Apr.		May		Jun		Jul.		Aug.		Sep.		Oct.		Nov.		Dec		Annual /Max.	Remarks
	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late		
Paddy	0	0	0	0	0	0	0	0	0	0	17.6	130.1	169.3	28.5	32.5	40.8	69.9	107.2	111.8	81.4	13.4	0	0	0	802	Annual total
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	16.9	266.6	55.7	40.8	69.9	111.3	139.3	194.2	108.6	21.5	0	0	1025	"
Wheat	35.1	53.6	67.1	78.7	116.9	84.0	11.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.0	17.2	470	"
Legume	40.5	47.1	44.7	17.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.4	16.9	26.7	200	"
Legume (L)	27.0	34.3	52.1	52.8	26.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.6	16.0	214	"
Mustard	44.3	50.3	55.9	21.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.3	21.3	205	"
Potatoes	35.7	47.8	65.6	55.9	24.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.2	17.6	253	"
Early Potatoes - 1	58.4	19.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.7	47.3	60.3	200	"
Early Potatoes - 2	61.1	55.5	21.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.9	44.8	196	"
Late Potatoes	0	0	0	10.9	80.1	145.7	146.7	37.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	421	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Summer Vegetables 1	0	0	0	0	0	0	9.2	0	22.2	81.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	20.5	29.8	49.9	62.2	65.4	28.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.9	11.2	271	"
2	3.8	3.0	9.4	39.9	89.6	119.3	90.0	21.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	377	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.6	98.2	75.7	42.8	12.5	0	250	"
4	12.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55.8	68.5	60.9	53.4	35.6	286	"
5	50.8	47.1	35.7	14.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.9	25.5	26.9	34.9	45.9	302	"

2. Semi-Monthly Diversion Water Requirement in mm/day

Unit : mm/day

Paddy	0	0	0	0	0	0	0	0	0	0	1.18	8.68	11.29	1.78	2.16	2.55	4.66	7.15	7.45	5.09	0.89	0	0	0	11.29	Maximum
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	1.13	16.66	3.71	2.55	4.66	7.42	9.29	12.14	7.24	1.43	0	0	16.66	"
Wheat	2.34	3.35	4.48	6.05	7.79	5.25	0.76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.40	1.08	7.79	"
Legume	2.70	2.95	2.98	1.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.43	1.13	1.67	2.98	"
Legume (L)	1.80	2.14	3.48	4.06	1.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.38	1.00	4.06	"
Mustard	2.96	3.15	3.73	1.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.75	1.33	3.73	"
Potatoes	2.38	2.99	4.38	4.30	1.61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.41	1.10	4.38	"
Early Potatoes - 1	3.89	1.21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.98	3.15	3.77	3.89	"
Early Potatoes - 2	4.07	3.47	1.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.86	2.80	4.07	"
Late Potatoes	0	0	0	0.83	5.34	9.11	9.78	2.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.78	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Summer Vegetables 1	0	0	0	0	0	0	0.61	0	1.48	5.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.07	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	1.37	1.86	3.33	4.78	4.36	1.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.26	0.70	4.78	"
2	0.25	0.19	0.63	3.07	5.97	7.46	6.00	1.46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.46	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.38	6.14	5.05	2.85	0.83	0	6.14	"
4	0.80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.49	4.57	4.06	3.56	2.23	4.57	"
5	3.39	2.95	2.38	1.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.31	1.70	1.79	2.33	2.87	3.39	"

3. Semi-Monthly Diversion Water Requirement in lit/sec/ha

Unit : lit/sec/ha

Paddy	0	0	0	0	0	0	0	0	0	0	0.136	1.004	1.306	0.206	0.251	0.295	0.539	0.827	0.862	0.589	0.103	0	0	0	1.306	Maximum
Paddy (L)	0	0	0	0	0	0	0	0	0	0	0	0	0.131	1.928	0.430	0.295	0.539	0.859	1.075	1.405	0.838	0.166	0	0	1.928	"
Wheat	0.271	0.387	0.518	0.701	0.902	0.608	0.088	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.047	0.124	0.902	"
Legume	0.313	0.341	0.345	0.157	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.130	0.193	0.345	"
Legume (L)	0.209	0.248	0.402	0.470	0.203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.043	0.116	0.470	"
Mustard	0.342	0.364	0.431	0.192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.087	0.154	0.431	"
Potatoes	0.275	0.346	0.506	0.498	0.187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.048	0.127	0.506	"
Early Potatoes - 1	0.451	0.140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.114	0.365	0.436	0.451	"
Early Potatoes - 2	0.471	0.401	0.163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.100	0.324	0.471	"
Late Potatoes	0	0	0	0.097	0.618	1.054	1.132	0.287	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.132	"
Maize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Summer Vegetables 1	0	0	0	0	0	0	0.071	0	0.171	0.587	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.587	"
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	"
Winter Vegetables 1	0.159	0.215	0.385	0.554	0.505	0.203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.030	0.081	0.554	"
2	0.029	0.022	0.072	0.355	0.691	0.863	0.694	0.169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.863	"
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.159	0.710	0.584	0.330	0.097	0	0.710	"
4	0.093	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.404	0.529	0.470	0.412	0.258	0.529	"
5	0.392	0.341	0.276	0.127	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.151	0.197	0.208	0.269	0.332	0.392	"