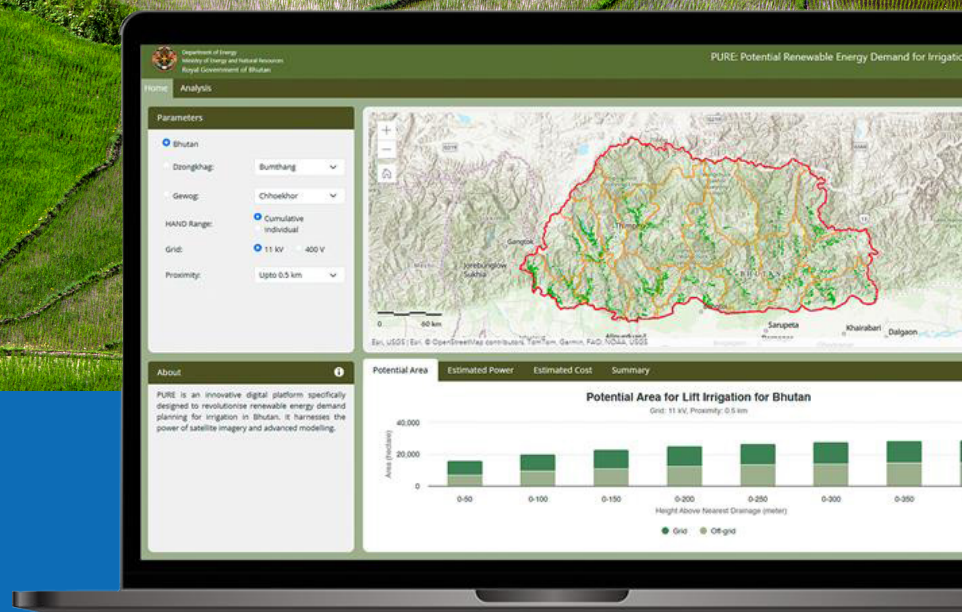


USER MANUAL

Productive Use of Renewable Energy (PURE) Platform for Bhutan



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CHAPTER 1

Introduction

Most regions of the Hindu Kush Himalaya (HKH), including Bhutan, face year-round irrigation challenges due to rugged terrain and settlements located on hilltops, far from valley water sources. Renewable energy-powered water pumps offer a sustainable irrigation solution and an alternative to diesel pumps, particularly for dispersed farms, to boost agricultural yields and safeguard farmers' livelihoods in a changing climate. However, critical market information to scale the solution—such as demand, location, and required investment—remains scarce.

PURE (Productive Use of Renewable Energy) is a transformative decision-support platform that optimises renewable energy planning for river-based lift irrigation systems. By leveraging satellite imagery and advanced modelling, PURE integrates diverse datasets and enables user-guided analysis, allowing stakeholders to:

- Select customisable data layers, including administrative boundaries, transmission and distribution lines, crop and irrigation requirements, river networks, canals etc.
- Generate integrated visualisations of renewable energy demand for river-based lift irrigation systems, cost predictions and enabling infrastructure, such as utility connections, market centres etc.
- Analyse results at national, provincial, and municipal levels through interactive graphics and tables.

Designed for governments, developers, and researchers, PURE transforms complex geospatial and multi-data sets into simple actionable insights – identifying and quantifying renewable energy-powered lift irrigation opportunities to strengthen climate resilience in agriculture and enhance food security.

CHAPTER 2

Getting started

1. Open your web browser

- a. Open your preferred web browser (e.g., Google Chrome, Mozilla Firefox, Microsoft Edge)

2. Enter the platform URL

- a. In the address bar of your browser, type the following URL and press Enter or click the link below to go directly to the platform.
<https://geoapps.icimod.org/BhutanPure/>
3. After entering the URL, you will be directed to the PURE platform page for Bhutan. Please ensure that the zoom level of the web browser matches your screen size.
4. The platform features two analytical tabs: “Home” and “Analysis”, as shown in the figure below. Users can select either tab to access different levels of analysis:
 - a. **Home:** Provides a macro-level analysis of lift irrigation systems powered by renewable energy (RE) across all the government administrative boundaries. For detailed instructions on functionality, refer to Section 3 of this manual.
 - b. **Analysis:** Offers site-specific analysis to generate a pre-feasibility report for RE-powered lift irrigation systems at user-defined locations. For usage guidelines and features, see Section 4 of this manual.

FIGURE 1

The platform’s tabs “Home” and “Analysis”



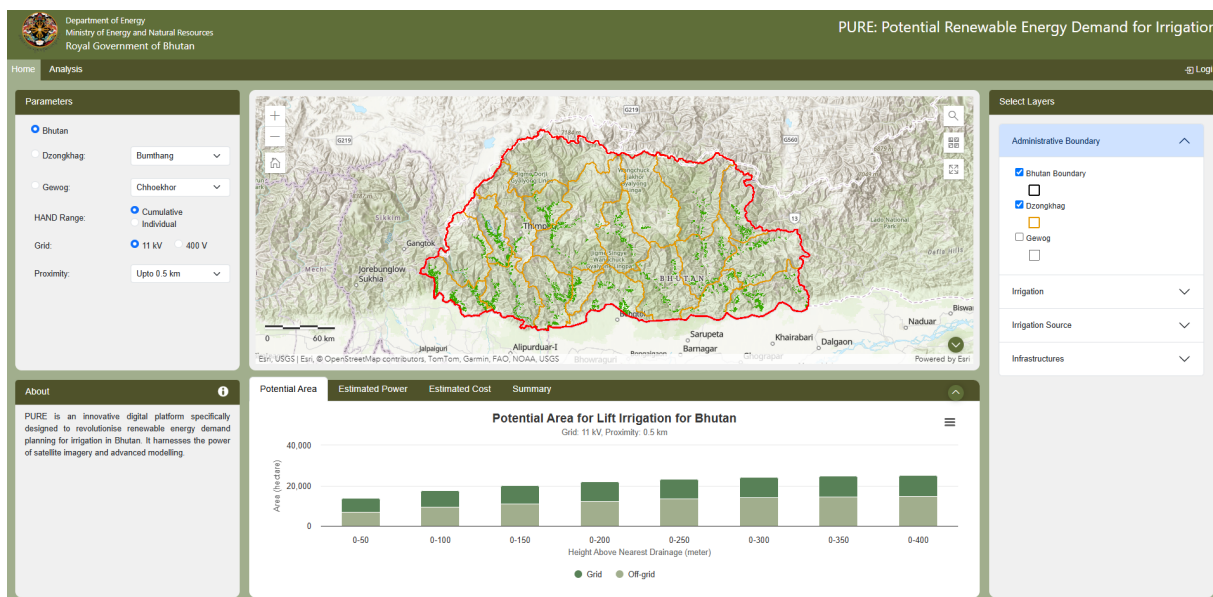
CHAPTER 3

Home tab

The following figure shows the landing page, which appears after selecting the **Home** tab on the PURE platform (Figure 2).

FIGURE 2

Platform landing page

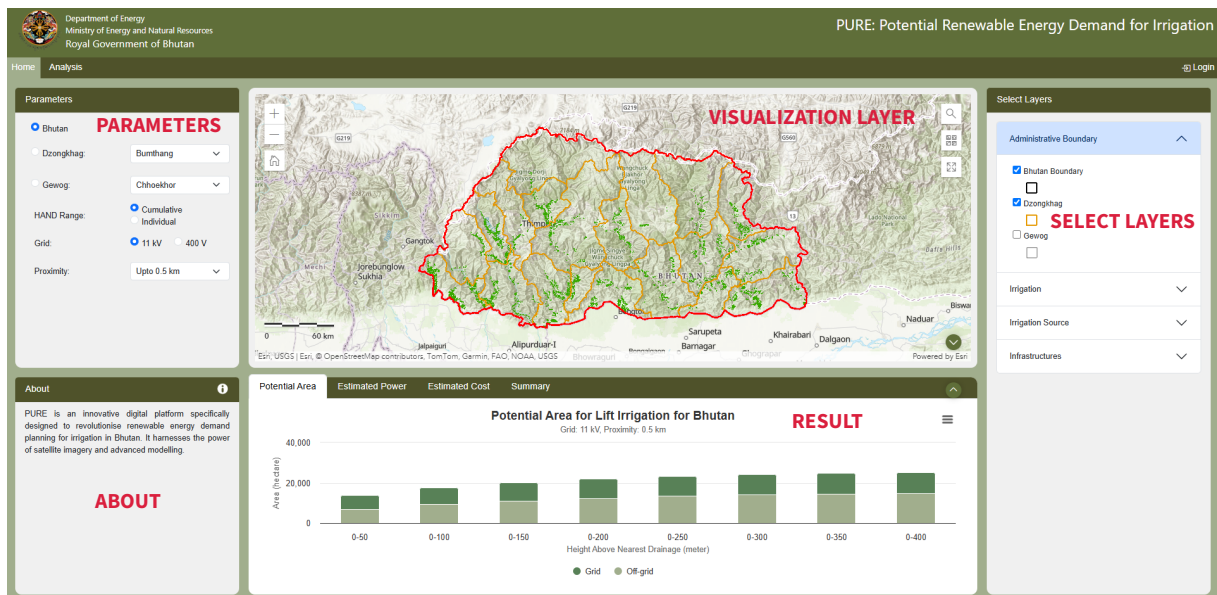


Navigating the platform

On the main landing page, you will find several sections that allow you to interact with different features. The features that you can find are listed as follows (Figure 3):

- Parameters
- About
- Select Layers
- Visualisation Layer
- Result

FIGURE 3 Platform features



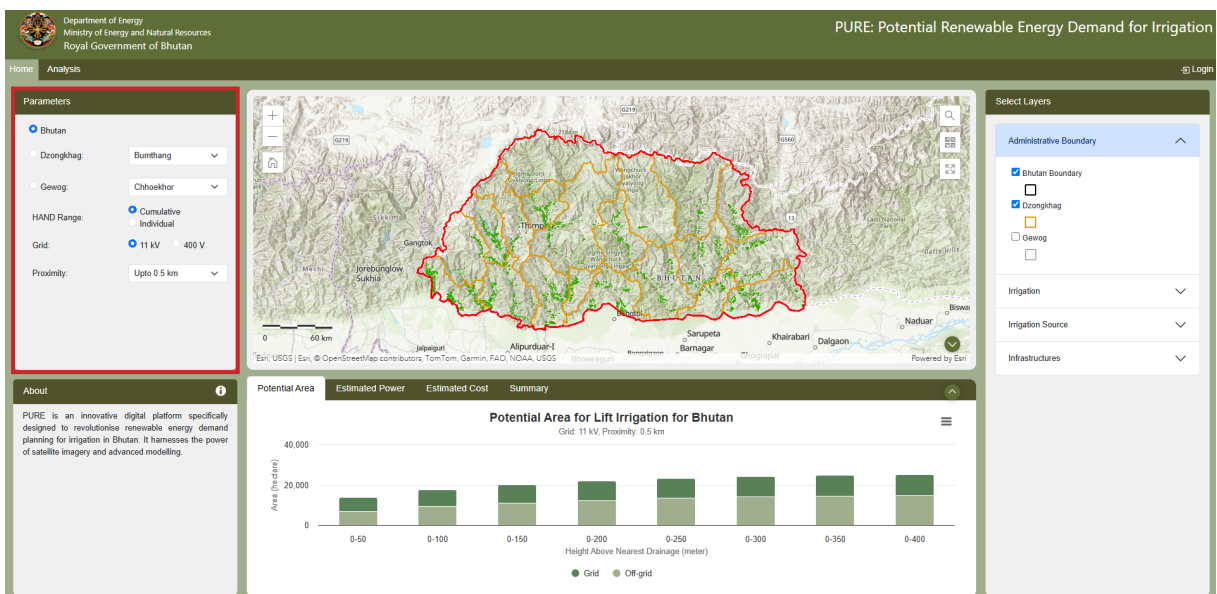
Here is the detailed guide to each section:

3.1 Parameters

Parameters refer to the specific inputs or variables that users can customise or select according to their unique preferences or requirements. You can find the **Parameters** section on the top left side, as shown in the figure below.

The parameters section allows users to configure various input parameters, which influence both the output in the result section and its visualisation in the visualisation section.

FIGURE 4 Parameter section of the platform



3.1.1 Administrative boundary

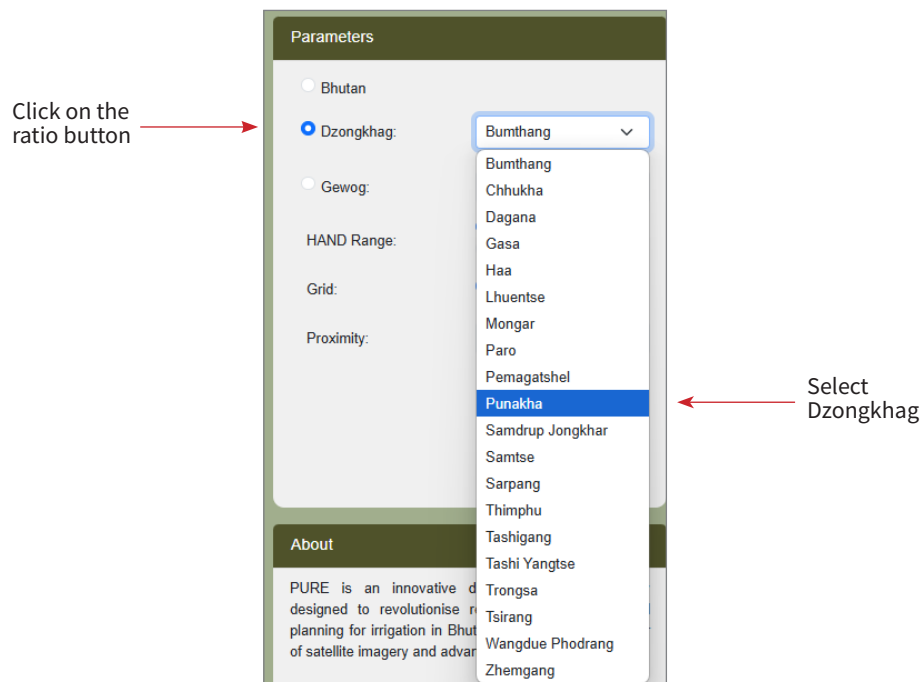
You can customise the results by selecting specific administrative boundaries:

- Dzongkhag
- Gewog

To select a Dzongkhag, you need to click on the radio button beside **Dzongkhag** and then click the dropdown arrow to select a specific Dzongkhag, eg Punakha, as shown in the figure below.

FIGURE 5

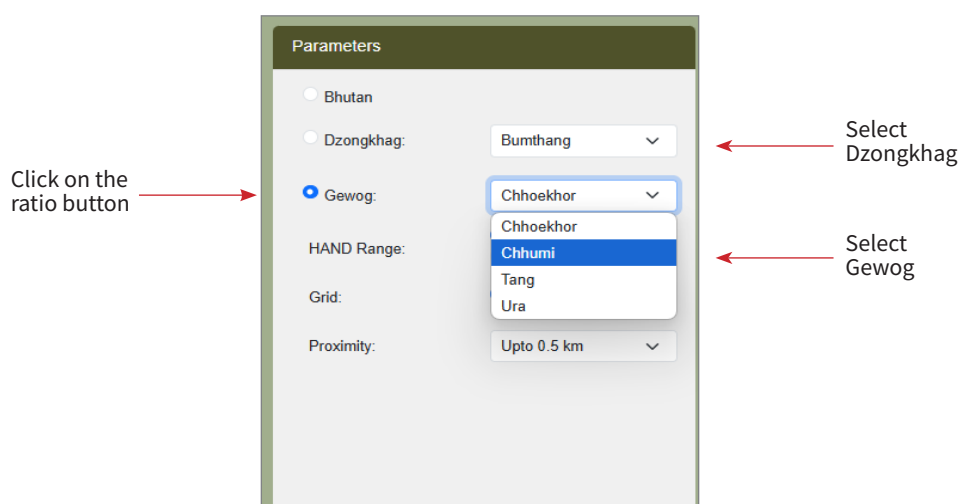
Dzongkhag selection toggle



Likewise, to select a Gewog, for example, Chhume Gewog, click the radio button next to **Gewog**, then click the dropdown arrow to select Chhume. Please note that you must first select a Dzongkhag before selecting the district.

FIGURE 6

Gewog selection toggle



3.1.2 HAND range

HAND (Height Above Nearest Drainage) is a terrain that measures the vertical distance between a given point on the land surface and the nearest drainage channel (for example, a river or stream). The analysis and results have incorporated HAND values ranging from 0 to 400 meters, categorised at 50-meter intervals.

For **HAND range** you can either view the results individually or cumulatively:

INDIVIDUAL

Results are displayed in 50-meter (m) intervals:

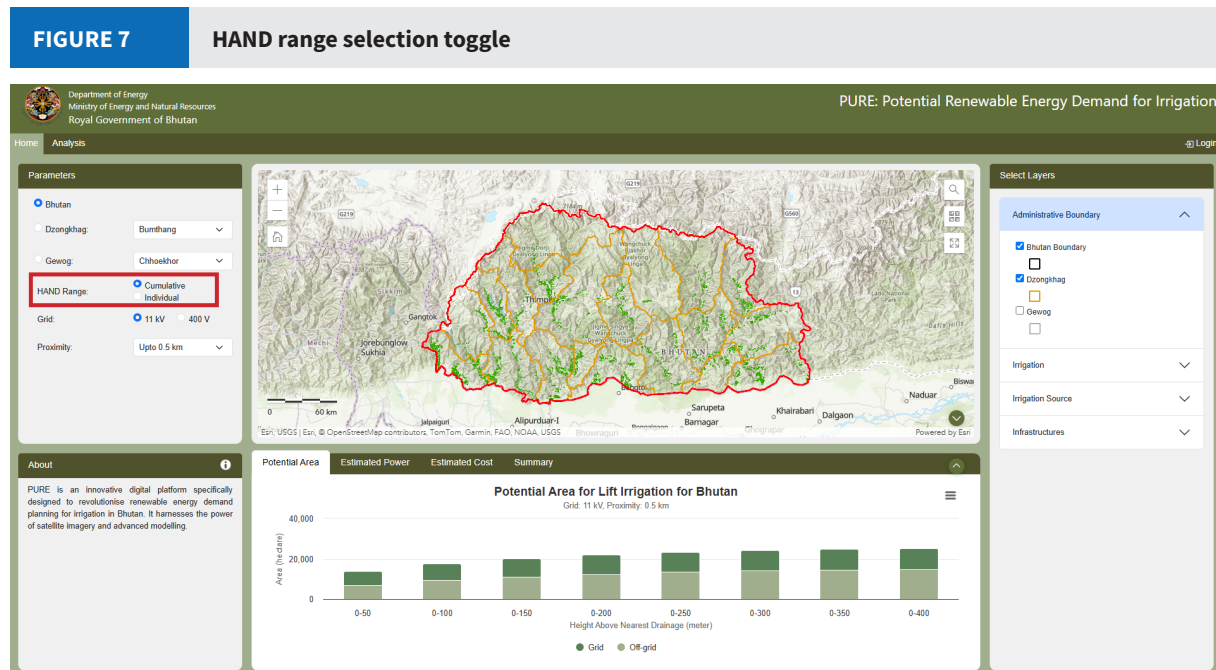
0–50m, 50–100m, 100–150m, 150–200m, 200–250m, 250–300m, 300–350m, and 350–400m.

CUMULATIVE

Results show the aggregate sum in progressive intervals starting from 0m:

0–50m, 0–100m, 0–150m, 0–200m, 0–250m, 0–300m, 0–350m, and 0–400m.

Results will vary based on the HAND parameters you set (Figure 7).



3.1.3 Grid proximity

The platform enables users to evaluate power generation options based on the proximity of the pumping site to the grid network. To support decision-making, users can select the distance (buffered area) between the pumping site and the grid network (in kilometres), as extending distribution lines over longer distances may become uneconomical. The available grid options are 11kV and 400V lines. For 11kV lines, the available distance options are:

Distance in kilometres (km)
11kV
0.5
1
2
3

FIGURE 8**Grid proximity selection toggle for 11kV**

The screenshot shows a 'Parameters' form with the following settings: 'Bhutan' is selected; 'Dzongkhag' is 'Bumthang'; 'Gewog' is 'Chhoeckhor'; 'HAND Range' is 'Cumulative'; 'Grid' is '11 kV'; and 'Proximity' is 'Upto 0.5 km'. A dropdown menu for 'Proximity' is open, showing options: 'Upto 0.5 km', 'Upto 1 km', 'Upto 2 km' (highlighted), and 'Upto 3 km'. A red arrow points to the 'Upto 2 km' option with the text 'Select Proximity'.

For 400V, the only available distance option is 0.5 km, as the lines are already distributed, which limits the possibility for longer distances.

FIGURE 9**Grid proximity selection toggle for 400V**

The screenshot shows the same 'Parameters' form, but with 'Grid' set to '400 V'. The 'Proximity' dropdown menu is open, showing only one option: 'Upto 0.5 km'. A red arrow points to this option with the text 'For 400 V only 0.5 km proximity is analyzed'.

Based on the selected distance, the platform calculates the power requirements:

- The power that can be supplied by the grid (within the buffered area).
- The remaining power demand, which must be met through off-grid solutions (outside the buffered area).

This feature empowers users to make informed decisions by estimating how much power can potentially be sourced from the grid and how much should be generated through off-grid systems. This analysis provides valuable insights into the market size for both utility electricity and off-grid solutions, helping stakeholders understand the balance between domestic consumption of grid power and the growing demand for decentralised energy systems in the sector.

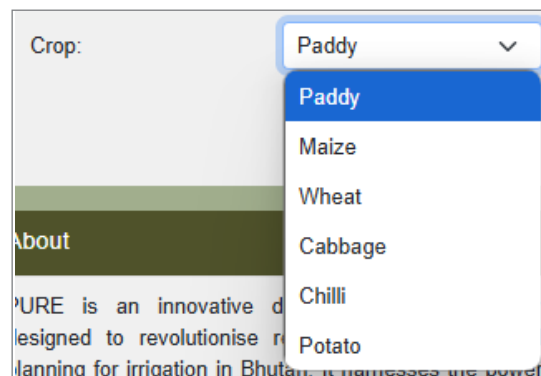
3.1.4 Crop selection

Irrigation water requirements, and consequently the power needed for irrigation, vary significantly depending on the type of crop. The platform allows users to evaluate power requirements based on the crop selected. You can choose from five major crops commonly cultivated in the country:

- Paddy
- Maize
- Wheat
- Cabbage
- Chilli
- Potato

FIGURE 10

Crop selection toggle



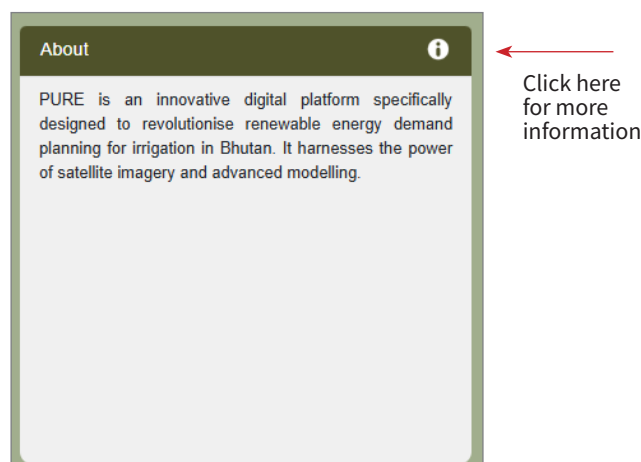
By selecting a specific crop, the platform calculates the corresponding irrigation needs and estimates the power required to meet those demands. This provides critical insights for decision-making, helping users understand the requirements for sustainable irrigation systems tailored to their specific agricultural needs.

3.2 About

The About section can be found in the lower left corner of the platform. It provides details about the platform, team members, and data references. To read more, simply click on the information (i) button.

FIGURE 11

About the platform

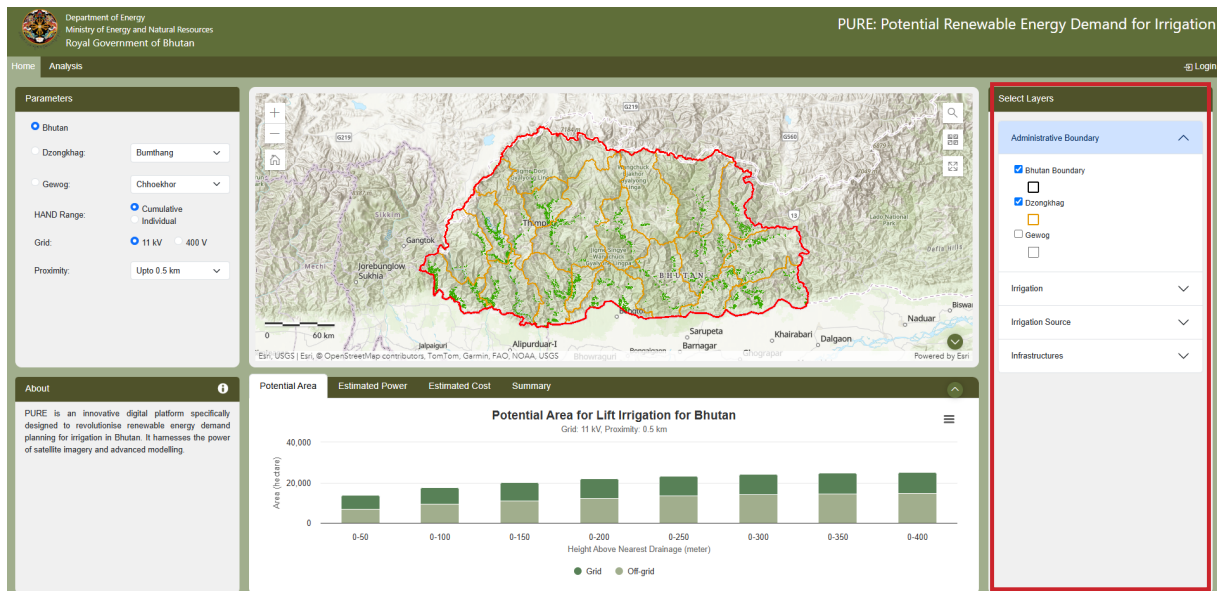


3.3 Select layers

On the top right side of the platform, you can find **Select Layers**.

FIGURE 12

Select layers section of the platform



This section enables users to visualise various GIS and remote sensing layers to better understand and characterise the sites. You can select a layer, which will be displayed in the central map window for detailed visualisation. The section includes four major layers, each with its own sub-layers: Administrative boundary, irrigation, irrigation source, and infrastructure.

3.3.1 Administrative boundary

Administrative boundaries are officially demarcated divisions that define a country's internal governance structure. The platform displays the following boundaries:

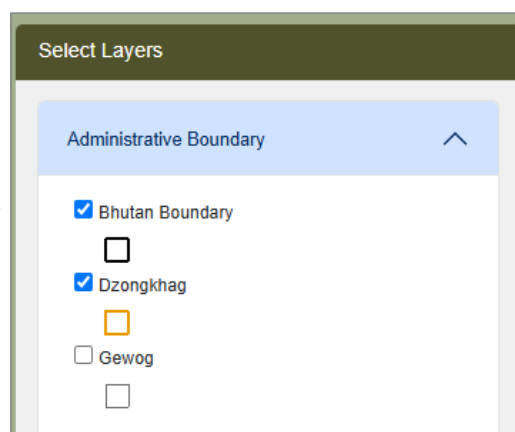
- National (Bhutan boundary)
- Dzongkhag
- Gewog

To view a specific boundary, simply check the corresponding box in the interface labelled **Administrative Boundary**.

FIGURE 13

Administrative boundary selection toggle

Click on the check box



3.3.2 Irrigation

The **Irrigation** section contains the following layers: irrigated area, non-irrigated area and potential area for lift irrigation. This section enables you to analyse the spatial distribution of these layers.

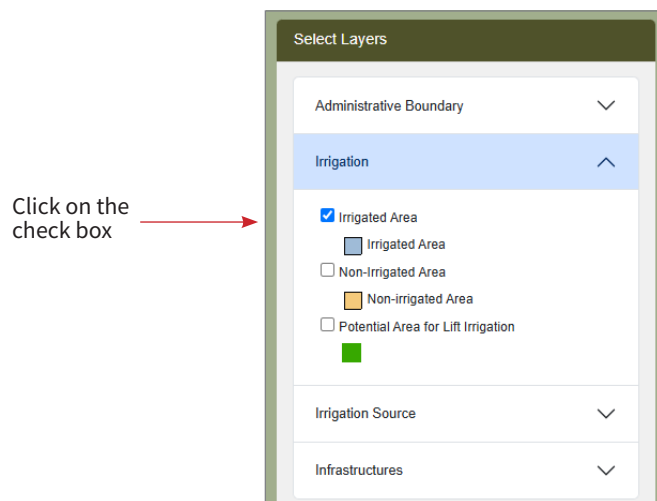
The following layers can be visualised:

a. IRRIGATED AREA

An irrigated area refers to cultivated area that has been categorised as irrigated schemes by the Department of Infrastructure Development (DOID). To visualise the irrigated layer, click the checkbox next to **Irrigated Area**.

FIGURE 14

Irrigated area selection toggle

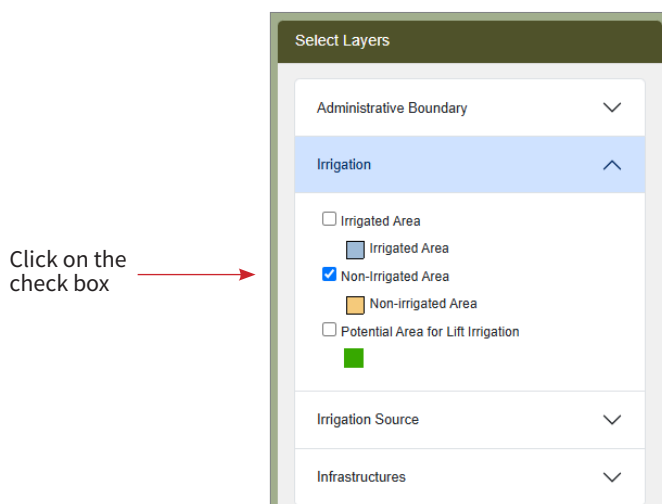


b. NON-IRRIGATED AREA

A non-irrigated area is the portion of cultivable land that remains after subtracting the irrigated area from the total cultivable area. To visualise the non-irrigated layer, click the checkbox next to **Non-irrigated Area**.

FIGURE 15

Non-irrigated area selection toggle



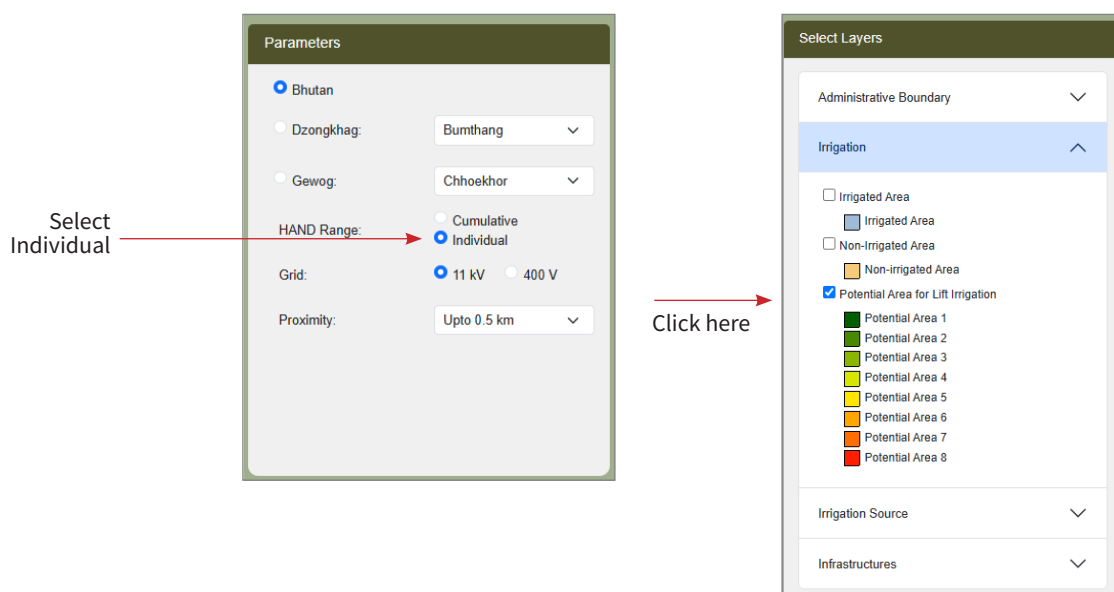
c. POTENTIAL AREA FOR LIFT IRRIGATION

This refers to cultivable land suitable for irrigation by lifting water from rivers to higher elevations using pumps or other mechanical methods. To view this layer select the checkbox next to **Potential Area for Lift Irrigation**. It offers two visualisations, depending on selections in the HAND range under the Parameter section:

- Individual intervals of the potential area are displayed if the **Individual** option is selected in the **Parameters** section. The intervals are named as Potential Area 1, Potential Area 2, Potential Area 3, Potential Area 4, Potential Area 5, Potential Area 6, Potential Area 7, Potential Area 8 for the HAND range of 0-50 m, 50-100 m, 100-150m, 150-200m, 200-250m, 250-300m, 300-350m, and 350-400m respectively.

FIGURE 16

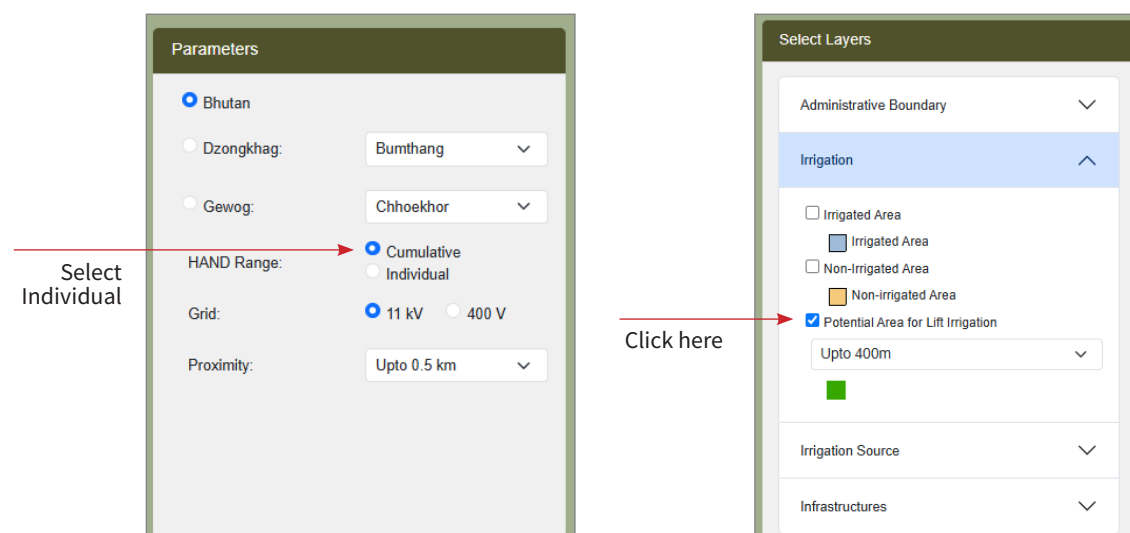
Potential area for lift irrigation selection toggle for HAND range "Individual"



- Cumulative potential area is displayed in various intervals as shown in the figure below if the Cumulative option is selected in the Parameters section.

FIGURE 17

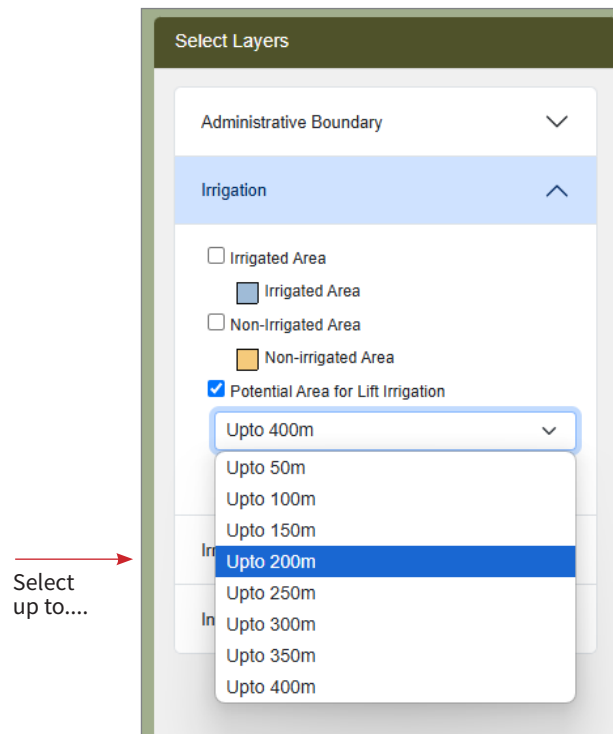
Potential area for lift irrigation selection toggle for HAND range "Cumulative"



Here, users can also select various HAND ranges in meters (m) such as 0-50 m, 0-100 m, 0-150m, 0-200m, 0-250m, 0-300m, 0-350m, and 0-400m as shown in the figure below.

FIGURE 18

HAND range selection toggle for potential area for lift irrigation



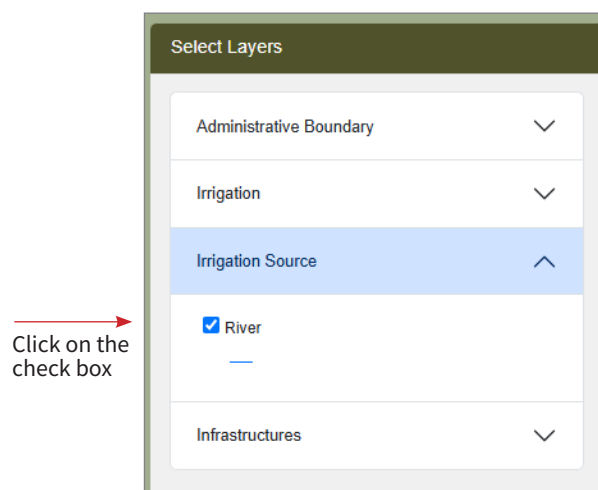
3.3.3 Irrigation source

An irrigation source is a water body used to supply water for agricultural irrigation. For example, rivers, streams, lakes, reservoirs etc. The platform only considers river classifications for 3rd-order streams or higher with minimum discharge of ≥ 100 litres/second (l/s). Rivers meeting these criteria ensure reliable year-round water availability for irrigation purposes.

To visualise the river layer, click the checkbox next to River under the Select Layers section, as shown in the figure below.

FIGURE 19

Irrigation source selection toggle



3.3.4 Infrastructure

Infrastructure refers to the fundamental physical systems and structures including a wide range of facilities and networks essential for economic activity, public services, and daily life such as roads, electricity, and so on. This section shows the spatial distribution of infrastructure around the country, such as the power grid, roads, and irrigation canals, since these types of infrastructure enable or provide a conducive environment for agriculture.

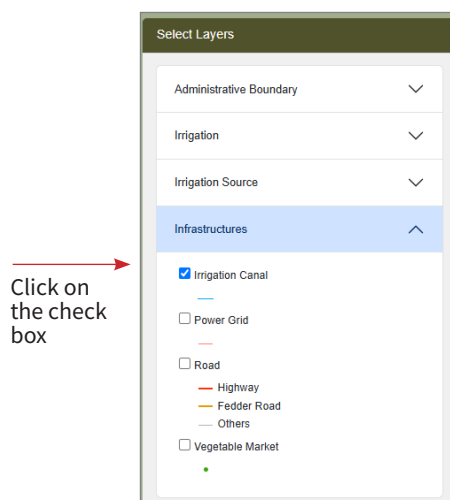
The sub-sections that are available in this section are:

a. IRRIGATION CANAL

An irrigation canal is a man-made channel designed to transport water from a source, such as a river or reservoir, to agricultural fields or other areas requiring irrigation. To visualise this, click the checkbox next to Irrigation Canal under Infrastructure in the Select Layers section, as shown below.

FIGURE 20

Irrigation Canal selection toggle

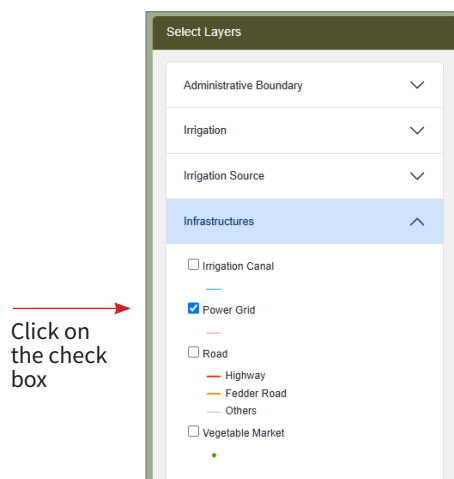


b. POWER GRID

A power grid is an interconnected network of electrical components, including power stations, transmission lines, and distribution systems, designed to generate, transmit, and supply electricity to consumers across a region. The two types of power grid connections, 11 kV and 33 kV transmission lines are added. To visualise the **Power Grid** layer, click the checkbox next to Power Grid under Infrastructure in the Select Layers section, as shown below.

FIGURE 21

Power grid selection toggle

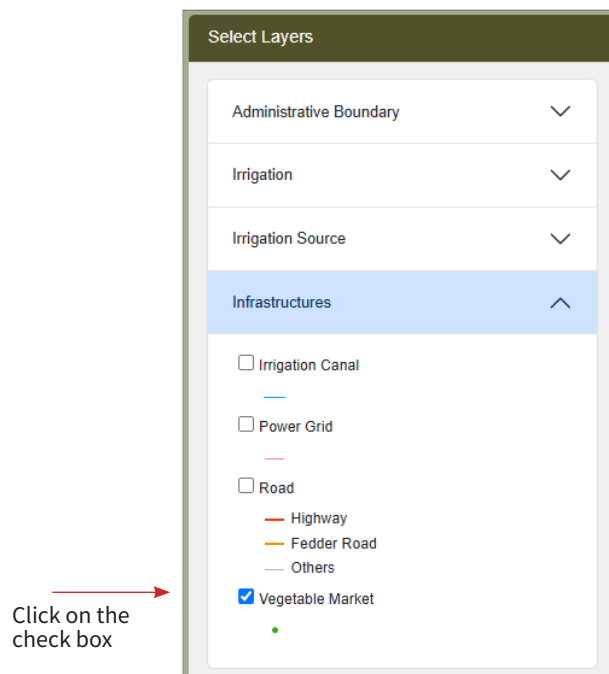


c. VEGETABLE MARKET

You can visualise the location of vegetable markets in Bhutan. To do this, click the checkbox next to Vegetable Market under Infrastructure in the Select Layers section, as shown in the figure below.

FIGURE 22

Market selection toggle

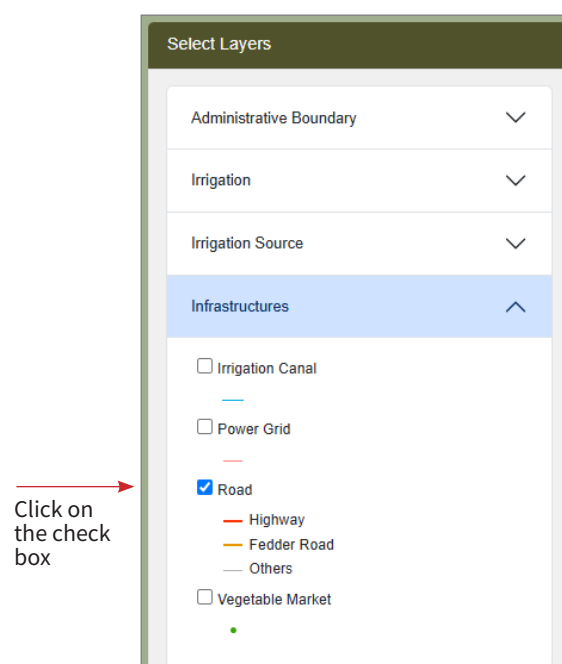


D. Road

A road is a constructed pathway or thoroughfare, typically paved with materials like asphalt or concrete, designed to facilitate the movement of vehicles, people, or goods between locations. Various types of roads are added in this layer, such as highways, metalled or gravelled roads, railways, and others. To visualise the Road layer, click the checkbox next to **Road** under Infrastructure in the Select Layers section, as shown below.

FIGURE 23

Road selection toggle

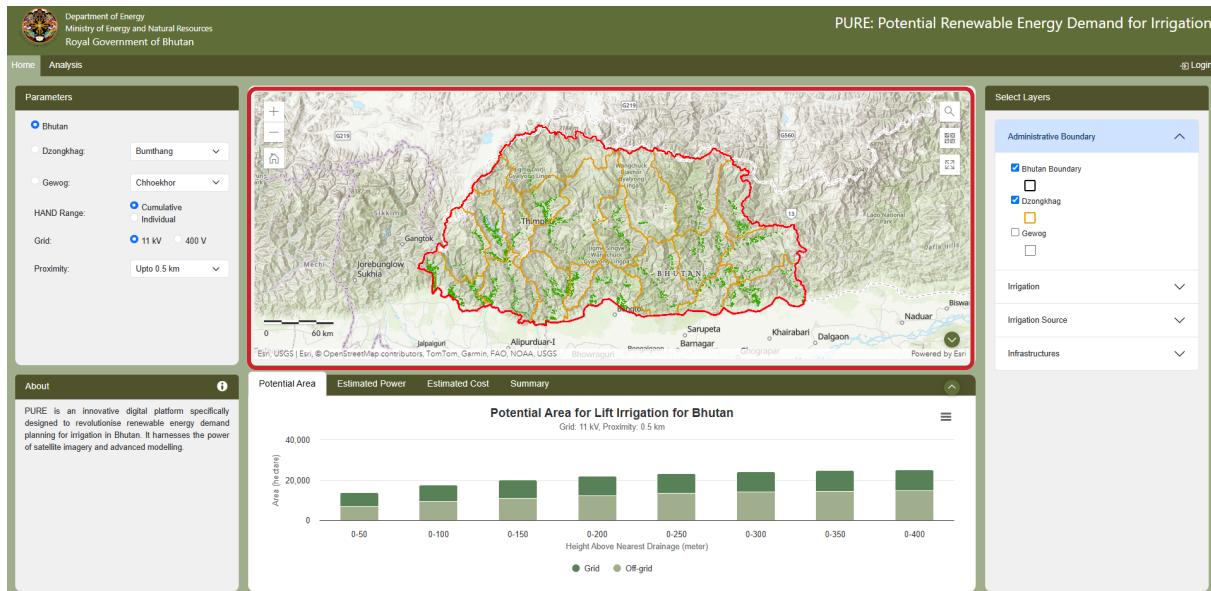


3.4 Visualisation

Top and centre of the platform is the Visualisation section, which displays the inputs selected under Parameters and Select Layers.

FIGURE 24

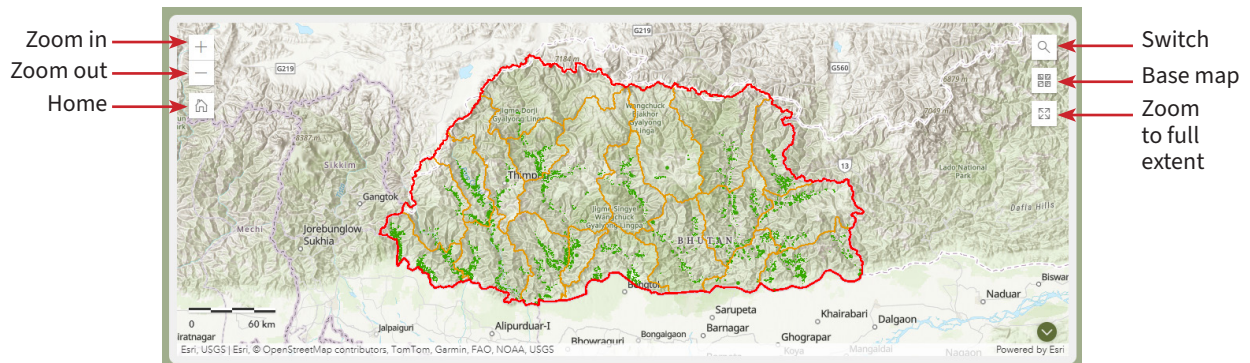
Visualisation section of the platform



To enhance viewing, there are six functions as shown in the figure below:

FIGURE 25

Functions for visualisation



a. ZOOM IN

This feature allows you to zoom in and magnify specific areas of interest, enabling detailed examination and more precise evaluation.

b. ZOOM OUT

This feature allows you to zoom out and reduce the magnification of the map, providing a broader view of the area and facilitating a more comprehensive understanding of the overall context.

c. DEFAULT MAP VIEW OR HOME

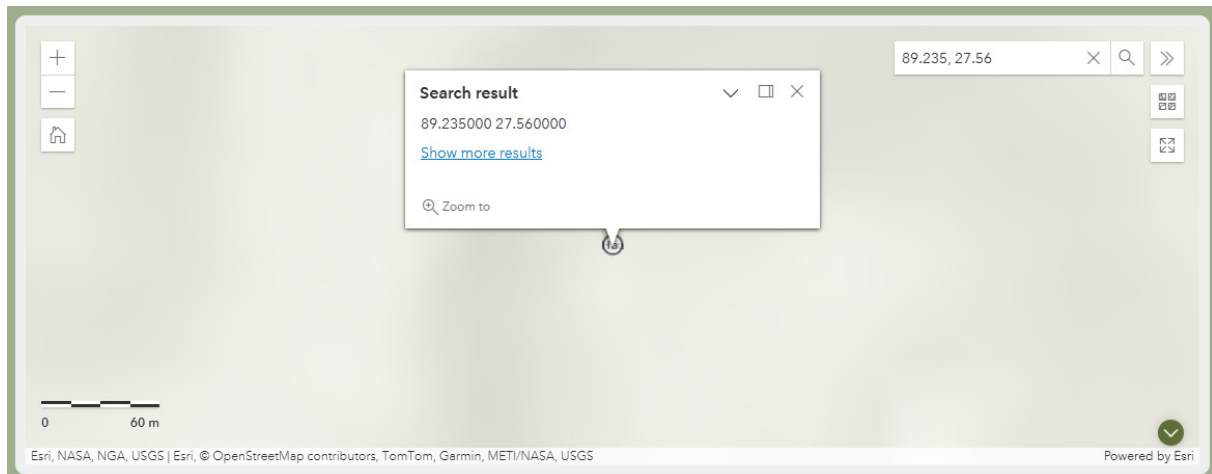
This feature allows you to return to the initial or standard map perspective, resetting the view to a predefined scale and position for a consistent starting point or overview of the entire area.

d. SEARCH

You have two options to search for a specific location: If you have the coordinates for the location, you can type out the longitude and latitude in the search bar, which will take you directly to the specified location.

FIGURE 26

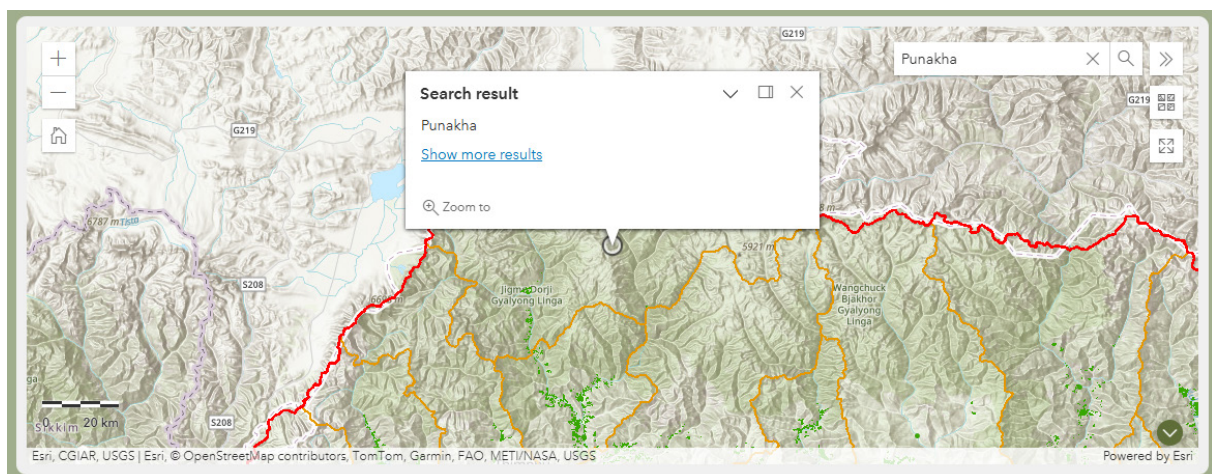
Location search with coordinates



Alternatively, you can type out the location name in the search bar, and it will direct you to the specified location.

FIGURE 27

Location search with physical address



e. BASE MAP

The platform also allows you to change the base map of the visualisation layer to Topographic, Imagery, and Dark Gray Canvas.

FIGURE 28

Base map visualisation

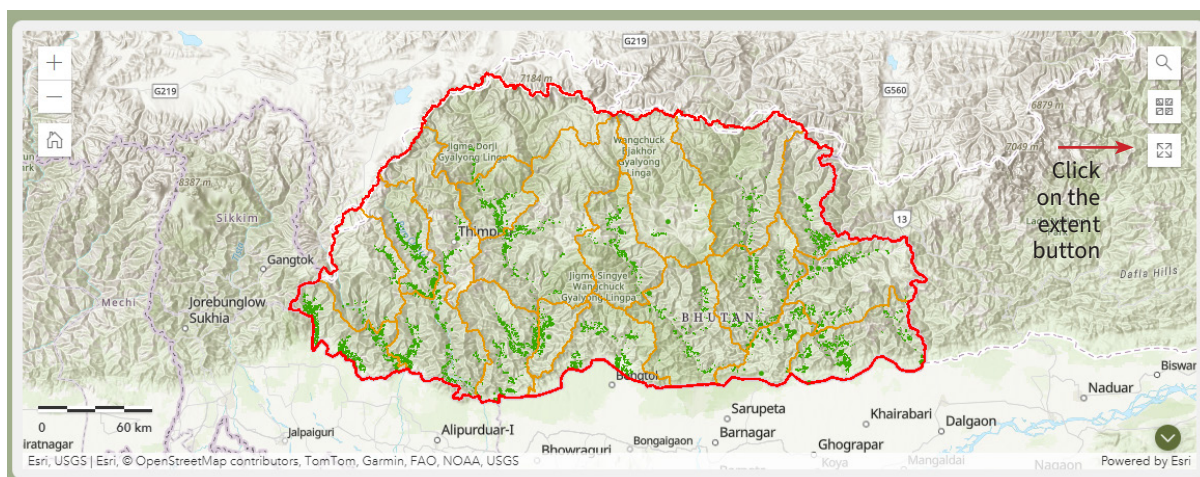


f. ENTER FULL SCREEN

This feature allows you to expand the map to its full extent in a maximised view, displaying the entire mapped area on the screen for a complete and comprehensive overview. To view the map in full screen, you have to click the full-screen button as shown in the figure below.

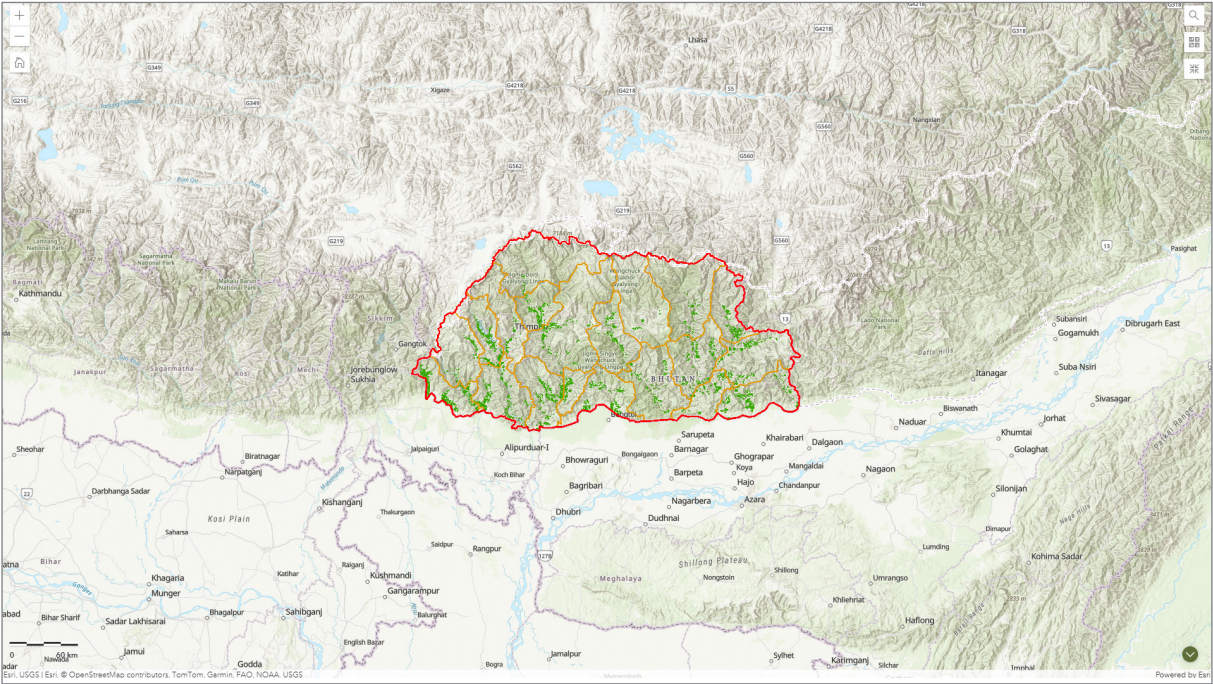
FIGURE 29

Pop-out option to enter full screen



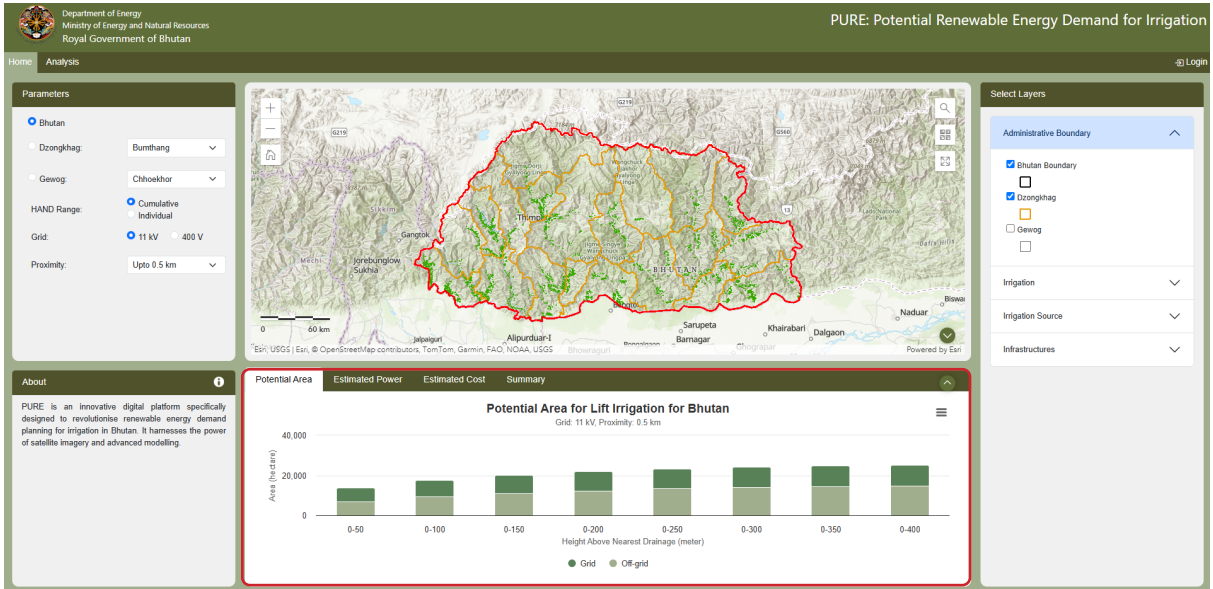
The map will be extended to the full-screen view as shown in the figure below. To exit full-screen view, click on the exit button.

FIGURE 30 Full-screen view

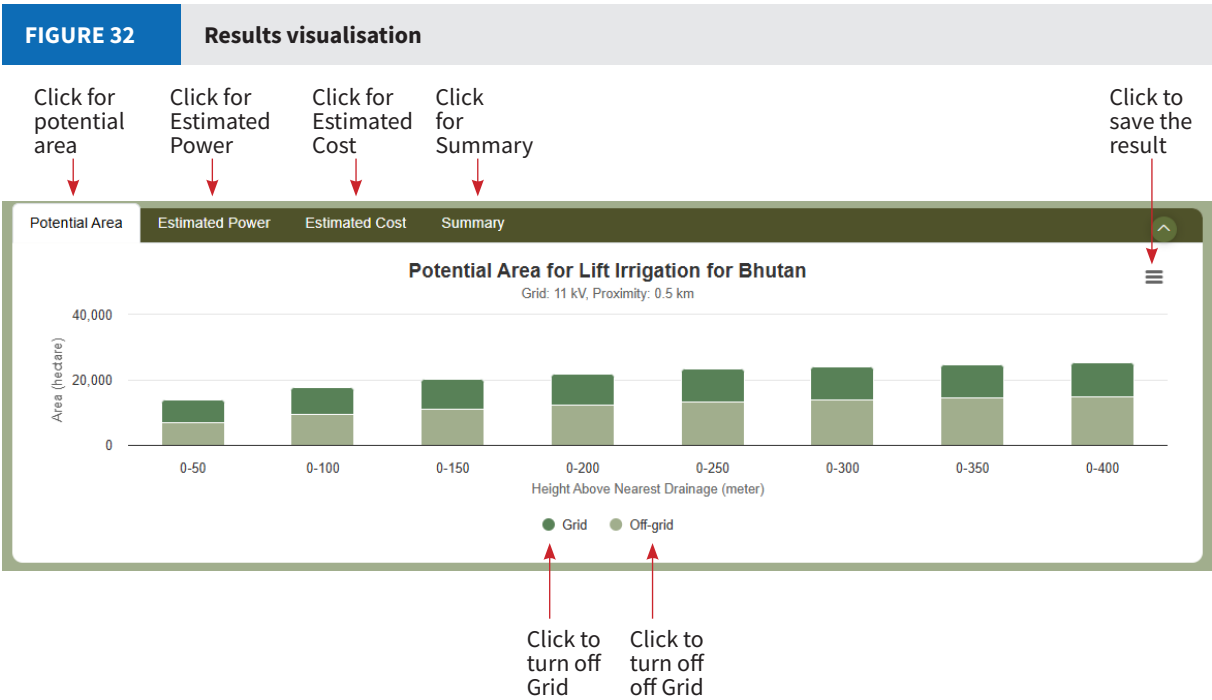


3.5 Results

FIGURE 31 Results section of the platform



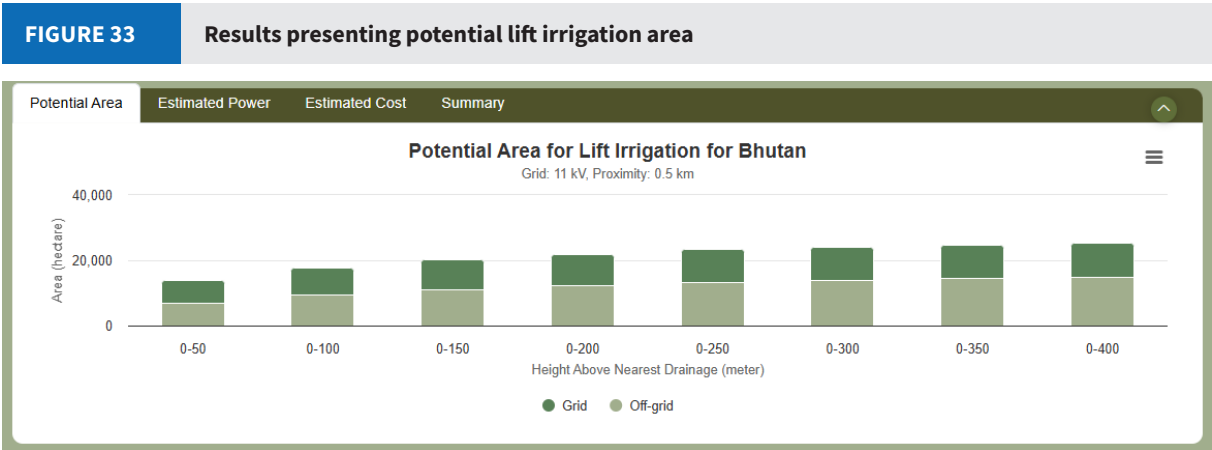
Based on the selected parameters, the Results section provides information on the potential area, estimated power, estimated cost and a summary of results. The results are displayed with four tabs to generate category-wise outputs, as illustrated in the figure below.



The graphs in the results section show the potential area in hectares, estimated power in megawatts, and estimated cost per million in BTN:

a. POTENTIAL AREA

The Potential Area section shows cultivable agricultural land that requires irrigation and can be serviced by river lift irrigation systems.



The bar graph illustrates the distribution of potential areas suitable for lift irrigation, categorised by their proximity to the grid. The title, positioned at the top of the graph, is “Potential Area for Lift Irrigation at [Location],” with a subtitle specifying “Grid Proximity.” The x-axis represents HAND in metres, while the y-axis quantifies the potential area in hectares. At the base of the graph, interactive toggles are provided, enabling the user to selectively display either the grid-based or off-grid results for independent analysis. You can hover the mouse over the graph to see the relevant values.

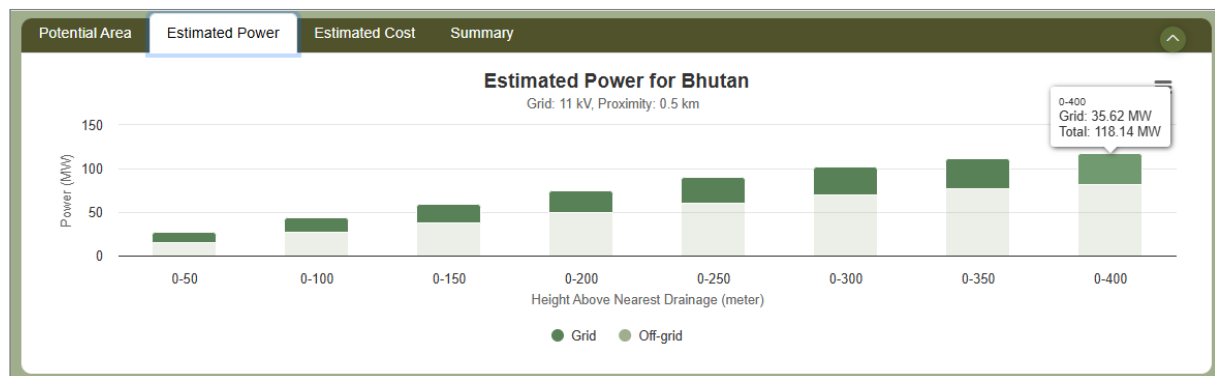
b. ESTIMATED POWER

Estimated power refers to the electrical power required to operate a pump in a lift irrigation system. The results provide power requirements in megawatts (MW). It is determined based on factors including the volume of water to be moved, the vertical distance (head) it is lifted, and the efficiencies.

To view the results for Estimated Power, you can apply input parameters as per your requirements as mentioned in the Parameters section. You can select five crops such as paddy, maize, wheat, cabbage, chilli, and potato for their respective power calculations.

FIGURE 34

Results presenting the estimated power required to irrigate the potential area



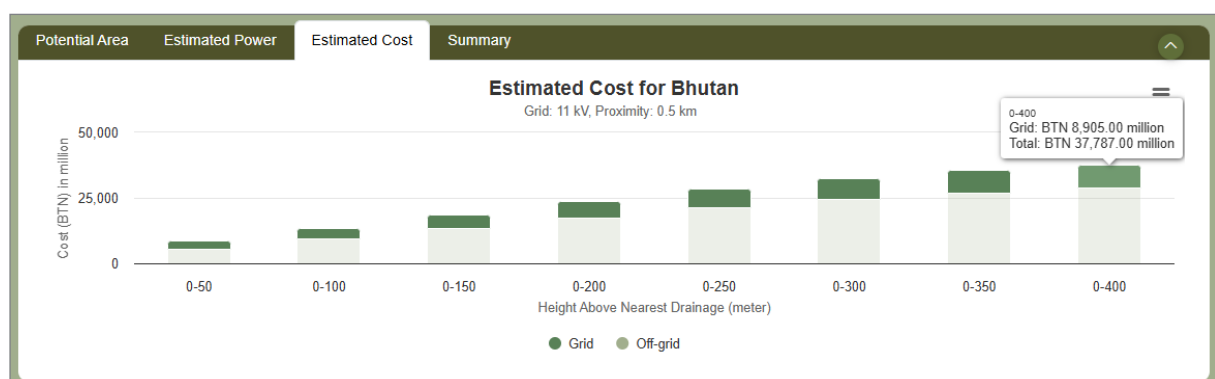
The bar graph illustrates the requirement of estimated power suitable for lift irrigation for the selected crop, such as paddy, categorised by proximity to the grid. The title is “Estimated Power for [Location],” with a subtitle specifying “Grid Proximity” and “Crop”. The x-axis represents (HAND) in metres, while the y-axis quantifies the estimated power in megawatts (MW). At the base of the graph, interactive toggles are provided, enabling you to selectively display either the grid-based or off-grid results for independent analysis. As shown in the figure above, you can hover the mouse over the graph to see the relevant values.

c. ESTIMATED COST

This tab provides the estimated cost of constructing a lift irrigation system. To view the result of the estimated cost, you can apply input parameters as per your requirements as mentioned in the Parameters section.

FIGURE 35

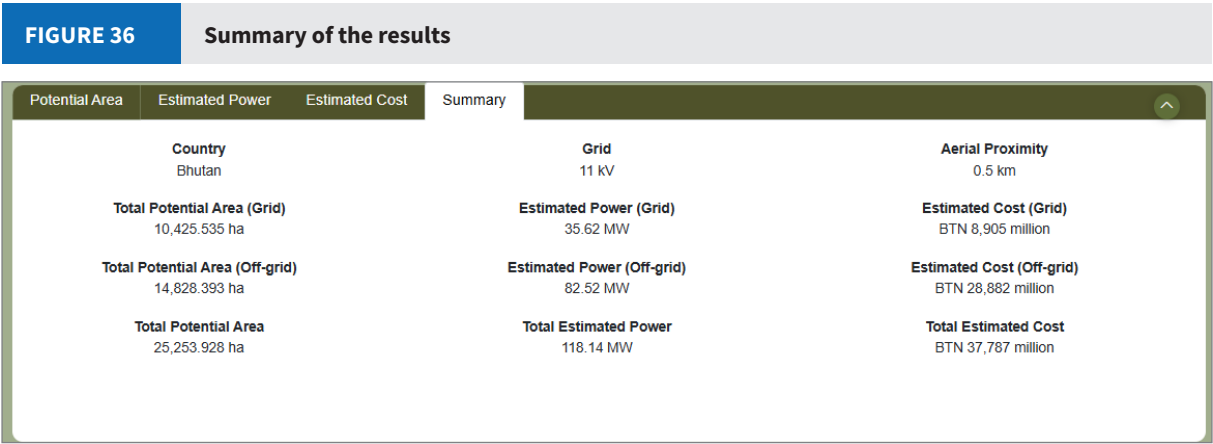
Results presenting the estimated cost required to irrigated the potential area



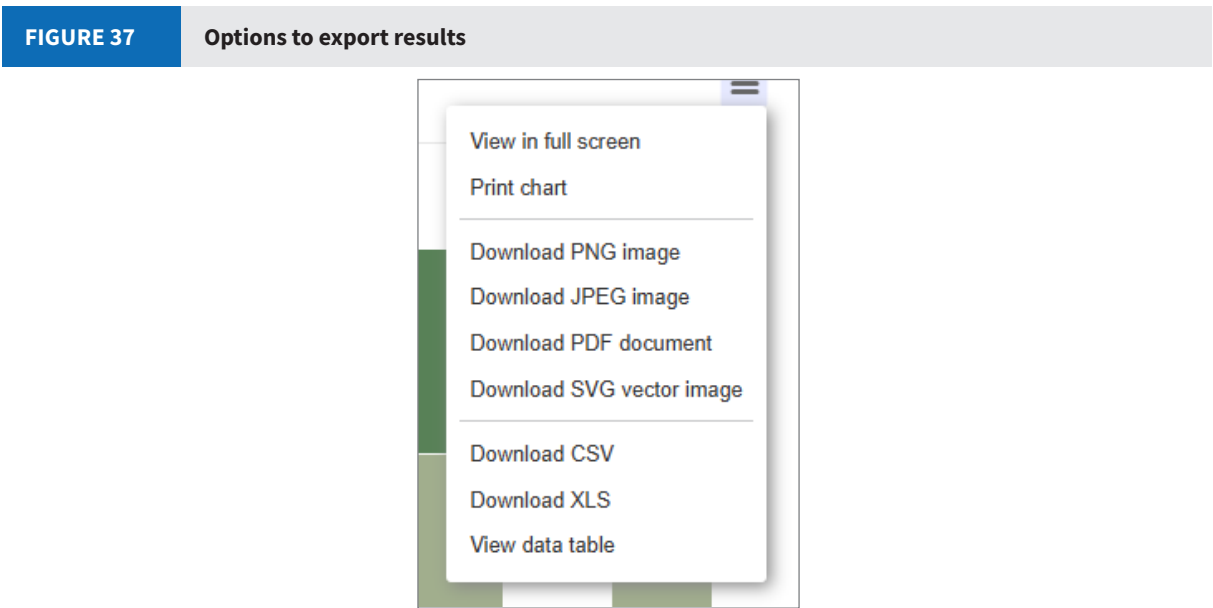
The bar graph illustrates the estimated cost required for lift irrigation for the selected crop, such as paddy, and the overall power required, categorised by proximity to the grid. The title is “Estimated Cost for [Location],” with a subtitle specifying “Grid Proximity” and “Crop”. The x-axis represents the HAND in metres, while the y-axis quantifies the estimated cost (BTN) in millions. At the base of the graph, interactive toggles are provided, enabling you to selectively display either the grid-based or off-grid results for independent analysis. As shown in the figure above, you can hover the mouse over the graph to see the relevant values.

d. SUMMARY

The Summary tab displays detailed information that includes administrative boundaries (e.g., Country, Province), grid proximity, selected crop, potential area (grid based, off-grid, and total), estimated power (grid based, off-grid, and total), and estimated cost (grid based, off-grid, and total). A sample summary is shown in figure below.



Once your results are finalised, you can save or download them in various file formats, as shown in the figure below. In the results section displaying the potential area, estimated power, and estimated cost, a three-line icon is located in the top right corner. Clicking this button shows a menu containing options to save the graphs.



CHAPTER 4

Analysis tab

The **Analysis tab** offers site-specific analysis to generate a pre-feasibility report for RE-powered lift irrigation systems at user-defined locations.

4.1 Access

1. Open your web browser:

- Open your preferred web browser (e.g., Google Chrome, Mozilla Firefox, Microsoft Edge, etc.)

2. Enter the platform URL:

- In the address bar of your browser, type the following URL and press enter or click the link below to go directly to the platform: <http://geoapps.icimod.org/BhutanPure>

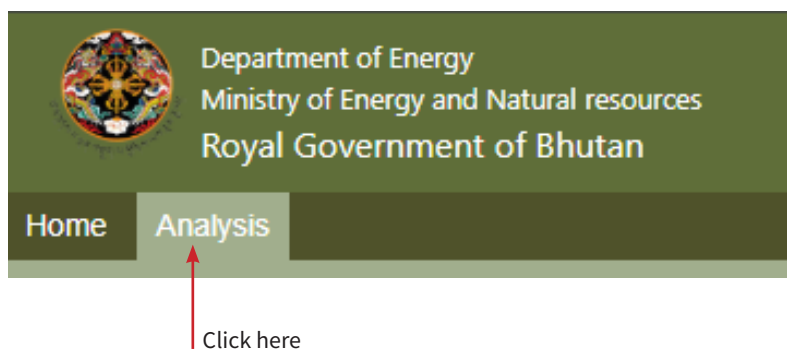
3. After entering the URL, you will be directed to the PURE platform page for Bhutan.

4.2 Detailed instructions

Upon accessing the **main page**, the user will observe two tabs located in the top left corner, labelled **Home** and **Analysis**. All analyses are conducted within the analysis section. To proceed, click the **Analysis** tab.

FIGURE 38

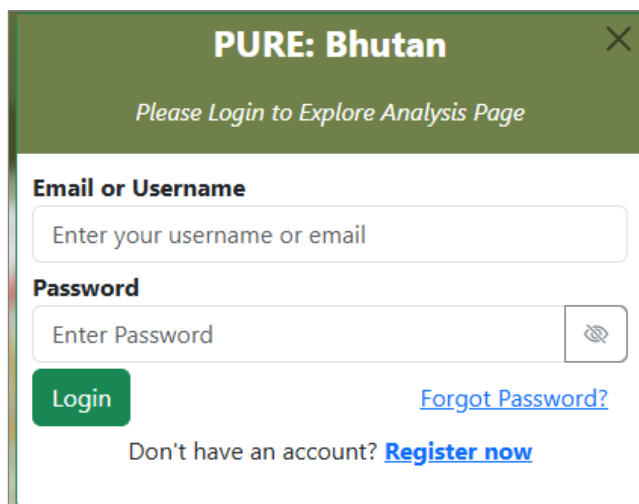
Analysis tab



Upon selecting the **Analysis** tab, you will be directed to the **login** section. If you already have an account, simply enter your username or email along with the password to log in. Otherwise, you must first create an account.

FIGURE 39

Login box



4.2.1 Creating an account

As shown in the figure above, to create an account, click on **Register now**. This will direct you to the account creation section as shown in the figure below and you will be required to fill in the information as follows.

- Username: Enter your preferred username in the designated field. This will serve as your identifier for logging in.
- Email Address: Enter your preferred email address in the designated field. This will also serve as your identifier for logging in.
- First Name: Provide your given name in the designated field.
- Last Name: Enter your family or surname in the designated field.
- Phone Number: Input your active contact number, including the country code.
- Gender: Select your gender from the available options (e.g., Male, Female, Other).
- User Type: Choose your account category (e.g., Government, Private, NGO, INGO, Other) from the dropdown.

In the case of other, the user can specify the user type.

- Password: Create a secure password adhering to the specified requirements such as 8+ characters with uppercase letter, lowercase letter, number, and special character.
- Confirm Password: Re-enter the password to ensure it matches the previous entry.
- Click on **Create Account**:

FIGURE 40

New account registration box

PURE: Bhutan

✕

👤+ Create New Account

Username

👤

3-20 characters, letters, numbers, and @/./+/-/_ allowed

Email Address

✉

Enter valid email address

We'll send a verification link to this email.

First Name

👤

Last Name

👤

Phone Number

☎

+975

Format: +975xxxxxxxx (8 digits after +975)

Gender

♀

Male

▼

User Type

👥

Government

▼

Password

🔒

Create a strong password

👁

8+ characters with uppercase, lowercase, number, and special character

Confirm Password

🔒

Repeat your password

👁

Re-enter your password to confirm

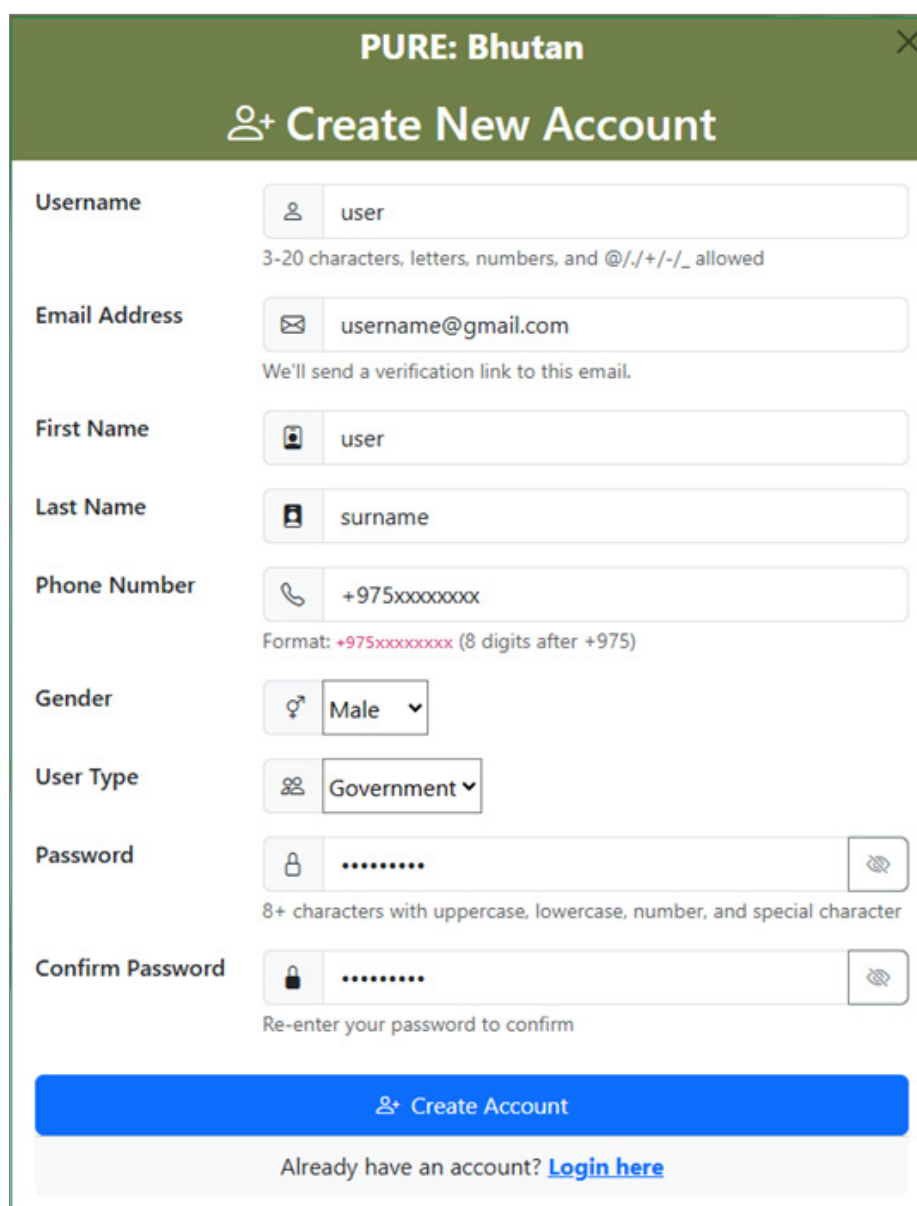
👤+ Create Account

Already have an account? [Login here](#)

Sample registration details are given in the following figure.

FIGURE 41

Sample registration details



The screenshot shows a web form titled "PURE: Bhutan" with a sub-header "Create New Account". The form contains the following fields and options:

- Username:** Input field with "user". Hint: "3-20 characters, letters, numbers, and @/./+/-/_ allowed".
- Email Address:** Input field with "username@gmail.com". Hint: "We'll send a verification link to this email."
- First Name:** Input field with "user".
- Last Name:** Input field with "surname".
- Phone Number:** Input field with "+975xxxxxxx". Hint: "Format: +975xxxxxxx (8 digits after +975)".
- Gender:** Dropdown menu with "Male" selected.
- User Type:** Dropdown menu with "Government" selected.
- Password:** Input field with masked characters ".....". Hint: "8+ characters with uppercase, lowercase, number, and special character".
- Confirm Password:** Input field with masked characters ".....". Hint: "Re-enter your password to confirm".

At the bottom, there is a blue button labeled "Create Account" and a link: "Already have an account? [Login here](#)".

After clicking on Create Account, an account will be created, and a confirmation email will be sent to the given email address. For the confirmation, click on **Confirm Email**, which will automatically direct you to the login page.

Now, log in with your username or email address and password. Then click the **Login** button to get to the Analysis page. The first view will be as shown in the figure below.

FIGURE 42

Create new project

PURE: Bhutan

Create New Project

Project Name

Project Details Select Dzongl ▾ Select Gewog ▾

Ward number

Estimated Number of Beneficiary Households

Project Type Irrigation Only ▾

Project Extent Draw Polygon Clear Drawing

[Not now](#)

4.2.2 Creating a new project

If you are using this platform for the first time, you will be directed to the Create New Project section after logging in. To create a new project, you need to provide the following information:

- Project Name: Enter the relevant project name. For instance, Punakha Irrigation Project.

FIGURE 43

Project location details

Select Dzongl ▾

- Select Dzongkhag
- Bumthang
- Chhukha
- Dagana
- Gasa
- Haa
- Lhuentse
- Mongar
- Paro
- Pemagatshel
- Punakha**
- Samdrup Jongkhar
- Samtse
- Sarpang
- Tashi Yangtse
- Tashigang
- Thimphu
- Trongsa
- Tsirang
- Wangdue Phodrang

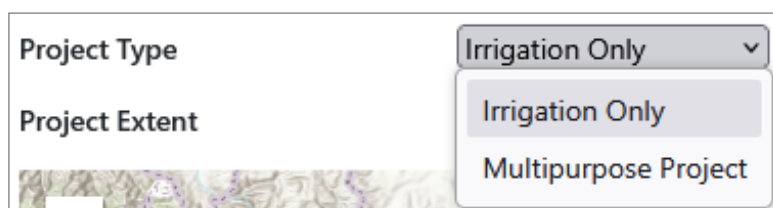
Select Gewog ▾

- Select Gewog
- Barp
- Chhubu
- Dzomi
- Goenshari
- Guma**
- Kabjisa
- Lingmukha
- Shengana
- Talo
- Toepisa
- Toewang

- b. Project Details: Select all two levels of administrative boundaries: Dzongkhag and Gewog. For example, Punakha Dzongkhag and Guma Gewog.
- c. Chiwog: Enter the name of the Chiwog for which the project analysis will be performed.
- d. Estimated Number of Beneficiary Households: Enter the number of households that will benefit from this project.
- e. Project Type: Select the type of project such as **Irrigation Only** or **Multipurpose Project**. Irrigation only means the project will be solely for the purpose of irrigation. Multipurpose Project means the project will also benefit other purposes in addition to irrigation purposes, such as drinking water, etc.

FIGURE 44

Project type

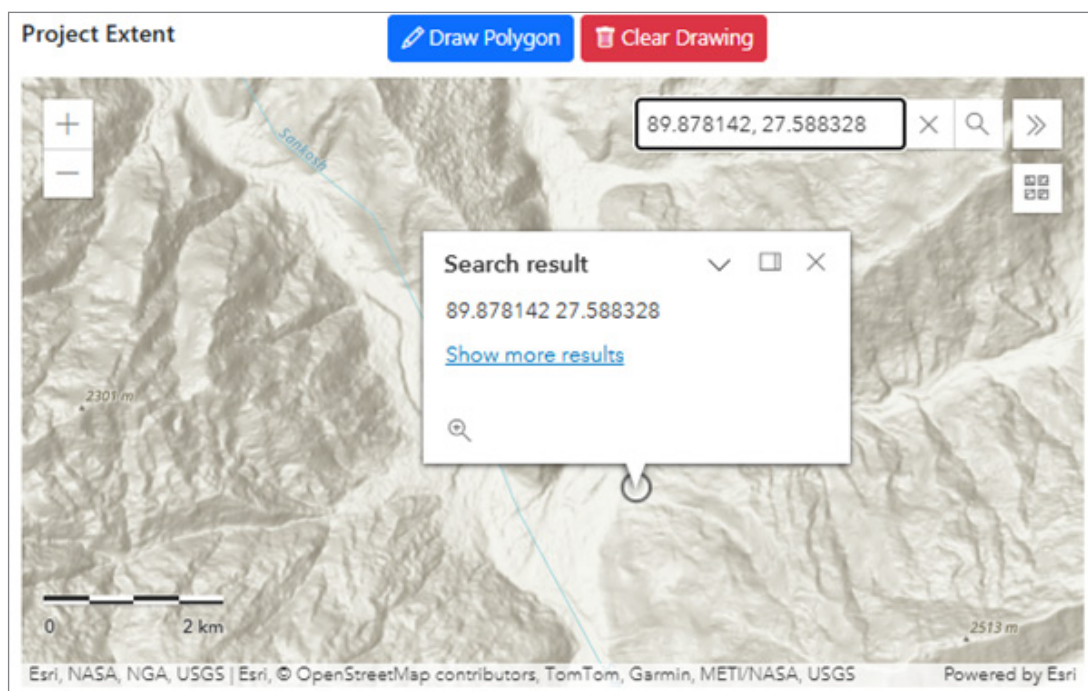


The screenshot shows a web interface with two labels: 'Project Type' and 'Project Extent'. Below 'Project Type' is a dropdown menu that is open, showing two options: 'Irrigation Only' (selected) and 'Multipurpose Project'. Below 'Project Extent' is a small map preview showing a terrain with a blue line and a red dot.

- f. Project Extent: Project extent is the tentative area of interest for performing the analysis to potentially plan or create a project. To define a project's extent, begin by **zooming in** on the specific area of interest. You may utilise the zoom-in tool to enlarge the map and focus on the desired area. Alternatively, if you possess **specific coordinates**, you can put the longitude and latitude directly into the provided fields, which will navigate the map to the corresponding location.

FIGURE 45

Search with coordinates (Go to location)



You have three base map options: Topographic, Imagery, and Dark Grey Canvas as shown in the following figures.

FIGURE 46 Base map, topographic

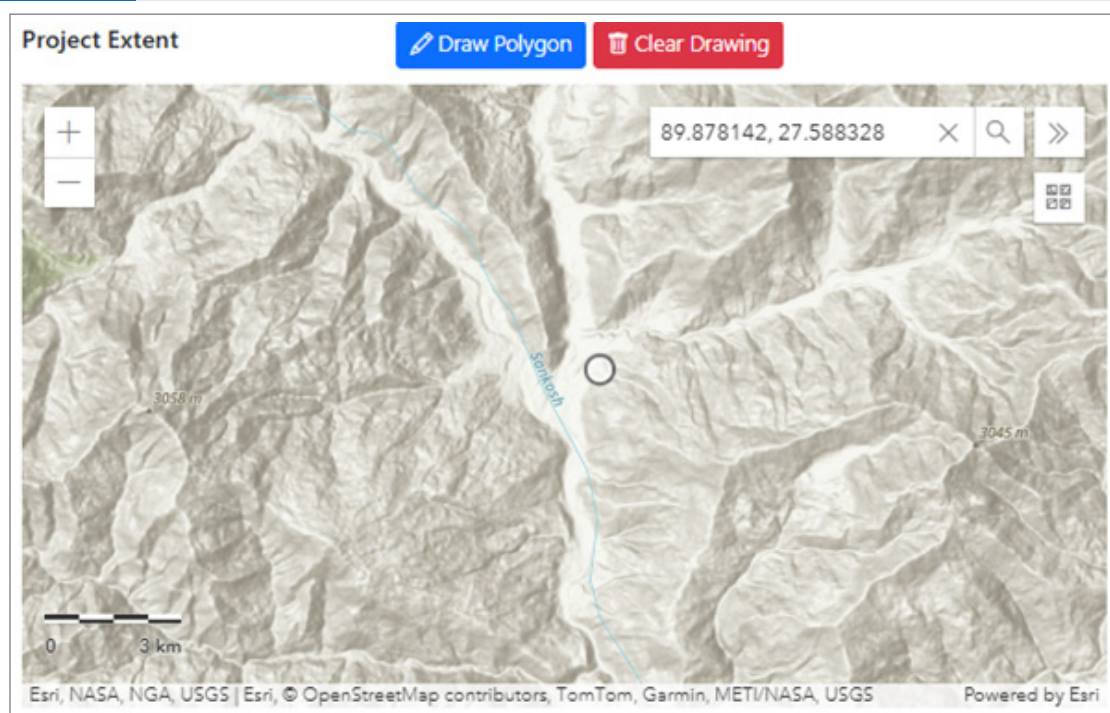


FIGURE 47 Base map, satellite imagery

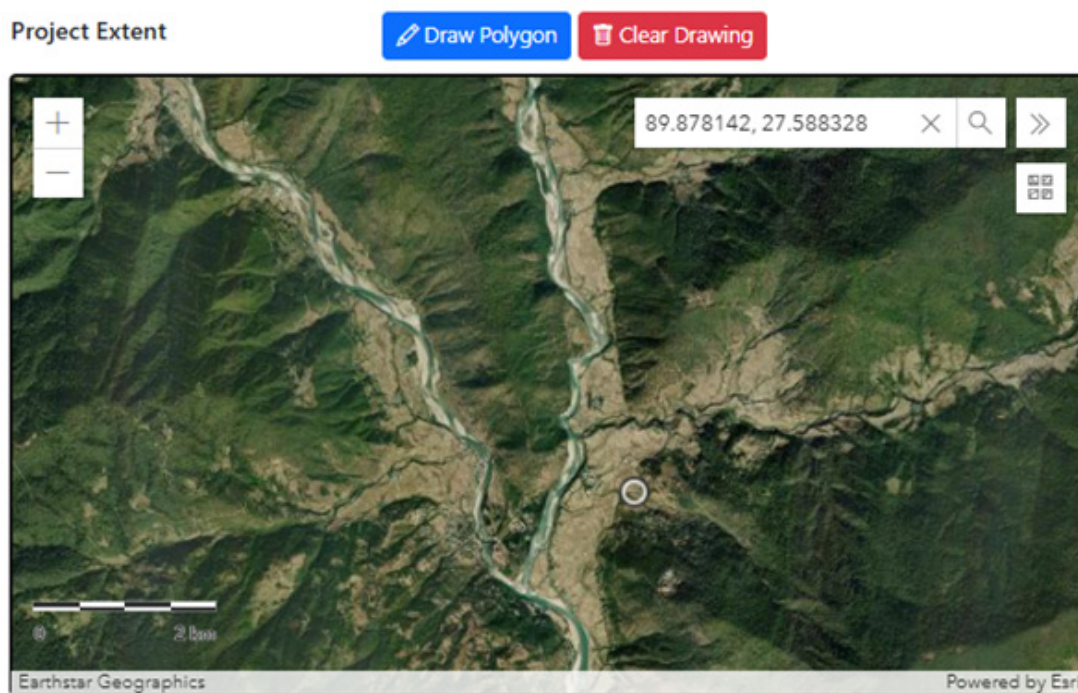
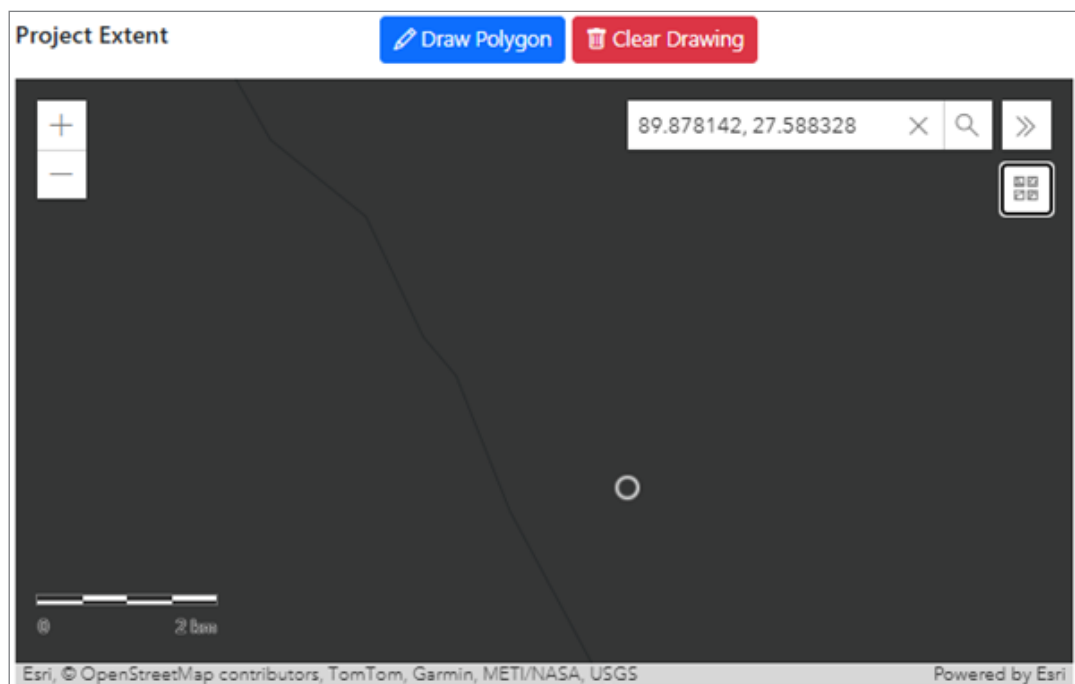


FIGURE 48

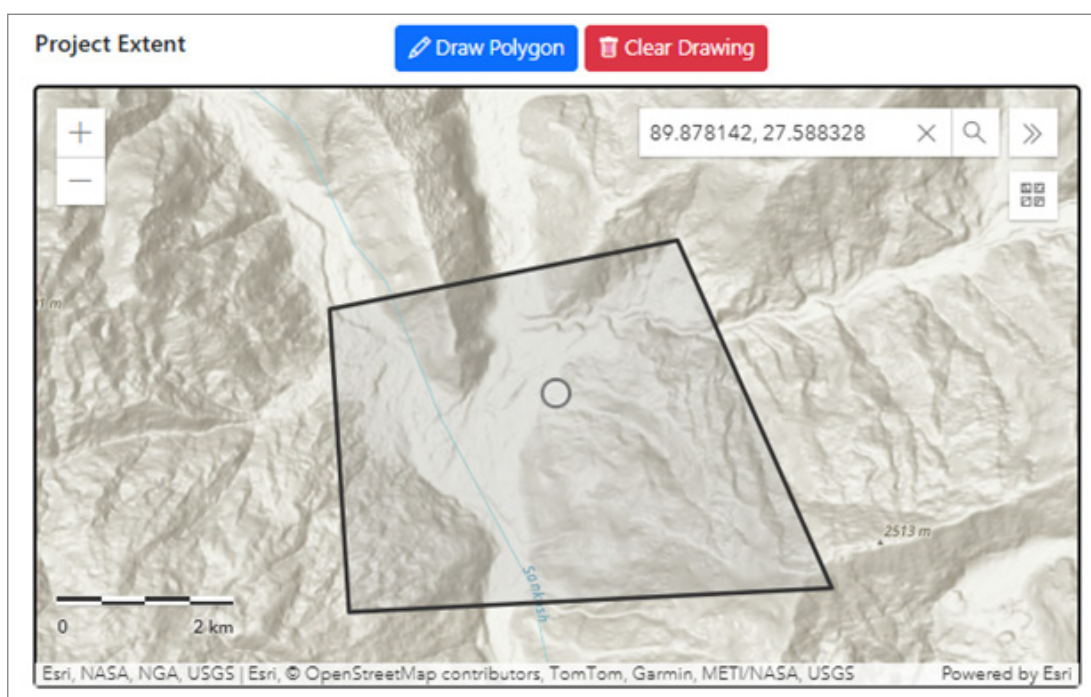
Base map, dark grey canvas



You can draw a polygon on the map to confirm the area of interest. After this, you will be automatically taken to the area of interest. To do this, click the **Draw Polygon** button and draw the required polygon as shown in the figure below. If you need to redraw the polygon, you can click on **Clear Drawing** to delete the polygon and then proceed to create a new polygon by again clicking on Draw Polygon.

FIGURE 49

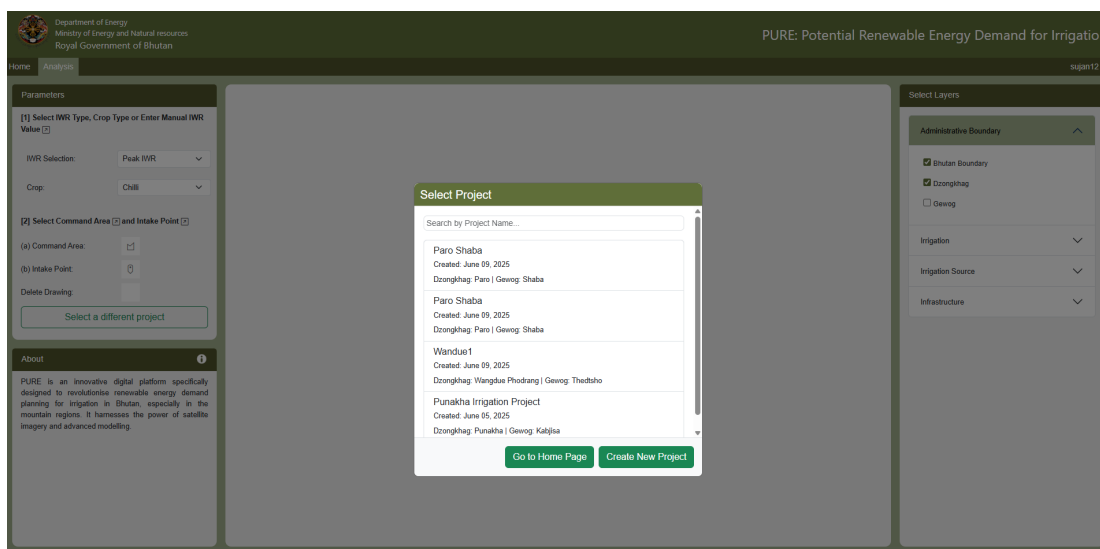
Define specific area for analysis



- g. Create Project: After the polygon is finalised, click on **Create Project** to create a project. The first outlook of the project created is shown in the figure below. All the analysis projects created under this specific project can be found in this list. If there are a number of projects available in the list, you can select the specific project you are working on for the analysis.

You also have the option to search for the project with the name of the project by typing in **Search by project name**. From here, you can go to the Home page by clicking on **Go to Home Page**. In the meantime, you can also create another new project by again clicking on the **Create New Project** button.

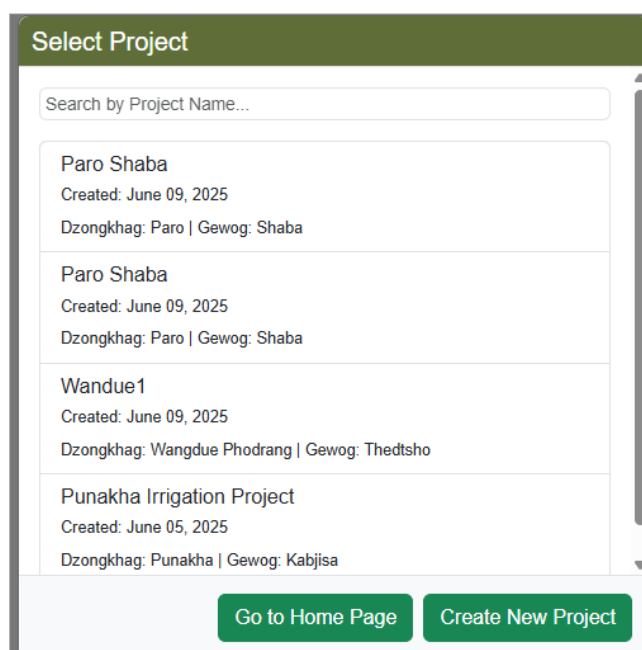
FIGURE 50 First outlook of the project(s) created



4.2.3 Selecting a project

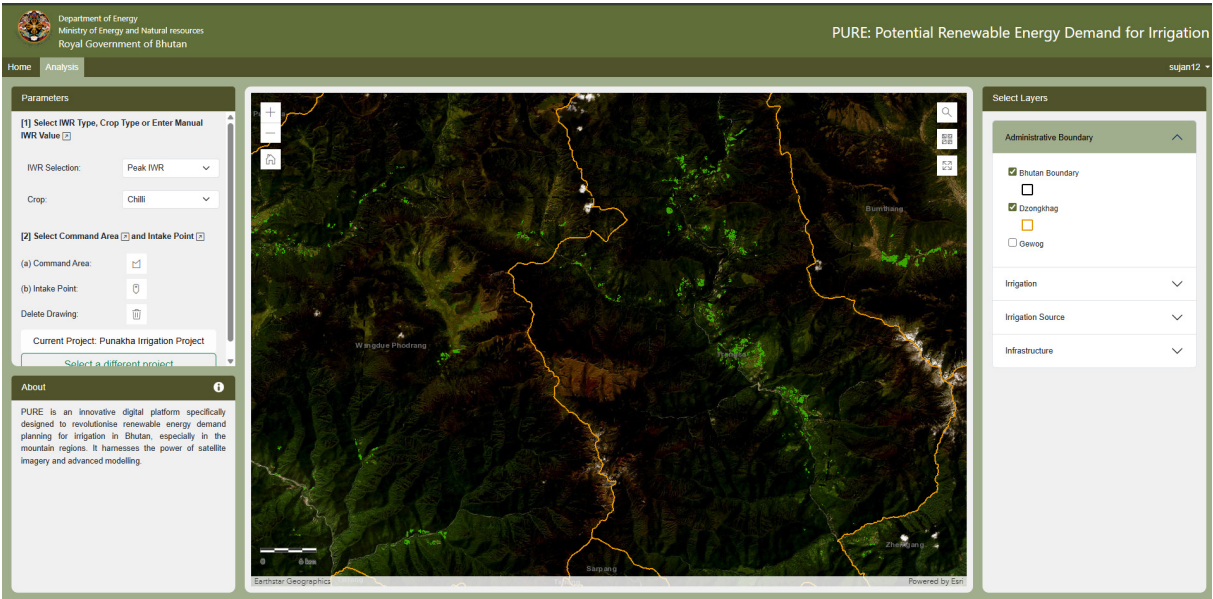
For further analysis, click on the project for example, Punakha Irrigation Project.

FIGURE 51 Selecting a project



The project's initial display will look like this:

FIGURE 52 Display of selected project



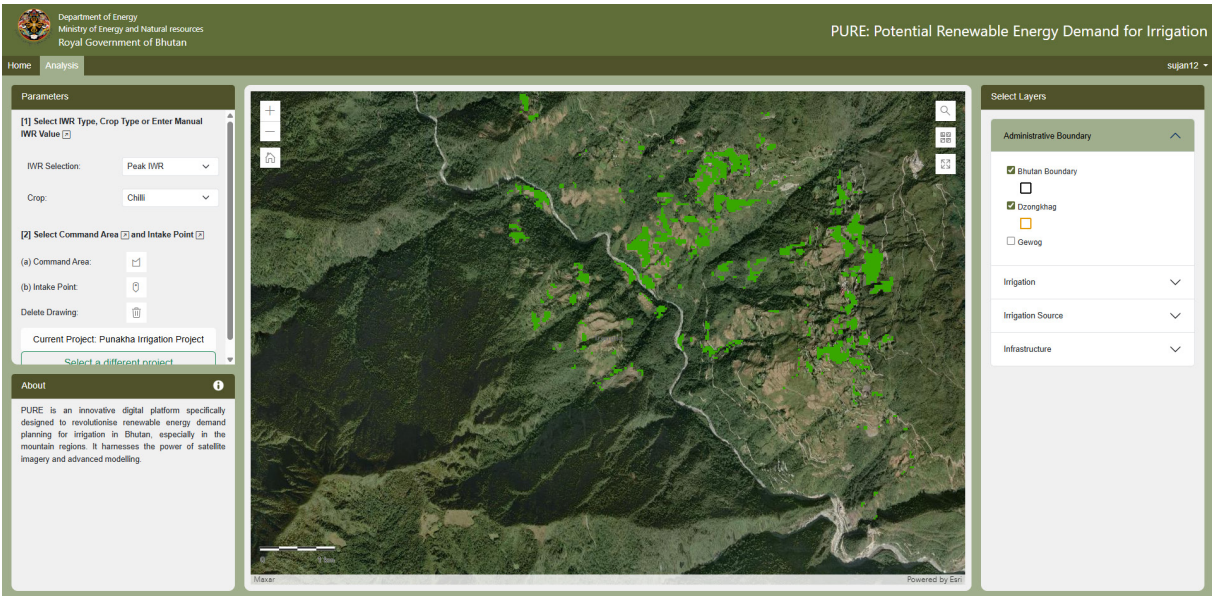
4.2.4 Perform analysis

Perform Analysis refers to the process of estimating the power and cost requirement based on the input parameters, that is, the command area and intake point. It also includes all other information associated with evidence for decision-making in selecting the potential area for river lift irrigation, such as head, river annual average discharge per month, and a list of vegetable markets.

The steps to perform the analysis are as follows:

- a. Zoom in to the exact area of the project where you want to perform the analysis.

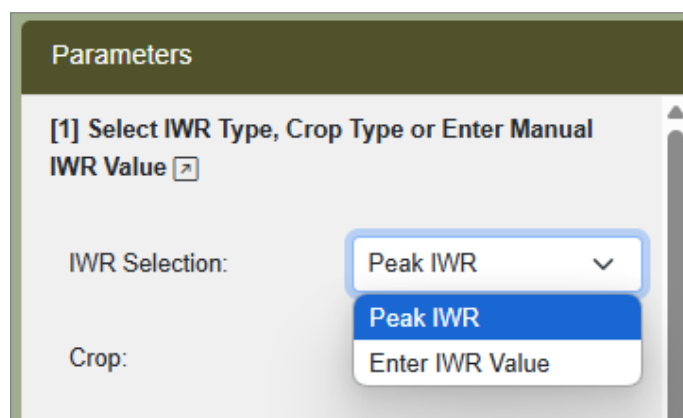
FIGURE 53 Specific location to perform the analysis



- b. Select the Irrigation Water Requirements (IWR) type. The platform has two types of IWR: Peak IWR, and Enter IWR Value. Select one of these from the dropdown menu next to **IWR Selection**.

FIGURE 54

Select IWR option

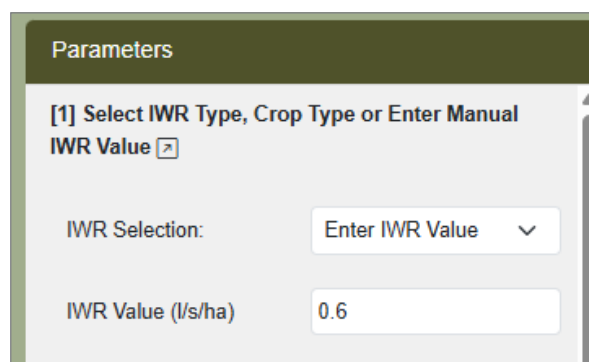


The screenshot shows a web form titled "Parameters". Below the title is a section header "[1] Select IWR Type, Crop Type or Enter Manual IWR Value" with a small icon. There are two labels: "IWR Selection:" and "Crop:". The "IWR Selection:" label is next to a dropdown menu that is open, showing three options: "Peak IWR" (selected), "Peak IWR", and "Enter IWR Value". The "Crop:" label is next to an empty input field.

- **Peak IWR (l/s/ha):** This represents the highest water demand for irrigation at any point during the crop's growing season.
- **Enter IWR Value (l/s/ha):** If you are familiar with the IWR values, you can manually enter the IWR in litres per second per hectare (l/s/ha). For reference, the Peak IWR for paddy (rice) is approximately 10 l/s/ha. Please exercise caution when entering IWR values manually to ensure accuracy.

FIGURE 55

Enter IWR value



The screenshot shows the same "Parameters" form. The "IWR Selection:" dropdown menu is now set to "Enter IWR Value". Below it, the "IWR Value (l/s/ha)" label is next to an input field containing the value "0.6".

- c. Select the crop type: Different types of crops are added to the platform for the analysis. The IWR for each district has been integrated into the platform. You can select crops from a dropdown menu next to **Crop**. The types of crops integrated into the platform are paddy, maize, wheat, cauliflower, and potato. The average and peak IWR for various crop types are calculated and added.

FIGURE 56

Select crop

The screenshot shows a web interface titled 'Parameters'. It contains several sections: '[1] Select IWR Type, Crop Type or Enter Manual IWR Value' with a 'Peak IWR' selection and a 'Crop' dropdown menu; '[2] Select Command Area' with sub-sections for '(a) Command Area' and '(b) Intake Point'; and a 'Delete Drawing' button. The 'Crop' dropdown menu is open, showing a list of crops: Chilli, Cabbage, Potato, Wheat, Maize, and Paddy. The 'Potato' option is highlighted with a blue background.

- d. Draw Command Area: Command area is the user-defined service area within the feasible coverage of a river lift irrigation system, delineating the extent of land that can be reliably irrigated. To draw the command area, first click on the polygon symbol beside **Command Area**, then draw the polygon in the map layer. The message indicating “Polygon drawn successfully. Now please set the intake point.” Then click on OK.

FIGURE 57

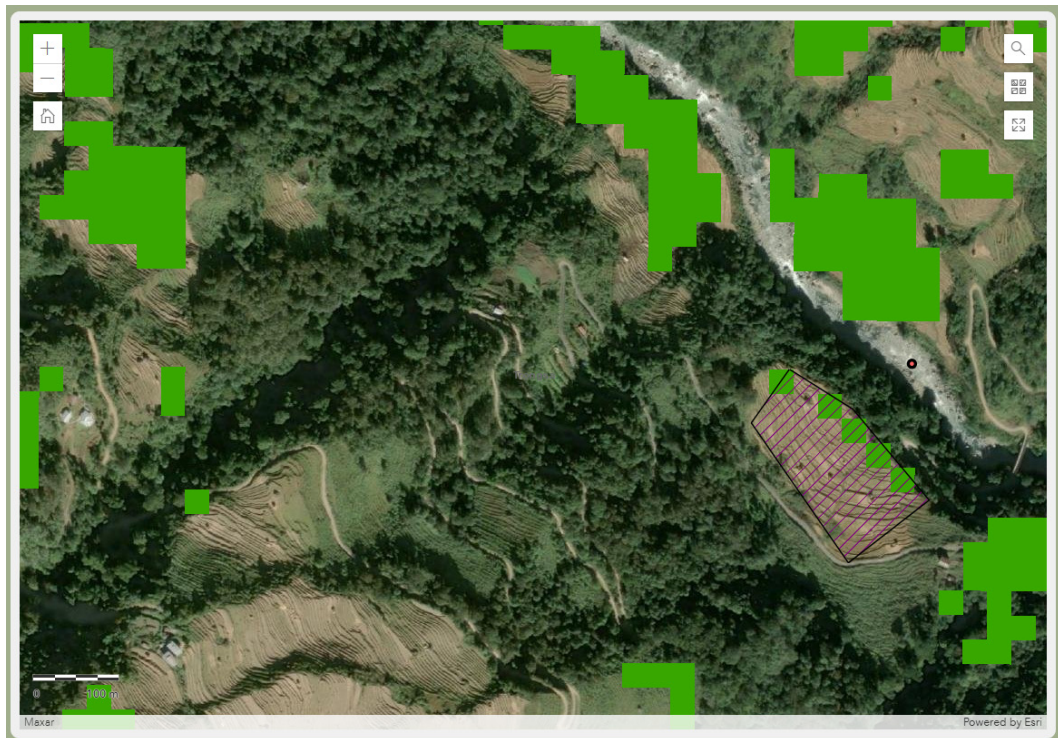
Click to draw a polygon

This screenshot shows the same 'Parameters' form as Figure 56, but with the 'Crop' dropdown menu closed. A red arrow points from the text 'Click here to draw command area' to a polygon icon located next to the '(a) Command Area' label. The form also shows the '(b) Intake Point' section with a pin icon, a 'Delete Drawing' button, and a 'Current Project: Punakha Irrigation Project' section with a 'Select a different project' link.

FIGURE 58**Draw polygon in the users' area of interest**

- e. Draw Intake Point: The intake point is the location just near the river from where water is drawn for lift irrigation. First click on the point symbol beside Intake Point, then draw the point in the map layer. The message indicates “Point drawn successfully.” Then, click on OK.

FIGURE 59**Click here to draw intake point**A screenshot of a web form titled "Parameters". The form is divided into two main sections. Section [1] is titled "[1] Select IWR Type, Crop Type or Enter Manual IWR Value" and contains two dropdown menus: "IWR Selection:" with "Peak IWR" selected, and "Crop:" with "Chilli" selected. Section [2] is titled "[2] Select Command Area and Intake Point" and contains two rows: "(a) Command Area:" with a map icon, and "(b) Intake Point:" with a point icon. To the right of the point icon is a black button labeled "Draw point". Below these sections is a text field showing "Current Project: Punakha Irrigation Project" and a link "Select a different project". A red arrow points from the text "Click here to draw intake point" to the point icon in the "(b) Intake Point:" row.

FIGURE 60**Draw intake point**

- f. Delete Drawing: If the plot is incorrect, you have the option to delete it before redrawing the intake point. To do this click on the delete symbol next to **Delete Drawing**.

FIGURE 61**Delete polygon**

Parameters

[1] Select IWR Type, Crop Type or Enter Manual IWR Value [?](#)

IWR Selection:

Crop:

[2] Select Command Area [?](#) and Intake Point [?](#)

(a) Command Area:

(b) Intake Point:

Delete Drawing:

Current Project: Punakha Irrigation Project

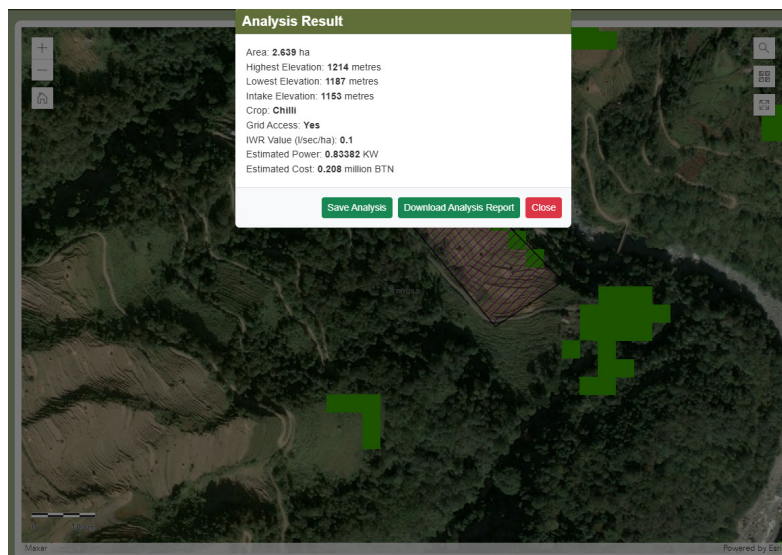
[Select a different project](#)

Click here to delete drawing

Once the input parameters are completed, the analysis results will pop up. The results consists of area, highest elevation, lowest elevation, intake elevation, crop, grid access, IWR value, estimated power, and estimated cost.

FIGURE 62

Analysis result



When obtaining the final result as per the required parameters and inputs, you can save the analysis by clicking the Save Analysis button. Then you can download the saved analysis in PDF format, for which you can simply click on Download Analysis Report.

4.2.5 Perform new analysis for the same project

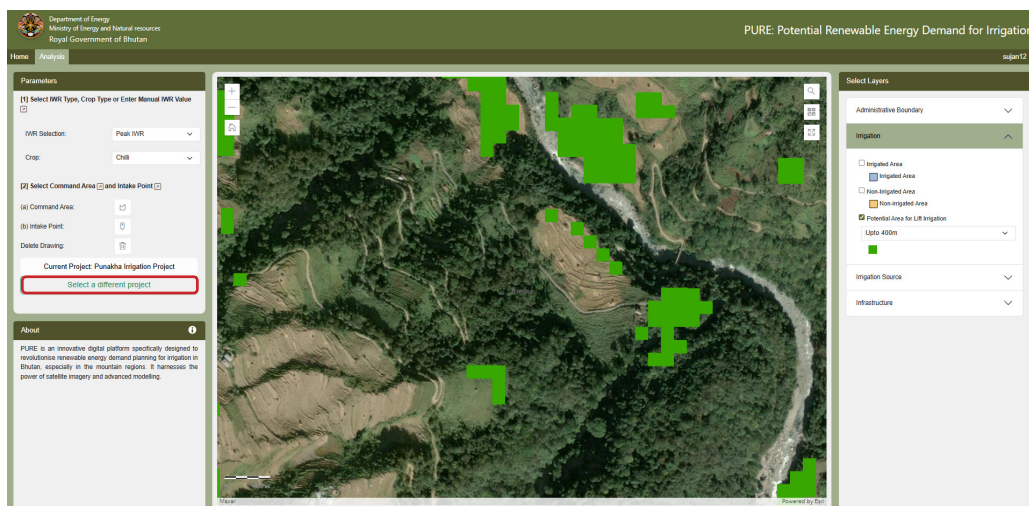
If you want to perform another analysis for the same project, you can simply restart a new analysis under the Perform Analysis section as described above.

4.2.6 Perform new analysis for a different project

To create or select a different project, click on **Select a different project**.

FIGURE 63

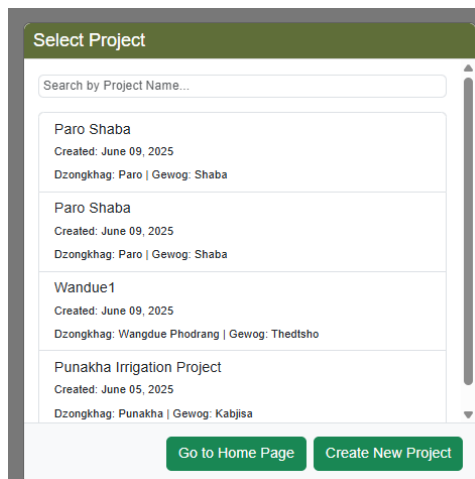
Selecting a different project



After clicking on Select a different project a list of saved projects will be displayed. To create a new project, simply click on Create New Project and follow the steps as explained above. To perform a new analysis for a different project, simply click on the project and perform the analysis.

FIGURE 64

Selecting the project

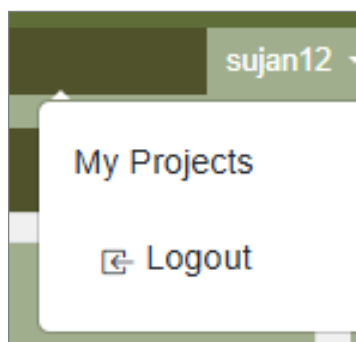


4.2.7 Check the project and analysis created and saved.

To check the list of projects and analyses saved, click on the user account on the top right and click on My Projects. It will direct you to the list of projects.

FIGURE 65

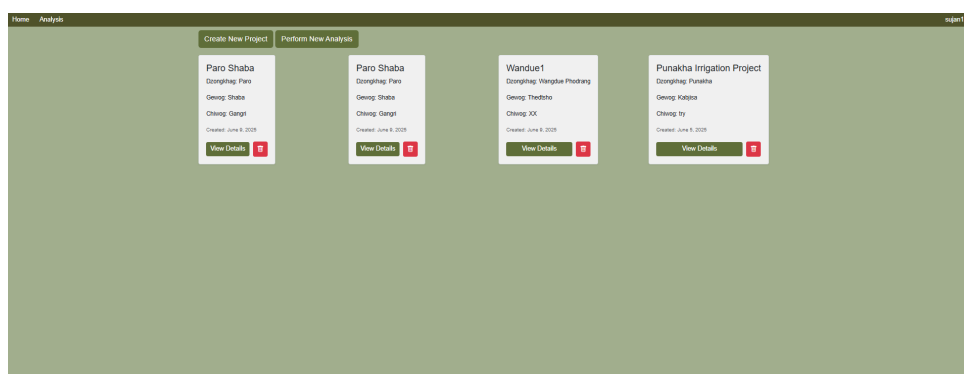
Click on My projects



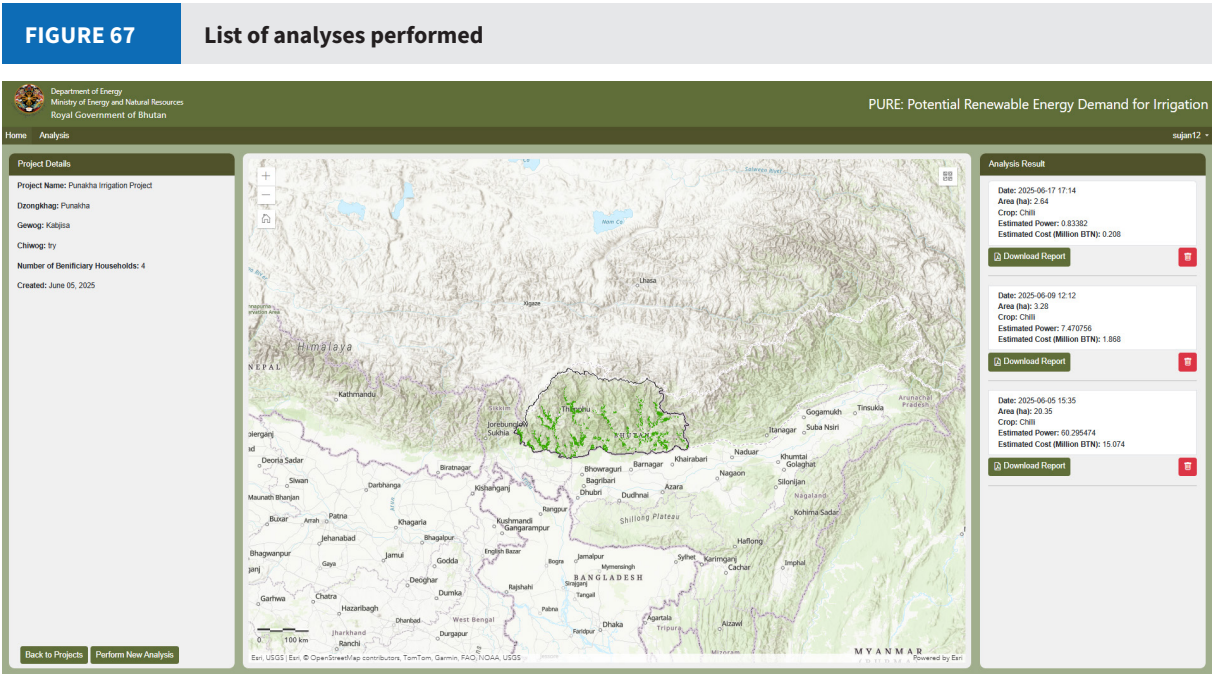
After you click on the My Projects, you will see the number of projects that have been created by the specific user.

FIGURE 66

List of projects created by specific user



You can check the list of analyses performed, as shown in the figure, by clicking on the View Details button. If the project is not useful, you can delete the entire project by clicking on Delete.



You can again download a report by clicking on Download report. If the analysis is not useful, you can delete it by clicking on the Delete button.

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