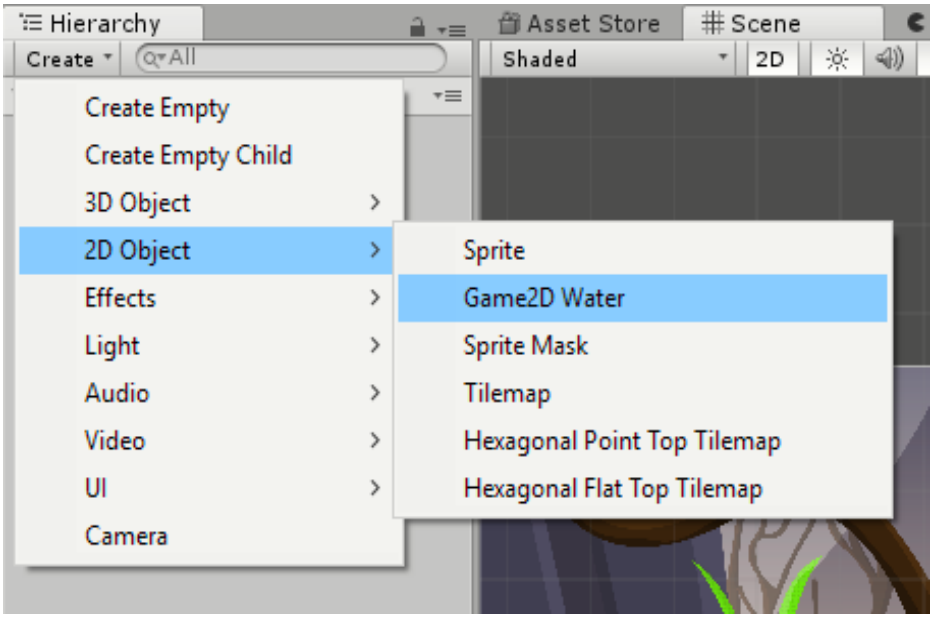
Game2D Water Kit v1.2 Documentation

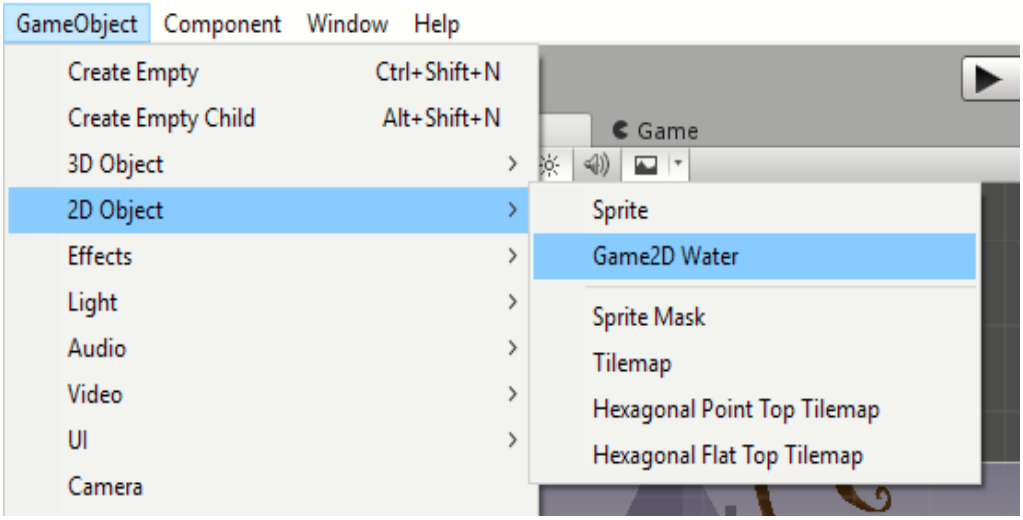
Getting Started:

You can simply create your 2D water:

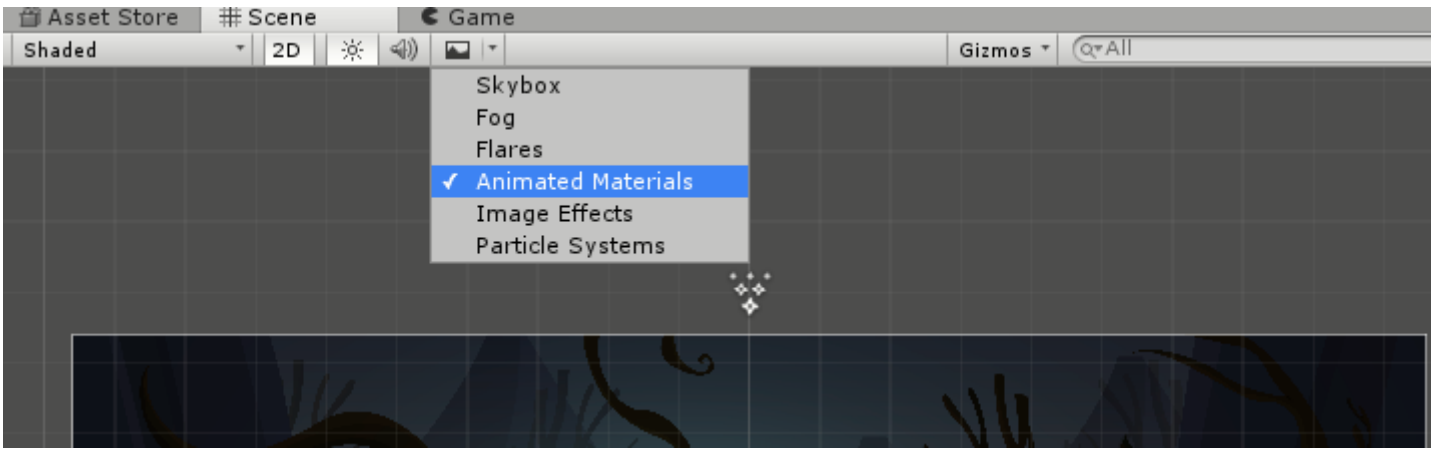
- From the hierarchy: **Create → 2D Object → Game2D Water**



- From the top menu: **GameObject → 2D Object → Game2D Water**



Initially the water has no refraction or reflection enabled. Those can be activated in the material editor. Make sure that “Animated Materials” is checked in order to visualize the water distortion effects in the scene view.



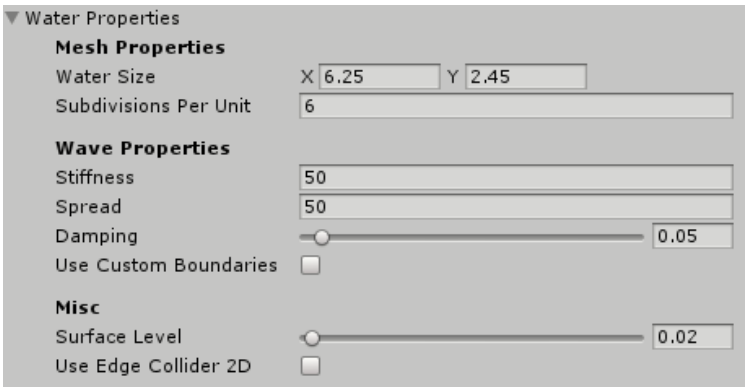
You can change the water size either in the inspector or by using the handles in the scene view.

That’s it! You just need to tweak the other parameters to customize the feel and look of your 2D water. Have fun!

Any suggestion would be greatly appreciated!

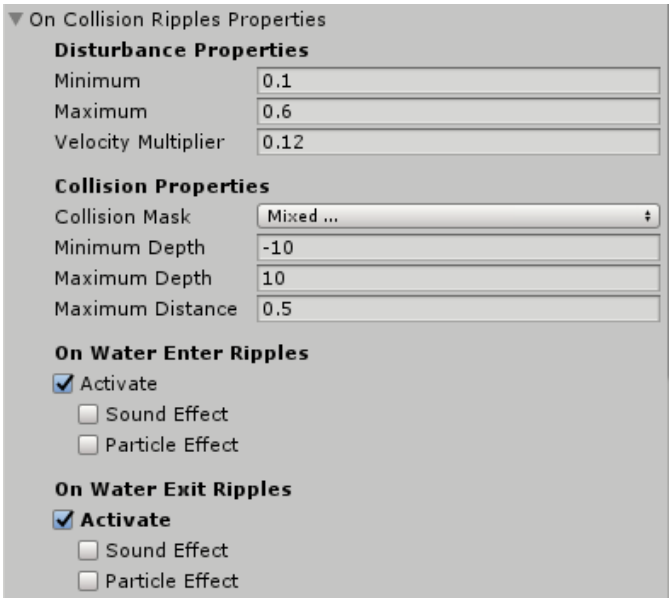
Game2D Water Script:

★ Water Properties:



- **Mesh Properties:**
  - **Water Size:** Sets the water size. X represents the width and Y represents the height.
  - **Subdivisions Per Unit:** Sets the number of water's surface vertices within one unit.
- **Wave Properties:**
  - **Stiffness:** Controls the frequency of wave vibration. A low value will make waves oscillate slowly, while a high value will make waves oscillate quickly.
  - **Spread:** Controls how fast the waves spread.
  - **Damping:** Controls how fast the waves decay. A low value will make waves oscillate for a long time, while a high value will make waves oscillate for a short time.
  - **Use Custom Boundaries:** Enables/Disables using custom wave boundaries. When waves reach a boundary, they bounce back.
    - **First Boundary:** The location of the first boundary.
    - **Second Boundary:** The location of the second boundary.
- **Misc:**
  - **Surface Level:** Sets the surface location of the buoyancy fluid. When a GameObject is above this line, no buoyancy forces are applied. When a GameObject is intersecting or completely below this line, buoyancy forces are applied.
  - **Use Edge Collider 2D:** Adds/Removes an EdgeCollider2D component. The water script takes care of updating the points of the edge collider whenever it is needed.

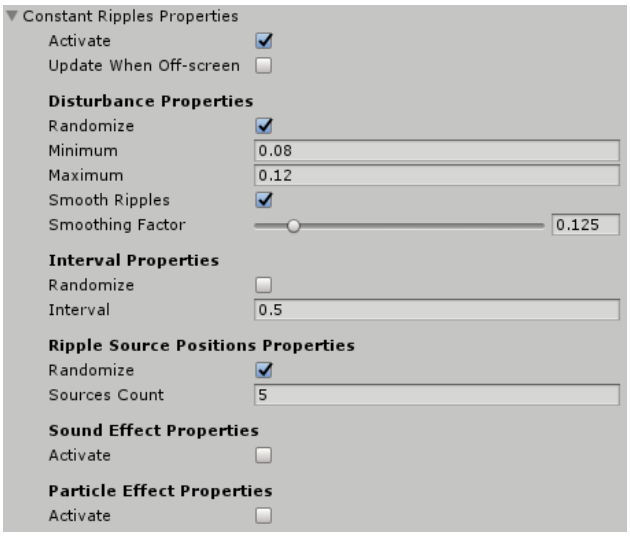
★ On Collision Ripples Properties:



- **Disturbance Properties:**
    - **Minimum:** The minimum displacement of water's surface.
    - **Maximum:** The maximum displacement of water's surface.
    - **Velocity Multiplier:** When a GameObject falls into water or leaves the water, the amount of water's surface displacement is determined by multiplying the GameObject's rigidbody velocity by this factor.
- **Collision Properties:**
    - **Collision Mask:** Only GameObjects on these layers will disturb the water's surface.
    - **Minimum Depth:** Only GameObjects with Z coordinate (depth) greater than or equal to this value will disturb the water's surface.
    - **Maximum Depth:** Only GameObjects with Z coordinate (depth) less than or equal to this value will disturb the water's surface.
    - **Maximum Distance:** The maximum distance from the water's surface over which to check for collisions (Default: 0.5)
- **On Water Enter Ripples:**
    - **Activate:** Activates/Deactivates generating ripples when a GameObject falls into water.
    - **Sound Effect Properties:**
        - **Activate:** Activates/Deactivates playing the sound effect when a GameObject falls into water.
        - **Audio Clip:** The AudioClip asset to play when a GameObject falls into water.
        - **Pool Size:** The number of audio sources objects that will be created and pooled when the game starts.
        - **Expand If Necessary:** Enables/Disables increasing the number of pooled objects at runtime if needed.
        - **Volume:** Sets the audio clip's volume.
        - **Constant Pitch:** Apply constant audio clip playback speed.
            - **Pitch:** Sets the audio clip's playback speed. (when Constant Pitch is selected)
            - **Minimum Pitch:** Sets the audio clip's minimum playback speed. (when constant pitch is deselected)
            - **Maximum Pitch:** Sets the audio clip's maximum playback speed. (when constant pitch is deselected)
    - **Particle Effect Properties:**
        - **Activate:** Activates/Deactivates playing the particle effect when a GameObject falls into water.
        - **Particle System:** Sets the particle system to play when a GameObject falls into water.
        - **Pool Size:** The number of particle systems objects that will be created and pooled when the game starts.
        - **Expand If Necessary:** Enables/Disables increasing the number of pooled particle systems objects at runtime if needed.
        - **Spawn Offset:** Shifts the particle system object spawn position.
        - **Stop Action:** UnityEvent that is triggered when the particle system stops playing.
- **On Water Exit Ripples:**
    - **Activate:** Activates/Deactivates generating ripples when a GameObject leaves the water.
    - **Sound Effect Properties:**
        - **Activate:** Activates/Deactivates playing the sound effect when a GameObject

leaves the water.
        - **Audio Clip:** The AudioClip asset to play when a GameObject leaves the water.
        - **Pool Size:** The number of audio sources objects that will be created and pooled when the game starts.
        - **Expand If Necessary:** Enables/Disables increasing the number of pooled objects at runtime if needed.
        - **Volume:** Sets the audio clip's volume.
        - **Constant Pitch:** Apply constant audio clip playback speed.
            - **Pitch:** Sets the audio clip's playback speed. (when Constant Pitch is selected)
            - **Minimum Pitch:** Sets the audio clip's minimum playback speed. (when constant pitch is deselected)
            - **Maximum Pitch:** Sets the audio clip's maximum playback speed. (when constant pitch is deselected)
    - **Particle Effect Properties:**
        - **Activate:** Activates/Deactivates playing the particle effect when a GameObject leaves the water.
        - **Particle System:** Sets the particle system to play when a GameObject leaves the water..
        - **Pool Size:** The number of particle systems objects that will be created and pooled when the game starts.
        - **Expand If Necessary:** Enables/Disables increasing the number of pooled particle systems objects at runtime if needed.
        - **Spawn Offset:** Shifts the particle system object spawn position.
        - **Stop Action:** UnityEvent that is triggered when the particle system stops playing.

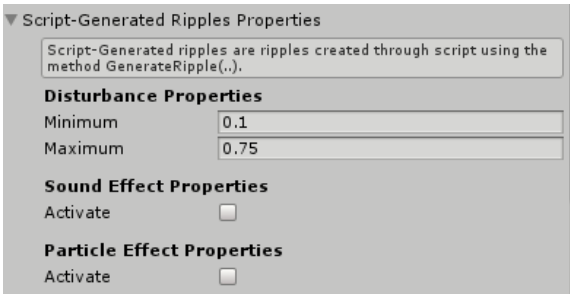
★ Constant Ripples Properties:



- **Activate:** Activates/Deactivates generating constant ripples at regular intervals.
- **Update When off-screen:** Generate constant ripples even when the water is invisible to the camera.
- **Disturbance Properties:**
    - **Disturbance:** Sets the displacement of water's surface when generating constant ripples.
    - **Randomize:** Randomize the disturbance (displacement) of water's surface.

    - **Minimum:** Sets the minimum displacement of water's surface.
    - **Maximum:** Sets the maximum displacement of water's surface.
    - **Smooth Ripples:** Disturb neighbor vertices to create a smoother ripple (wave).
    - **Smoothing Factor:** The amount of disturbance to apply to neighbor vertices.
- **Interval Properties:**
    - **Interval:** Generate constant ripples at regular intervals (in seconds).
    - **Randomize:** Randomize the interval.
    - **Minimum:** Minimum interval.
    - **Maximum:** Maximum interval.
- **Ripples Sources Positions Properties:**
    - **Randomize:** Randomize constant ripples sources positions.
    - **Sources Count:** Sets the number of constant ripples sources.
    - **Allow Duplicate Positions:** Allow generating on the same frame and in the same position multiple constant ripples.
    - **Edit Positions:** Edit constant ripples sources positions when "Randomize" positions is switched off.
- **Sound Effect Properties:**
    - **Activate:** Activates/Deactivates playing the sound effect when generating constant ripples.
    - **Audio Clip:** The AudioClip asset to play when generating constant ripples.
    - **Pool Size:** The number of audio sources objects that will be created and pooled when the game starts.
    - **Expand If Necessary:** Enables/Disables increasing the number of pooled audio sources objects at runtime if needed.
    - **Volume:** Sets the audio clip's volume.
    - **Constant Pitch:** Apply constant audio clip playback speed.
        - **Pitch:** Sets the audio clip's playback speed. (when constant pitch is selected)
        - **Minimum Pitch:** Sets the audio clip's minimum playback speed. (when constant pitch is deselected)
        - **Maximum Pitch:** Sets the audio clip's maximum playback speed. (when constant pitch is deselected)
- **Particle Effect Properties:**
    - **Activate:** Activates/Deactivates playing the particle effect when generating constant ripples.
    - **Particle System:** Sets the particle system to play when generating constant ripples.
    - **Pool Size:** The number of particle systems objects that will be created and pooled when the game starts.
    - **Expand If Necessary:** Enables/Disables increasing the number of pooled particle systems objects at runtime if needed.
    - **Spawn Offset:** Shifts the particle system spawn position.
    - **Stop Action:** UnityEvent that is triggered when the particle system stops playing.

★ Script-Generated Ripples Properties:

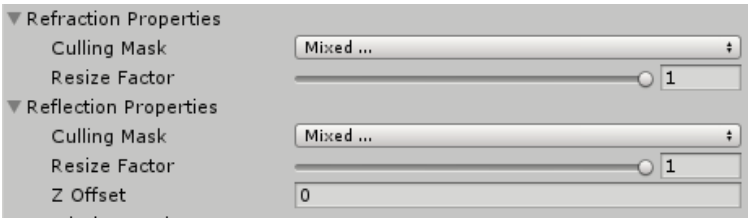


- **Disturbance Properties:**
  - **Minimum:** Sets the minimum displacement of water's surface when generating ripples.
  - **Maximum:** Sets the maximum displacement of water's surface when generating ripples.
- **Sound Effect Properties:**
  - **Activate:** Activates/Deactivates playing the sound effect when generating ripples.
  - **Audio Clip:** The AudioClip asset to play when generating ripples.
  - **Pool Size:** The number of audio sources objects that will be created and pooled when the game starts.
  - **Expand If Necessary:** Enables/Disables increasing the number of pooled audio sources objects at runtime if needed.
  - **Volume:** Sets the audio clip's volume.
  - **Constant Pitch:** Apply constant audio clip playback speed.
    - **Pitch:** Sets the audio clip's playback speed. (when constant pitch is selected)
    - **Minimum Pitch:** Sets the audio clip's minimum playback speed. (when constant pitch is deselected)
    - **Maximum Pitch:** Sets the audio clip's maximum playback speed. (when constant pitch is deselected)
- **Particle Effect Properties:**
  - **Activate:** Activate/Deactivate playing the particle effect when generating ripples.
  - **Particle System:** Sets the particle effect system to play when generating ripples.
  - **Pool Size:** The number of particle systems objects that will be created and pooled when the game starts.
  - **Expand If Necessary:** Enables/Disables increasing the number of pooled particles systems objects at runtime if needed.
  - **Spawn Offset:** Shifts the particle system spawn position.
  - **Stop Action:** UnityEvent that is triggered when the particle system stops playing.

You can generate a ripple in a specific position using the method:

- `GenerateRipple(position, disturbanceFactor, playSound, playParticleEffect, /, smoothingFactor)`
  - **position [Vector2]:** The position where to generate the ripple.
  - **disturbanceFactor [float]:** Range: [-1..1]: The disturbance is linearly interpolated between the minimum disturbance and the maximum disturbance by this factor's absolute value. For values > 0, the water's surface will be pulled down then up (as if an object was falling into water). For values < 0, the water's surface will be pulled up then down.
  - **playSound [bool]:** Play the sound effect.
  - **playParticleEffect [bool]:** Play the particle Effect.
  - **Smooth [bool]:** Disturb neighbor vertices to create a smoother ripple.
  - **SmoothingFactor [float]:** Range: [0..1]: The amount of disturbance to apply to neighbor vertices.

★ Refraction & Reflection Properties:



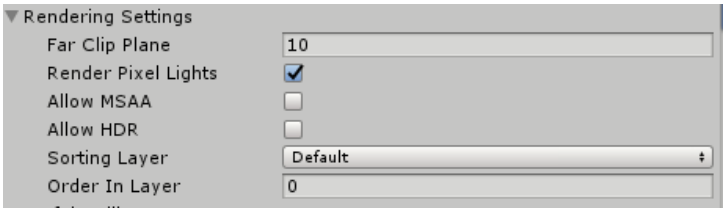
- **Culling Mask:** Only GameObjects on these layers will be rendered.
- **Resize Factor:** Specifies how much the RenderTexture used to render refraction and/or

reflection is resized. Decreasing this value lowers the RenderTexture resolution and thus improves performance at the expense of visual quality.

- **Z Offset:** (Reflection Only) Controls where to start rendering reflection relative to the water GameObject position.

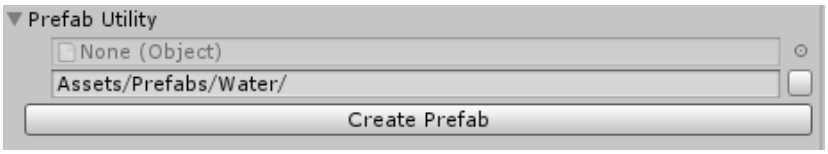
Note: *When rendering refraction and/or reflection, only the visible part of the water is rendered for the sake of better performance!*

★ Rendering Settings:



- **Far Clip Plane:** Sets the furthest point relative to the water that will be drawn when rendering refraction and/or reflection.
- **Render Pixel Lights:** Controls whether the rendered objects will be affected by pixel lights. Disabling this parameter could increase performance at the expense of visual fidelity.
- **Allow MSAA:** Allow multisample antialiasing rendering.
- **Allow HDR:** Allow high dynamic range rendering.
- **Sorting Layer:** The name of the water mesh renderer sorting layer.
- **Order In Layer:** The water mesh renderer order within a sorting layer.

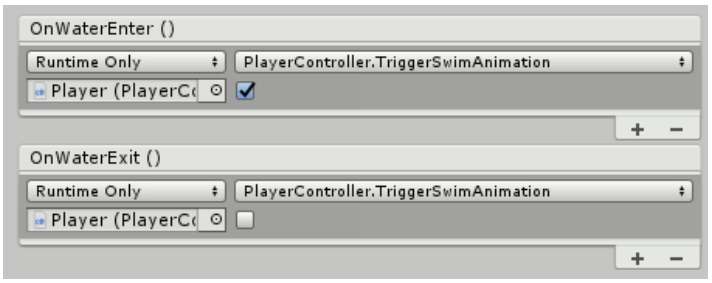
★ Prefab Utility:



- **Prefabs Path:** Specifies the prefabs destination path.
- **Create Prefab:** Creates a prefab in the specified path.
- **Unlink Prefab:** Breaks the prefab connection.
- **Relink Prefab:** Restores the prefab connection.

Note: *As of Unity 2018.3, disconnecting (unlinking) and relinking a Prefab instance are no longer supported. Alternatively, you can now unpack a Prefab instance if you want to entirely remove its link to its Prefab asset and thus be able to restructure the resulting plain GameObject as you please.*

★ OnWaterEnter & OnWaterExit Events



- Only GameObjects on the collision mask layers (set in the “On Collision Properties” section) will trigger these Unity Events when they enter/exit the water.

★ Important notes:

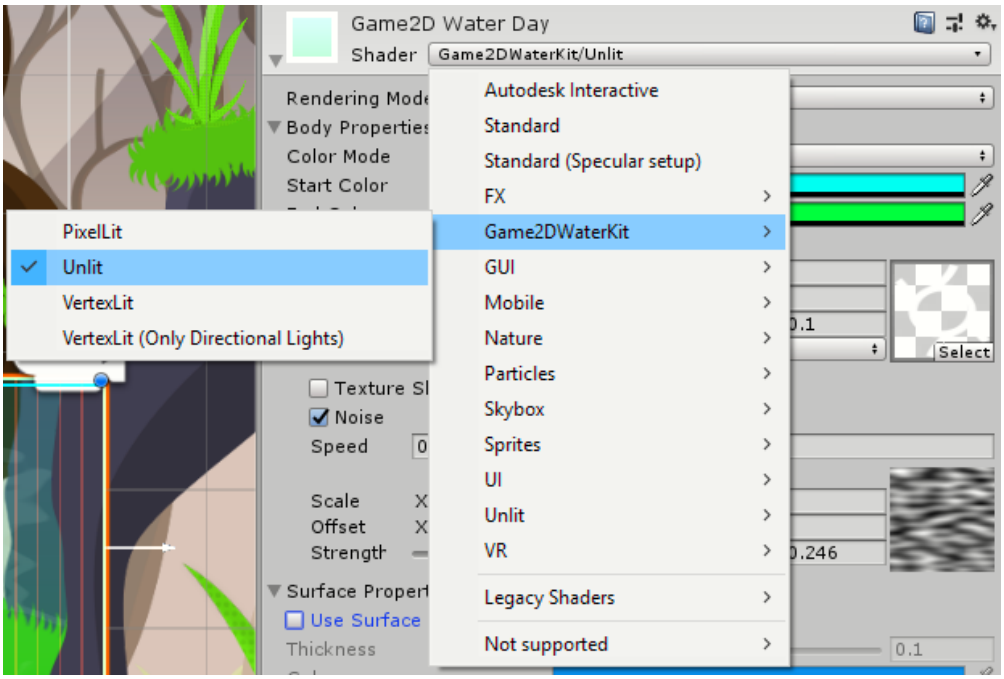
- ❏ Refraction and reflection only work with orthographic cameras.
- ❏ Skyboxes are not rendered when rendering refraction and/or reflection.
- ❏ Lens Flares are not visible when rendering refraction and/or reflection.
- ❏ Refraction and reflection may not work correctly when the water GameObject is marked as Batching Static.

Game2D Water Material Editor:

★ An overview:

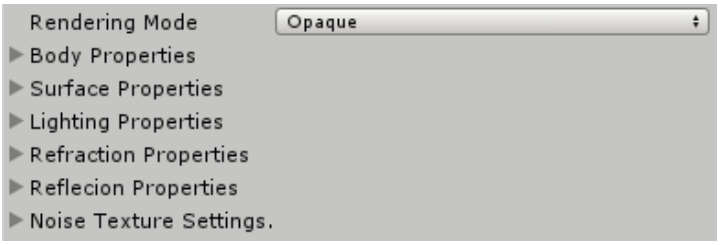
This asset comes with four optimized “Uber” shaders:

- Unlit
- VertexLit (Only Directional Lights And Supports Lightmaps)
- VertexLit (Supports Lightmaps)
- PixelLit (Supports Lightmaps)



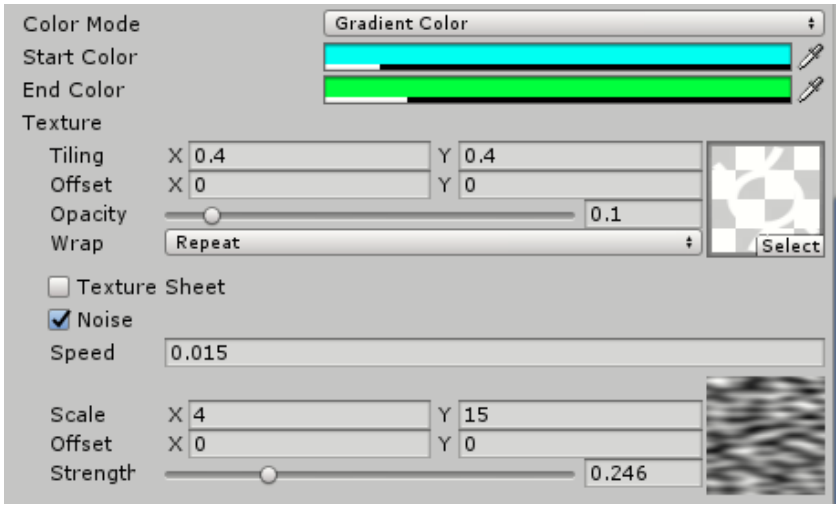
- The Unlit shader is the fastest, no realtime lighting calculations are done.
- The VertexLit shaders are cheaper than the PixelLit shader.
- When using VertexLit shaders, all lights are rendered in a single pass and calculated at water mesh vertices only.
- When using PixelLit shader, light is calculated at each pixel that is drawn and each light is rendered in its own pass. Thus, the water GameObject may have to be drawn more than once.
- The PixelLit shader comes at performance cost and it’s not recommended to use it on mobile platforms.
- These shaders come with various features that are enabled or disabled by simply using or not using the texture slots and parameters in the material editor, so the unused shader functions are discarded at runtime automatically with no extra computing overhead.

★ Material Editor:



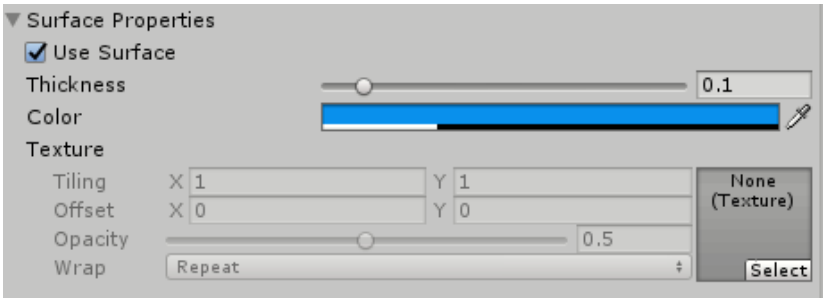
- **Rendering Mode:** Sets the rendering mode to either Opaque or Transparent. Refraction and reflection are not available when the rendering mode is set to Transparent.

★ Water Body Properties:



- **Color Mode:** Controls whether the water's body is tinted with a Solid Color or a Gradient Color.
  - **Color:** Sets the water's color when Color Mode is set to Solid Color.
  - **Start Color:** Sets the first color used to generate the gradient color when Color Mode is set to Gradient Color.
  - **End Color:** Sets the second color used to generate the gradient color when Color Mode is set to Gradient Color.
- **Texture:** The texture image applied over the water's body.
  - **Texture Sheet:** Specifies that the provided texture consist of smaller images (animation frames).
    - **Lerp:** Interpolate between successive texture sheet frames.
    - **Frames Per Second:** The number of frames to play per second.
    - **Columns:** The number of the texture sheet columns.
    - **Rows:** The number of the texture sheet columns.

★ Water Surface Properties:



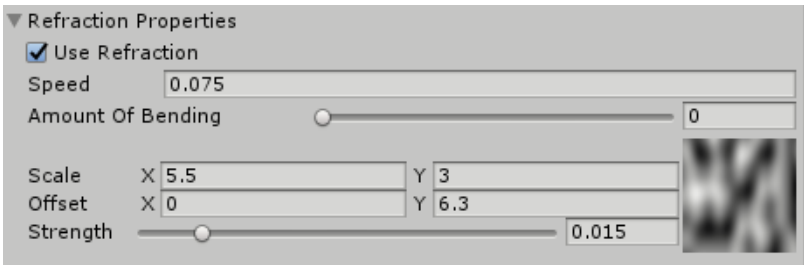
- **Use Surface:** Enables/Disables rendering the water's surface.
- **Thickness:** Sets the water's surface thickness.
- **Color:** Sets the color of the water's surface.
- **Texture:** The texture image applied over the water's surface.
  - **Texture Sheet:** Specifies that the provided texture consist of smaller images (animation frames).
    - **Lerp:** Interpolate between successive texture sheet frames.
    - **Frames Per Second:** The number of frames to play per second.
    - **Columns:** The number of the texture sheet columns.
    - **Rows:** The number of the texture sheet columns.

★ Lighting Properties:

- **Activate Emission:** Activates/Deactivates adjusting the brightness of the water.
- **Emission Color**: Sets the emission color.
- **Emission Intensity:** Sets the brightness level.

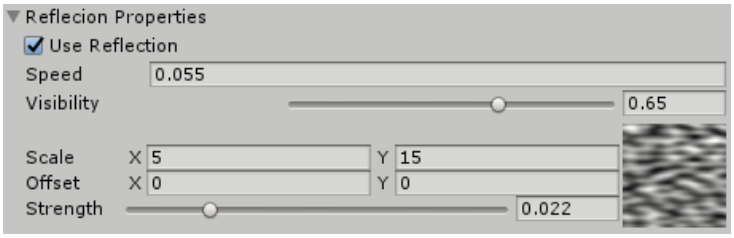
Note: *Currently, the water object appears as self-illuminated but it does not act as an actual source of light (It does not affect other surrounding objects).*

★ Water Refraction Properties:



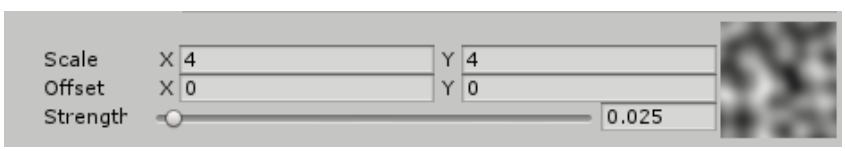
- **Use Refraction:** Enables/Disables water refraction.
- **Speed**: Sets the refraction noise texture scroll speed.
- **Amount Of Bending:** Controls how much the portion of the GameObject above the water is shifted relative to the other portion's image under the water.

★ Water Reflection Properties:



- **Use Reflection:** Enables/Disables water reflection.
- **Speed:** Sets the reflection noise texture scroll speed.
- **Visibility:** Controls the visibility of the reflection when both reflection and refraction are enabled.

★ Noise texture generation parameters:



- **Scale:** Sets the noise scale in x and y axes.
- **Offset:** Sets the noise offset in x and y axes.
- **Strength:** Sets the strength of the distortion.

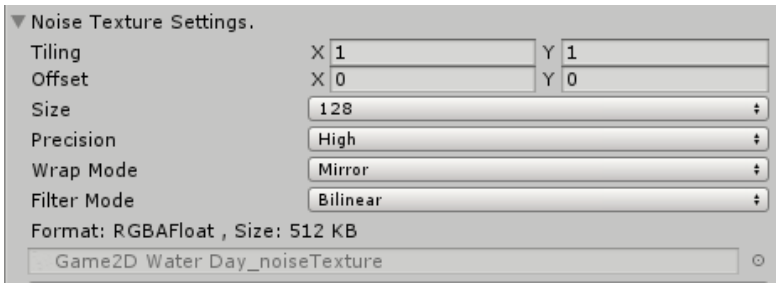
The distortion effect is achieved using a Perlin noise texture. The distortion effect could be applied to:

- The water's body texture.
- The water's surface texture.
- Refraction render texture.
- Reflection render texture.

To save memory bandwidth, only one noise texture is generated:

- The alpha color channel stores the distortion information for the water's body texture.
- The green color channel stores the distortion information for the water's surface texture.
- The blue color channel stores the distortion information for the reflection render texture.
- The red color channel stores the distortion information for the refraction render texture.

★ Noise texture settings:



- **Tiling:** Sets the noise texture tiling.
- **Offset:** Sets the noise texture offset.
- **Size:** Sets the noise texture size.
- **Precision:** Sets the noise texture's data type precision.
  - **Low:** 8 bits per channel (Fixed).
  - **Medium:** 16 bits per channel (Half).
  - **High:** 32 bits per channel (Float).
- **Wrap Mode:** Sets the noise texture's wrap mode to Repeat or Mirror.
- **Filter Mode:** Sets the noise texture's filter mode to Point, Bilinear or Trilinear.

Note: *The Wrap Mode field is only available in Unity version 2017.x or newer. Unity versions prior to 2017.x don't support setting texture wrap mode to Mirror, and thus the noise texture wrap mode is always set to Repeat in those versions.*