This problem can be solved by various methods (Biot-Savart formula, Stokes theorem, etc.).

Since the only nonzero component of magnetic field is \( B_y \), which changes sign with \( z \):

\[
B_y(z) = -B_y(-z),
\]

we can select a contour \( C \) as shown in the figure and find (\( z < a \))

\[
2B_y(z) \cdot L = 2L \mu_0 \int_0^z \frac{z'^2}{a^2} dz' + \frac{z}{a^2} = \frac{2L \mu_0 j_0}{3a^2} z^3
\]

Similarly, for \( z > a \):

\[
2B_y(z) \cdot L = 2L \mu_0 \int_0^a \frac{z'^2}{a^2} dz' = \frac{2L \mu_0 j_0 a}{3}
\]

Thus,

\[
B_y(z > 0) = \begin{cases} 
\frac{\mu_0 j_0}{3} \frac{z^3}{a^2}, & z < a, \\
\frac{\mu_0 j_0}{3} \frac{a}{a}, & z > a.
\end{cases}
\]
According to Eq. (5.35) the part $AB$ gives the contribution (direction down)

$$B_{AB} = \frac{\mu_0 I}{4\pi d/2} \left(1 + \frac{1}{r^2}\right)$$

The horizontal part of the wire gives simply a half of the field of an infinite wire (note "-" sign denoting direction — up)

$$B_{BC} = -\frac{\mu_0 I}{4\pi d}$$

$$B_{tot} = B_{AB} + B_{BC} = \frac{\mu_0 I}{2\pi \frac{d}{2}}$$

Only circular parts of the loop give non-zero contributions. Each is equal to $\frac{1}{4}$ of the field produced by a full closed loop, Eq. (5.38)

The two contributions are of opposite direction, with the inner part giving the bigger one:

$$B_p = \frac{\mu_0 I}{8} \left(\frac{1}{a} - \frac{1}{b}\right)$$

(direction shown in the picture)
The resulting field is a sum of two (equal) contributions of the semi-infinite wires and one semi-circle:

\[ B_p = 2 \times \frac{M_0 I}{4\pi R} + \frac{M_0 I}{4R} = \frac{M_0 I}{4\pi R} (2+\pi) \]

All three contributions have the same direction.